

**U. S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS**

**REPORT OF THE
THIRTIETH NATIONAL CONFERENCE
ON
WEIGHTS AND MEASURES**

**ATTENDED BY REPRESENTATIVES
FROM VARIOUS STATES**

**HELD AT THE NATIONAL BUREAU OF STANDARDS
WASHINGTON, D. C., JUNE 4, 5, 6, AND 7, 1940**

MISCELLANEOUS PUBLICATION M167



U. S. DEPARTMENT OF COMMERCE
JESSE H. JONES, Secretary
NATIONAL BUREAU OF STANDARDS
LYMAN J. BRIGGS, Director

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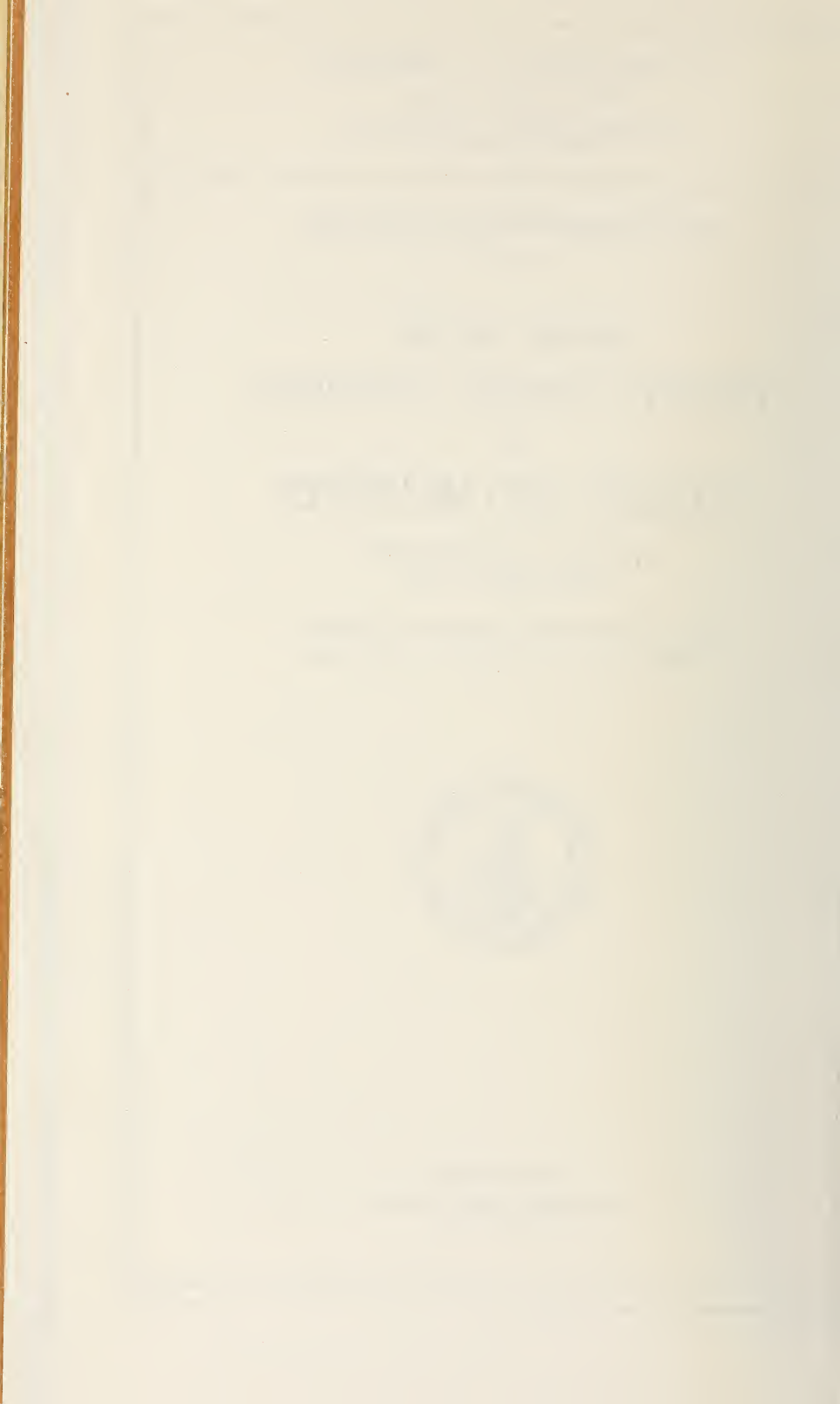
HELD AT THE NATIONAL BUREAU OF STANDARDS
WASHINGTON, D. C., JUNE 4, 5, 6, AND 7, 1940



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Official photograph of delegates and guests attending the Thirtieth National Conference on Weights and Measures, assembled at the entrance of the East Building, National Bureau of Standards.



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Vice Presidents:

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(As elected by Thirtieth National Conference)

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 JAMES O'KEEFE, Sealer of Weights and Measures, Chicago, Ill.
 C. E. TUCKER, Chief, State Bureau of Weights and Measures, Sacramento, Calif.
 GEORGE WARNER, Chief Inspector, State Division of Weights and Measures,
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¹ Mr. Hammon retired temporarily from weights and measures work, and was replaced on the Committee by C. E. TUCKER. Mr. Hammon later returned to office as a weights and measures official.

COMMITTEE ON PUBLICITY AND EDUCATION¹

W. S. BUSSEY, Chief, State Division of Weights and Measures, Austin, Tex., Chairman.

I. G. BOUTELL, National Bureau of Standards, Washington, D. C.

M. A. HUBBARD, State Supervisor of Weights and Measures, Richmond, Va.

A. J. JENSEN, Chief State Inspector of Weights and Measures, Jamestown, N. D.

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A. EDWARD SNYDER, Inspector of Weights and Measures, Terre Haute, Ind.

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JOHN J. LEVITT, State Superintendent of Standards, Springfield, Ill.

ALEX PISCIOTTA, Director, Bureau of Weights and Measures, New York, N. Y.

GEORGE M. ROBERTS, Superintendent of Weights, Measures, and Markets, Washington, D. C.

LOUIS G. WALDMAN, Commissioner of Weights and Measures, St. Louis, Mo.

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ALEX PISCIOTTA, Director, Bureau of Weights and Measures, New York, N. Y., Chairman.

V. D. CAMPBELL, Deputy State Sealer, Columbus, Ohio.

M. A. HUBBARD, State Supervisor of Weights and Measures, Richmond, Va.

JOSEPH G. ROGERS, Assistant State Superintendent of Weights and Measures, Trenton, N. J.

C. E. TUCKER, Chief, State Bureau of Weights and Measures, Sacramento, Calif.

JAMES O'KEEFE, Sealer of Weights and Measures, Chicago, Ill.

LOUIS G. WALDMAN, Commissioner of Weights and Measures, St. Louis, Mo.

ACTING COMMITTEES FOR THE THIRTIETH NATIONAL CONFERENCE

Committee on Nominations. JOSEPH G. ROGERS, of New Jersey, Chairman; HOWARD E. CRAWFORD, of Jacksonville, Fla.; R. L. FULLEN, of Dallas, Tex.; M. A. HARRINGTON, of New York, N. Y.; G. K. HEATH, of Maine⁴; JOHN J. LEVITT, of Illinois; TOM WEBB, of Nashville, Tenn.

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In Charge of Registrations: MISS H. C. GUNDERSON.

¹ By action of the Thirtieth National Conference the name of this committee was changed to Committee on Weights and Measures Education.

² This committee was authorized by the Thirtieth National Conference, and the membership was announced by the President of the Conference during the seventh session.

⁴ JAMES A. BOYLE, of Portland, Me., served on the Committee as alternate for G. K. HEATH.

PERSONS ATTENDING THE CONFERENCE **DELEGATES—STATE, CITY, AND COUNTY OFFICIALS**

ALABAMA

City: Birmingham..... R. M. JOHNSON, Inspector of Weights and Measures, 425 City Hall.

CALIFORNIA

State..... C. E. TUCKER, Chief, Bureau of Weights and Measures, State Building, Sacramento.
 County: Los Angeles..... CHARLES M. FULLER, Sealer of Weights and Measures, 501 New High Street, Los Angeles.

CONNECTICUT

State..... CARLTON L. KLOCKER, Inspector of Weights and Measures, 100 Washington Street, Hartford.
 City: Hartford..... THOMAS F. RICE, Deputy Sealer of Weights and Measures, Municipal Building.
 County: Hartford..... M. C. GRIFFIN, Sealer of Weights and Measures, 95 Washington Street, Hartford.

DISTRICT OF COLUMBIA

District..... GEORGE M. ROBERTS, Superintendent of Weights, Measures, and Markets, 301 Sixth Street, Washington.

FLORIDA

City:
 Jacksonville..... HOWARD E. CRAWFORD, Inspector of Weights and Measures, Utilities Building.
 Miami..... G. L. ASH, Director of Public Welfare, 820 County Court House.
 H. E. HOWARD, Chief Inspector of Weights and Measures, City Hall.

GEORGIA

City: Atlanta..... W. P. REED, Inspector of Weights and Measures, Police Headquarters.
 County: Fulton..... A. A. STOVALL, Inspector of Weights and Measures, 301 Court House, Atlanta.

ILLINOIS

State..... JOHN J. LEVITT, Superintendent of Standards, Armory Building, Springfield.
 City: Chicago..... JAMES O'KEEFE, Sealer of Weights and Measures, 608 City Hall.

INDIANA

State..... ROLLIN E. MEEK, Chief, Bureau of Weights and Measures, State House Annex, Indianapolis.
 City:
 Gary..... CLEO C. MORGAN, Sealer of Weights and Measures, City Hall.
 Indianapolis..... THOMAS E. TARPEY, Inspector of Weights and Measures, Room 2, City Hall.
 Terre Haute..... A. EDWARD SNYDER, Inspector of Weights and Measures, City Hall.

MAINE

State-----	G. K. HEATH, Deputy Sealer of Weights and Measures, State House, Augusta.
City:	
Portland-----	JAMES A. BOYLE, Sealer of Weights and Measures, City Building.
Waterville-----	WILLIAM A. JONES, Sealer of Weights and Measures, City Hall.

MARYLAND

City: Baltimore-----	S. T. GRIFFITH, Chief, Division of Weights and Measures, 1106 Municipal Building. CHARLES G. CROCKETT, Inspector of Weights and Measures, 1106 Municipal Building. JOHN R. GRAEFF, Inspector of Weights and Measures, 1106 Municipal Building. GEORGE H. LEITHAUSER, Inspector of Weights and Measures, 1106 Municipal Building. THOMAS J. NAPFEL, Inspector of Weights and Measures, 1106 Municipal Building. ELMER E. NICHOLSON, Inspector of Weights and Measures, 1106 Municipal Building. FRED J. O'GORMAN, Inspector of Weights and Measures, 1106 Municipal Building. ELMER S. PIERPONT, Inspector of Weights and Measures, 1106 Municipal Building. HENRY J. SLITZER, Inspector of Weights and Measures, 1106 Municipal Building.
County:	
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Washington-----	CHARLES E. BREZLER, Inspector of Weights and Measures, 432 North Prospect Street, Hagerstown.

MASSACHUSETTS

State-----	JOHN P. MCBRIDE, Director of Standards and Necessaries of Life, Room 194, State House, Boston.
City:	
Arlington-----	ALLAN E. COWIE, Sealer of Weights and Measures, Town Hall.
Belmont }-----	RALPH E. CHADWICK, Sealer of Weights and Measures, 67 Orchard Street, Belmont.
Lexington }	
Revere-----	PETER F. CONLEY, Sealer of Weights and Measures.
Springfield-----	CARL E. HAWKINS, Sealer of Weights and Measures, Administration Building.
Taunton-----	E. C. WARD, Sealer of Weights and Measures, City Hall.

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State-----	GLENN W. DAVIS, Director, Bureau of Foods and Standards, Lansing.
City:	
Detroit-----	GEORGE F. AUSTIN, Jr., Supervising Inspector of Weights and Measures, 740 Elmwood Avenue.
Highland Park-----	MANON L. FOWLER, Sealer of Weights and Measures, 25 Gerald Avenue.
Lansing-----	CHARLES T. QUINN, Sealer of Weights and Measures, City Market.

MINNESOTA

City: Minneapolis..... RUSSELL S. ACKERMAN, Superintendent, Department of Licenses, Weights, and Measures, Room 3, City Hall.

MISSOURI

City: St. Louis..... LOUIS G. WALDMAN, Commissioner of Weights and Measures, Room 12, City Hall.

NEW JERSEY

State..... CHARLES C. READ, Superintendent of Weights and Measures, 187 West Hanover Street, Trenton.

JOSEPH G. ROGERS, Assistant Superintendent and Secretary, Department of Weights and Measures, 187 West Hanover Street, Trenton.

ROWLAND K. BODENWIESER, Assistant Superintendent of Weights and Measures, 187 West Hanover Street, Trenton.

ARCHIE T. SMITH, Assistant Superintendent of Weights and Measures, 187 West Hanover Street, Trenton.

SAMUEL H. CHRISTIE, Jr., Inspector of Weights and Measures, 187 West Hanover Street, Trenton.

City:

Camden..... HENRY W. AITKEN, Superintendent of Weights and Measures, City Hall.

ALBERT C. BECKER, Assistant Superintendent of Weights and Measures, City Hall.

Clifton..... GARRET H. DEVRIES, Superintendent of Weights and Measures, City Hall.

Elizabeth..... WILLIAM J. BENDER, Superintendent of Weights and Measures, City Hall.

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Jersey City..... JOHN S. BURKE, Superintendent of Weights and Measures, City Hall.

Paterson..... JOSEPH P. LEONARD, Superintendent of Weights and Measures, 115 Van Houten Street.

Perth Amboy..... JOHN FARKAS, Jr., Superintendent of Weights and Measures, City Scales.

Trenton..... FRANCIS J. BLACK, Superintendent of Weights and Measures, 29 West Hanover Street.

Union City..... ALFRED O. OSLUND, Superintendent of Weights and Measures, City Hall.

County:

Atlantic..... WESLEY VAUGHN, Superintendent of Weights and Measures, 932 Central Avenue, Hammonton.

Bergen..... ALFRED F. BARNARD, Superintendent of Weights and Measures, 66 Zabriskie Street, Hackensack.

Burlington..... CLARENCE MATTIS, Assistant Superintendent of Weights and Measures, 34 Braniard Street, Mt. Holly.

Cape May..... GILBERT S. SMITH, Superintendent of Weights and Measures, Avalon.

Cumberland..... ALFRED LIRIO, Superintendent of Weights and Measures, Court House, Bridgeton.

Gloucester..... WILLIAM P. ABDILL, Superintendent of Weights and Measures, Woodbury.

Mercer..... RALPH M. BODENWEISER, Superintendent of Weights and Measures, Court House, Trenton.

Middlesex..... CHARLES H. ENGELHARD, Superintendent of Weights and Measures, County Offices, New Brunswick.

Monmouth.....	GLENN L. BERRY, Superintendent of Weights and Measures, 706 Eighth Avenue, Asbury Park.
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Sussex.....	R. LEE SLATER, Superintendent of Weights and Measures, Newton.
Union.....	JAMES M. DIETZ, Superintendent of Weights and Measures, Court House, Elizabeth.

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City:	
New York.....	ALEX PISCIOTTA, Director, Bureau of Weights and Measures, 139 Centre Street. MATTHIAS A. HARRINGTON, Chief Inspector, Bureau of Weights and Measures, 139 Centre Street.
Rochester.....	ANTHONY C. SAMENFINK, Sealer of Weights and Measures, 280 North Union Street.
County:	
Allegany.....	ALLEN W. CORWIN, Sealer of Weights and Measures, 21 Osborn Street, Wellsville.
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Nassau.....	ROBERT WILLIAMS, Sealer of Weights and Measures, Court House Annex, Mineola.
Suffolk.....	C. P. SMITH, Sealer of Weights and Measures, Room 20, Court House, Riverhead.

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State.....	C. D. BAUCOM, Superintendent of Weights and Measures, Raleigh. GEORGE S. TURNER, Inspector of Weights and Measures, Raleigh. H. L. SHANKLE, Chief, Gasoline and Oil Inspection Division, Department of Revenue, Box 1510, Raleigh.
City and County: Charlotte, and Mecklenburg County...	F. C. YARBROUGH, Inspector of Weights and Measures, 300 South Poplar Street, Charlotte.

NORTH DAKOTA

State.....	A. J. JENSEN, Chief Inspector of Weights and Measures, Jamestown.
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Reading-----	WILLIAM A. HIGH, Inspector of Weights and Measures, City Hall.
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Franklin-----	ROBERT I. OLIVER, Sealer of Weights and Measures, 1141 Scotland Avenue, Chambersburg.
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Lackawanna-----	P. F. MCINTYRE, Sealer of Weights and Measures, 1230 Monroe Avenue, Dunmore.
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Westmoreland-----	MERLE D. MUSICK, Chief Inspector of Weights and Measures, Court House, Greensburg.

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City: Nashville-----	TOM WEBB, Sealer of Weights and Measures, City Hall.
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City: Dallas-----	R. L. FULLEN, Chief, Division of Weights and Measures, 305 City Hall.

VERMONT

State-----	H. N. DAVIS, Supervisor, Division of Weights and Measures, Montpelier.
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VIRGINIA

State-----	J. H. MEEK, Director, Division of Markets, 1030 State Office Building, Richmond. M. A. HUBBARD, Supervisor of Weights and Measures, 1030 State Office Building, Richmond.
City:	
Newport News-----	H. G. TWYFORD, Sealer of Weights and Measures, Box 284.

Norfolk-----	H. V. LAYMAN, Assistant Sealer of Weights and Measures, New City Hall.
Richmond-----	B. W. RAGLAND, Chief, Bureau of Weights and Measures, City Hall Annex.
Staunton-----	C. F. HANGER, Sealer of Weights and Measures, City Hall.
County: Arlington-----	E. M. MORELAND, Sealer of Weights and Measures, County Court House, Arlington.

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State-----	EDWARD A. BROOKES, State Scale Inspector, 1815 Warwood Avenue, Wheeling.
County: Wood-----	S. A. MILLER, State Scale Inspector, Martinsburg.
	H. A. WATKINS, Sealer of Weights and Measures, Court House, Parkersburg.

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Wausau-----	A. K. MICHAELSON, Sealer of Weights and Measures, City Hall.

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R. W. SMITH, Assistant Chief.

H. S. BEAN, Chief, Section on Gas Measuring Instruments.

R. W. CROUCH, Jr., Physical Science Aid.

R. E. GOULD, Chief, Time Section.

L. V. JUDSON, Chief, Length Section.

C. R. LETZKUS, Chief Engineering Inspector (Scales).

D. R. MILLER, Chief, Section on Limit Gages.

E. L. PEPPER, Chief, Section on Capacity and Density.

A. T. PIENKOWSKY, Chief, Mass Section.

C. L. RICHARD, Technologist (Scales).

H. H. RUSSELL, Chief Engineering Inspector (Scales).

D. V. SMITH, Chief Engineering Inspector (Scales).

WILMER SOUDER Chief, Section on Thermal Expansivity, Dental Research, and Identification.

Division of Simplified Practice:

E. W. ELY, Chief.

W. E. BRAITHWAITE, Assistant Chief Business Specialist, Containers and Miscellaneous Products.

Division of Chemistry: E. R. WEAVER, Chief, Section on Gas Chemistry.

GUESTS REPRESENTING UNITED STATES GOVERNMENT

Department of Agriculture:

Agricultural Marketing Service:

C. A. BRIGGS, Weighing Engineer, Washington, D. C.

H. A. SPILLMAN, Senior Marketing Specialist, Washington, D. C.

Food and Drug Administration:⁵

W. S. FRISBIE, Chief, Division of State Cooperation, Washington, D. C.

SUMNER C. ROWE, Associate Chemist, Washington, D. C.

Post Office Department:

Equipment and Supplies Branch: J. C. MILLER, Skilled Draftsman, Washington, D. C.

⁵ Effective June 30 the Food and Drug Administration was transferred from the Department of Agriculture to the Federal Security Agency.

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Black & Decker Manufacturing Co.: E. E. POWELL, Manager, Loadometer Sales, Towson, Maryland.

Bowser, S. F., & Co. (Inc.):

E. C. MARSH, Vice President, Fort Wayne, Ind.

C. P. GRIFFITH, Chief Engineer, Fort Wayne, Ind.

Brodie, Ralph N., Co. (Inc.):

D. W. KINGSLEY, Eastern Manager, 425 Chrysler Building, New York, N. Y.

C. J. McCAFFREY, 425 Chrysler Building, New York, N. Y.

Chatillon, John, & Sons: PAUL T. BORTELL, Vice President, 89 Cliff Street, New York, N. Y.

Cincinnati Time Recorder Co.: ELMER G. STRECKFUSS, Factory Manager and Chief Engineer, 1733 Central Avenue, Cincinnati, Ohio.

Dayton Pump & Manufacturing Co.:

E. E. EICKMEYER, Vice President and General Manager, Dayton, Ohio.

K. M. BROWER, Sales Manager, Dayton, Ohio.

G. W. EICHHOFF, Eastern Manager, 441 Lexington Avenue, New York, N. Y.

A. G. HORVATH, Chief Engineer, Dayton, Ohio.

Erie Meter Systems (Inc.): L. R. OLSEN, Chief Engineer, P. O. Box 559, Erie, Pa.

Exact Weight Scale Co.:

THOMAS FLANAGAN, Plant Manager, 944 West 5th Avenue, Columbus, Ohio.

JAMES F. BALDWIN, 309 American Building, Baltimore, Md.

Fairbanks, Morse & Co.:

J. F. CRUIKSHANK, Sales Engineer, 600 South Michigan Avenue, Chicago, Ill.

W. C. GANTT, Scale Service Manager, 2010 Lovegrove Street, Baltimore, Md.

C. A. HENNIE, Government Scale Representative, 2010 Lovegrove Street, Baltimore, Md.

JEROME KENNEY, Sales Representative, 415 Normandy Avenue, Baltimore, Md.

F. E. TOWNSEND, Chief Draftsman, Scale Division, St. Johnsbury, Vt.

Gilbert & Barker Manufacturing Co.:

J. A. LOGAN, Manager, New Products & Patents Division, Springfield, Mass.

J. G. O'CONOR, Manager, Foreign Operations, Springfield, Mass.

Gurley, W. & L. E.:

ROBERT G. BETTS, Sales Representative, 514 Fulton Street, Troy, N. Y.

F. G. WILLIAMS, Washington Representative, 3616 Newark Street, Washington, D. C.

Hobart Manufacturing Co.: KENNETH C. ALLEN, Chief Engineer, Dayton Scale Division, Dayton, Ohio.

Howe Scale Co.:

C. A. LINDSAY, Special Representative, 1305 Euclid Street, Washington, D. C.

ELWOOD VROOME, Branch Manager, 111 8th Avenue, New York, N. Y.

WILLY JENSEN, Service Manager, 111 8th Avenue, New York, N. Y.

International Business Machines Corporation: L. S. SMITHERS, Special Representative, 590 Madison Avenue, New York, N. Y.

Jacobs Bros. Co. (Inc.): J. E. WOODLAND, Vice President and Sales Manager, Detectogram Division, 1 Main Street, Brooklyn, N. Y.

Kron Co.: RICHARD F. STRAW, President, Bridgeport, Conn.

Martin & Schwartz (Inc.): J. H. PRAUSE, Assistant to Vice President, Salisbury, Md.

National Meter Co.:

S. J. PASCUAL, Manager, Oil Meter Department, 4207 First Avenue, Brooklyn, N. Y.

RAYMOND H. BARGE, Development Engineer, 4207 First Avenue, Brooklyn, N. Y.

Neptune Meter Co.:

R. K. BLANCHARD, Vice President, 50 West Fiftieth Street, New York, N. Y.

WALTER H. SIEGER, Engineer, 50 West Fiftieth Street, New York, N. Y.

Peerless Weighing & Vending Machine Corporation: J. J. CROSBY, Sales Manager, 22-19 Forty-first Avenue, Long Island City, N. Y.

Pittsburgh Equitable Meter Co.:

H. I. BEARDSLEY, Manager, Oil & Gasolene Meter Division, 400 North Lexington Avenue, Pittsburgh, Pa.

CHARLES H. OBROCK, Jr., Sales Engineer, 50 Church Street, New York, N. Y.

EDWARD R. EYLER, Representative, 3801 Seven Mile Lane, Baltimore, Md.

Robinson Seal Co. (Inc.):

C. J. ROBINSON, Boston, Mass.

W. M. ROBINSON, Boston, Mass.

Schirmer-Dornbier Pump Co.: W. P. SCHIRMER, President, Cleveland, Ohio.

Seederer Kohlbusch (Inc.): J. E. SEEDERER, President, 149 New York Avenue, Jersey City, N. J.

Seraphin Test Measure Co.: THEO. A. SERAPHIN, President, 1314 North Seventh Street, Philadelphia, Pa.

Service Station Equipment Co.:

ERIC H. BRADLEY, Chief Engineer, Muskegon, Mich.

W. M. HOXIE, Muskegon, Mich.

H. F. KANITZ, Muskegon, Mich.

Spinks Scale Co.: J. M. SPINKS, Manager, 656 Mayland Avenue, S. W., Atlanta, Ga.

Standard Computing Scale Co.: W. TOM WHITE, Assistant Supervisor of Agencies, 2461 East Grand Boulevard, Detroit, Mich.

Stimpson Computing Scale Co.: W. F. STIMPSON, President, Louisville, Ky.

Streeter-Ames Co.:

HARRY M. ROESER, Manager of Sales & Service, 4101 Ravenswood Avenue, Chicago, Ill.

J. G. McCARTY, Field Engineer, 15731 Ardmore, Detroit, Mich.

Tokheim Oil Tank & Pump Co.: L. W. KOHLER, Sales Engineer, Fort Wayne, Ind.

Toledo Scale Co.:

STANLEY Q. BENNETT, Manager of Service and Weights & Measures Division, Toledo, Ohio.

LLOYD ELLINGWOOD, Advertising Manager, Toledo, Ohio.

H. WARREN HEM, Engineer, Toledo, Ohio.

V. V. RADIONOFF, District Sales Manager, 807 Rock Creek Church Road, Washington, D. C.

R. W. RIIS, 522 Fifth Avenue, New York, N. Y.

Triner Scale & Manufacturing Co.:

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JOHN E. EDGERTON, Representative, 1395 National Press Building, Washington, D. C.

FRANK A. LANG, Sales Representative, Chicago, Ill.

Veeder Root (Inc.): JOHN J. BRANNICK, Sales Representative, Hartford, Conn.

Wayne Pump Co.:

CHARLES C. NEALE, Manager, Weights and Measures Division, Fort Wayne, Ind.

M. C. BROWN, District Manager, 609 American Building, Baltimore, Md.

Wood, John, Manufacturing Co. (Inc.):

A. E. McKEEVER, Manager, Master Duplicator Division, 618 Capitol Avenue, Hartford, Conn.

BEN L. BEVERLY, District Manager, 122 East Forty-second Street, New York, N. Y.

Worthington-Gamon Meter Co.: HUBERT P. MATTE, Consulting Engineer, 296 South Street, Newark, N. J.

GUESTS REPRESENTING ASSOCIATIONS, BUSINESS AND INDUSTRY, RAILROADS, ETC.

American Can Co.:

F. F. FITZGERALD, Director of Research, 230 Park Avenue, New York, N. Y.

HENRY B. TOURTELLOT, 230 Park Avenue, New York, N. Y.

American Petroleum Institute, DAVID V. STROOP, Engineer, 50 West Fiftieth Street, New York, N. Y.

American Potash & Chemical Corporation: DONALD B. HYATT, Scale Inspector & Repairman, Box 106, Trona, Calif.

American Veneer Package Association: ROBERT W. DAVIS, Secretary & Engineer, 804 Seventeenth Street, N. W., Washington, D. C.

Association of American Railroads, Engineering Division: M. J. J. HARRISON, Pennsylvania Railroad, Altoona, Pa.

Baltimore & Ohio Railroad System: E. KENT LAWRENCE, General Scale Inspector, Baltimore, Md.

Bethlehem Steel Co.: HARRY MARCHANT, Scale Inspector, Sparrows Point, Md.

- Carbide & Carbon Chemical Corporation: THOMAS T. CROWELL, Washington, D. C.
- Chesapeake & Ohio Railway Co.: H. C. PROBST, Supervisor of Scales and Weighing, Richmond, Va.
- Gasoline Pump Manufacturers Association: G. DENNY MOORE, Managing Director, 420 Lexington Avenue, New York, N. Y.
- Glass Container Association: VICTOR L. HALL, Secretary, 19 West Forty-fourth Street, New York, N. Y.
- Great Northern Railway Co.: H. M. BATCHELLER, Scale Inspector, Great Northern Railway Passenger Depot, Room 204, Minneapolis, Minn.
- Home Makers Forum—(New York City): IRENE CASE NAMUR, R. R. 1, Chatham, N. J.
- Liquefied Petroleum Gas Association, Inc.: F. R. FETHERSTON, Secretary-Treasurer, 11 West Forty-second Street, New York, N. Y.
- Lockport Cotton Batting Co.: RICHARD M. ARCHIBALD, Lockport, N. Y.
- Michigan Association of Weights and Measures Officials: ARTHUR J. WILHELM, 2444 Andrus Street, Hamtramck, Mich.
- National Canners Association:
E. J. CAMERON, Research Director, 1739 H Street, N. W., Washington, D. C.
CARLOS CAMPBELL, Director, Division of Statistics, 1739 H Street, N. W., Washington, D. C.
- National Scale Men's Association: J. G. McCARTY, President, 15731 Ardmore Street, Detroit, Mich.
- New York Produce Exchange: J. B. PAIGE, General Scale Inspector, 2 Broadway, New York, N. Y.
- Norfolk & Western Railway Co.: C. H. RODENISER, General Scale Inspector, Roanoke, Va.
- Owens-Illinois Glass Co.: J. D. LAIRD, Supervisor of Specifications, Toledo, Ohio.
- Pennsylvania Railroad: M. J. J. HARRISON, Supervisor of Scales and Weighing, Altoona, Pa.
- Phillips Petroleum Co.:
H. EMERSON THOMAS, Eastern Representative, Philgas Department, 1 Wall Street, New York, N. Y.
A. W. BROWN, District Manager, Philgas Department, Rockville, Md.
- Scale Journal Publishing Co.: EDITH G. JACOBS, Secretary, Scale Journal, 1703 East Eighty-fourth Street, Chicago, Ill.
- Socony-Vacuum Co.: E. R. EICHNER, Engineer, 26 Broadway, New York, N. Y.
- Southern Grocery Stores, (Inc.): T. C. LAWLER, Manager, Service Department, 682 Whitehall Street, Atlanta, Ga.
- Southern Railway System: J. N. TODD, Superintendent of Scales, Washington, D. C.
- Standard Oil Company of New Jersey: J. W. SAYBOLT, Sales Manager, 26 Broadway, New York, N. Y.
- Stearns & Foster Co.: F. J. HOOKER, Lockland, Ohio.
- Tide Water Oil Co.: EDGAR A. ORPIN, Supervisor of Equipment, Automotive Sales, 17 Battery Place, New York, N. Y.
- Western Newspaper Union: WILLIAM BRUCKART, National Press Building, Washington, D. C.

CONTENTS

Officers and committees.....	Page III
Persons attending the Conference.....	VI

FIRST SESSION—MORNING OF TUESDAY, JUNE 4, 1940

Fay Stanley Holbrook—In Memoriam:	
Remarks of Lyman J. Briggs, Director, National Bureau of Standards..	1
Remarks of John P. McBride, Director of Standards and Necessaries of Life, State of Massachusetts.....	3
Remarks of James O'Keefe, Sealer of Weights and Measures, City of Chicago, Ill.....	3
Remarks of Charles C. Neale, Manager, Weights and Measures Division, Wayne Pump Co.....	4
Remarks of M. J. J. Harrison, Supervisor of Scales and Weighing, Pennsylvania Railroad.....	5
National Unity in the Administration of Weights and Measures, by Lyman J. Briggs, Director, National Bureau of Standards, and President, National Conference on Weights and Measures.....	6
Announcements by the Chairman.....	8
The Consolidated Standard-Container Bill, by H. A. Spilman, Senior Market- ing Specialist, Agricultural Marketing Service, United States Department of Agriculture.....	8
Discussion of foregoing paper.....	13
Appointment of Special Resolution Committee.....	15
The Function and Operation of Sight-Glasses, by C. D. Baucom, Superin- tendent of Weights and Measures, State of North Carolina.....	15

SECOND SESSION—AFTERNOON OF TUESDAY, JUNE 4, 1940

Automatic-Indicating Scales—Printed Weight Indications and Remote Weight Indications:	
Paper of J. F. Cruikshank, General Scale Sales, Fairbanks, Morse & Co....	19
Paper of Harry M. Roeser, Manager of Sales and Service, Streeter-Amet Co.....	22
Paper of H. W. Hem, Engineer, Toledo Scale Co.....	26
Report of Committee on Proposed Federal Legislation to Provide Assistance for the States in Administration of Weights and Measures Laws, presented by John P. McBride, Chairman.....	29
A Novel Form of Weights and Measures School, by Cleo C. Morgan, Sealer of Weights and Measures, City of Gary, Indiana.....	32
Report on Testing of Vehicle Scales by the National Bureau of Standards in Cooperation with the States, by Ralph W. Smith, National Bureau of Standards.....	35
Discussion on informal meeting to consider methods of sale of commodities..	43
"Selection, Installation, and Maintenance of Vehicle Scales"—A sound- slide treatment of Form NBS 256, by Lloyd Ellingwood, Toledo Scale Co..	45

THIRD SESSION—MORNING OF WEDNESDAY, JUNE 5, 1940

Appointment of committees.....	47
Announcements by the Acting Secretary.....	47
Measurement of Liquefied Petroleum Gases:	
Physical Properties as Affecting Measurement, a paper presented by E. R. Weaver, National Bureau of Standards.....	48

	Page
Report of Special Resolution Committee, presented by C. E. Tucker, Chairman.....	60
Measurement of Liquefied Petroleum Gases—Continued:	
Instruments for Commercial Measurement, a paper presented by H. S. Bean, National Bureau of Standards.....	62
Measurement Problems of the Distribution Industry, a paper presented by Franklin R. Fetherston, Secretary-Treasurer, Liquefied Petroleum Gas Association (Inc.).....	65
Weights and Measures Regulation, a paper presented by Charles M. Fuller, Sealer of Weights and Measures, County of Los Angeles, Calif.....	71
Discussion of foregoing papers.....	77
Activities of the National Scale Men's Association, by J. G. McCarty, President, National Scale Men's Association.....	78
Twisted Strands, by Joseph G. Rogers, Assistant Superintendent and Secretary, Department of Weights and Measures, State of New Jersey.....	81
The Effects on SR of Packing Pivots and Bearings With Grease, by C. L. Richard, National Bureau of Standards.....	88
FOURTH SESSION—AFTERNOON OF WEDNESDAY, JUNE 5, 1940	
Tour of the laboratories of the National Bureau of Standards.....	95
FIFTH SESSION—MORNING OF THURSDAY, JUNE 6, 1940	
Report of Committee on Specifications and Tolerances, presented by John P. McBride, Chairman, and discussion thereon:	
Single-service measure-containers.....	97
Section on liquid-measuring devices.....	98
Dollar Justice, by William Bruckart, Columnist, Western Newspaper Union.....	100
Report of Committee on Publicity and Education, presented by W. S. Bussey, Chairman.....	103
Report of Committee on Specifications and Tolerances—Continued:	
Section on vehicle tanks.....	107
Section on scales.....	108
Section on weights.....	110
Section on general regulations.....	112
Questionnaire on vehicle-scale tolerance.....	112
Demonstration of recent developments in weighing and measuring apparatus, by representatives of manufacturers.....	113
Corrections to Standards, by H. W. Bearce, National Bureau of Standards.....	114
Testing, Servicing, and Repair of Liquid-measuring devices, by G. Denny Moore, Managing Director, Gasoline Pump Manufacturers Association.....	121
Methods of sale for certain commodities.....	130
Parallax, by Howard E. Crawford, Inspector of Weights and Measures, City of Jacksonville, Florida.....	131
SIXTH SESSION—AFTERNOON OF THURSDAY, JUNE 6, 1940	
Federal Food, Drug, and Cosmetic Act:	
General Regulations Relative to Net Weight, a paper presented by W. S. Frisbie, Chief, Division of State Cooperation, Food and Drug Administration, United States Department of Agriculture.....	135
Deceptive Containers, a paper presented by Sumner C. Rowe, Associate Chemist, Food and Drug Administration, United States Department of Agriculture.....	138
Discussion of foregoing papers.....	142
Report of Committee on Standardization of Packaged Goods, presented by Alex Pisciotta, Chairman.....	145
Report of Committee on Legislation, presented by Rollin E. Meek, Chairman, and discussion thereon.....	163
Distribution of mimeographed material.....	167
Insignia for members of National Conference.....	167
Request for appointment of committee.....	167
Marking and lettering of milk bottles.....	168

SEVENTH SESSION—MORNING OF FRIDAY, JUNE 7, 1940

Abstracts of State reports:	Page
Alabama, R. W. Johnson.....	171
California, Charles M. Fuller.....	171
Connecticut, Carlton L. Klocker.....	171
District of Columbia, George M. Roberts.....	171
Georgia, W. P. Reed.....	172
Illinois, John J. Levitt.....	172
Indiana, A. Edward Snyder.....	172
Maryland, S. T. Griffith.....	172
Massachusetts, John P. McBride.....	172
Michigan, Glenn W. Davis.....	173
Missouri, Louis G. Waldman.....	173
New Jersey, Joseph G. Rogers.....	173
New York, Barnett Kanzer.....	173
North Carolina, C. D. Baucum and H. L. Shankle.....	173
North Dakota, A. J. Jensen.....	174
Ohio, V. D. Campbell.....	174
Pennsylvania, Joseph F. Blickley.....	174
Texas, C. W. Condit.....	174
Vermont, H. N. Davis.....	174
Virginia, M. A. Hubbard.....	175
West Virginia, Edward A. Brooks.....	175
Reports of representatives of State associations of weights and measures officials.....	175
Representation at meetings of other organizations.....	176
Report of Committee on Nominations, presented by Joseph G. Rogers, Chairman, and election of officers.....	177
Report of Committee on Resolutions, presented by Carlton L. Klocker, Chairman, and adoption of resolutions:	
Appreciation to Director and staff of the National Bureau of Standards.....	178
Appreciation to management of headquarters hotel.....	178
Appreciation to officials cooperating.....	178
In memory of deceased members.....	178
Appreciation to the press and to the Scale Journal.....	178
Report on the measurement of liquefied petroleum gases.....	179
Report of the treasurer, George F. Austin, Jr.....	179
Announcement of committee appointments.....	179
New business:	
Amendments to the Model State Law on Weights and Measures.....	180
Weights and Measures News Letter.....	183
Pattern approval.....	184

REPORT OF THE THIRTIETH NATIONAL CONFERENCE ON WEIGHTS AND MEASURES

HELD AT THE NATIONAL BUREAU OF STANDARDS, WASHINGTON,
D. C., JUNE 4, 5, 6, AND 7, 1940

FIRST SESSION—MORNING OF TUESDAY, JUNE 4, 1940

(The Conference was called to order at 11:20 a. m. by Lyman J. Briggs, President of the Conference.)

FAY STANLEY HOLBROOK—IN MEMORIAM

REMARKS OF LYMAN J. BRIGGS, DIRECTOR, NATIONAL BUREAU OF STANDARDS

We are meeting this morning to honor the memory of our beloved friend, Fay Stanley Holbrook.

Fay S. Holbrook, Secretary of the National Conference on Weights and Measures from 1922 to 1940, joined the staff of the National Bureau of Standards in August 1909 as an assistant physicist qualified as inspector of weights and measures. His preparation for this post included not only work at Cornell University but also practical experience as chief adjuster of weights and measures in the laboratories of W. & L. E. Gurley and as inspector of weights and measures in the State of New York.

Mr. Holbrook's first assignment in the Bureau was to conduct a Nation-wide investigation of conditions relating to weights and measures, which was carried out under a special appropriation by Congress for this purpose. At the end of the first year he was placed in complete charge of this investigation, which covered every State in the Union and included the determination of the condition of the standards of weights and measures in each State and the character and manner of enforcement of the weights and measures laws, as well as the commercial conditions existing in respect to the weights and measures in actual use. In all, 187 cities were covered in this survey. Separate reports were prepared for each city, which were sent by the Bureau to the Governors of the States concerned, to the legislatures, to the mayors of cities, and to weights-and-measures officials.

This investigation developed the great need of adequate and uniform State laws, and Mr. Holbrook was assigned to prepare a model State law for weights and measures. This model law was officially adopted by the Annual Conference on Weights and Measures in 1911 and has been revised and brought up to date by the Conference from time to time since.

With this background, it was but natural that Mr. Holbrook should be called upon to prepare special bills on various phases of weights-and-measures

regulation for introduction into Congress or State legislatures. It was a part of his duties to appear before committees of Congress and State legislatures, on request, to support the passage of this legislation.

Such uniformity in weights and measures laws as we enjoy today is a result in large measure of the enactment of these measures, the laws of about half of the States now being based directly on the model laws.

In 1913 Mr. Holbrook was delegated to put into effect a new weights and measures law in Puerto Rico. He spent about 6 months on the island, wrote the rules and regulations officially promulgated under this law, procured the equipment, selected the personnel, and established the service on a working basis.

In 1911 Mr. Holbrook began his work under L. A. Fischer on the important Conference Committee on Specifications and Tolerances, and from 1919 until his death he was Chairman of this Committee. Through the work of this Committee, the National Conference on Weights and Measures has produced specifications and tolerances for scales of all kinds, weights, measures, graduated glassware, liquid-measuring devices, vehicle tanks, and other apparatus. These specifications have been officially adopted in a number of States as requirements with which all commercial apparatus sold in these jurisdictions must conform. The National Bureau of Standards considers the uniformity thus far attained an accomplishment of great importance, and it was Mr. Holbrook's hope that practical uniformity throughout the country might later be secured.

Mr. Holbrook supervised with deep interest the annual testing of the master track scales of the country. Associated with this work was the survey of railway track scales, and the gradual but steady progress in the number of railway scales meeting present Conference specifications (from 33 percent in 1915 to 85 percent in 1939) was a source of deep satisfaction to him. He was gratified with the cordial reception accorded by State officials to the Bureau's efforts to provide a Nation-wide survey of highway scales, but he insisted that the credit for this undertaking belonged to the operating personnel. The painstaking attention he gave to the selection of these men, extending over a period of months, provides a happy and characteristic example of the way he worked.

Early in the course of his work on weights and measures Mr. Holbrook recognized that a legal training would be helpful, and accordingly he began his studies in the Law School of Georgetown University, from which he received the degrees of bachelor of laws in 1915, and master of laws in 1917. To what extent his law studies were responsible for the development of a highly judicial attitude of mind, I do not know, but he approached every decision of importance from this viewpoint. He sought the fullest information on the subject in hand, weighed the evidence with care, and reserved his decision to the end. Where matters involving personnel were concerned his inherent kindness was always manifest. His analytical power, his judicial viewpoint, and his sterling character would have adorned any court of justice in the land, had his inclination taken him in that direction. I often sought his wise and friendly counsel on Bureau matters beyond his immediate field of responsibilities, and never was he found wanting.

Reserved on first acquaintance, always possessed of a simple dignity, he revealed to those of us who knew him best an endearing personality that we shall always cherish in our memories. He was devoted to his Bureau work and to the work of this Conference. We have lost a great friend and a wise counselor.

REMARKS OF JOHN P. MCBRIDE, DIRECTOR OF STANDARDS AND NECESSARIES OF LIFE, STATE OF MASSACHUSETTS

It is fitting that we should, at the commencement of this Conference, set apart this brief period in memory of one of the principal proponents of the Conference idea—Fay Stanley Holbrook.

That we thus collectively pause and reflect in this manner is symbolic of the many times that we will individually pause and reflect in our deliberations as we seek to emulate his able reasoning power, his clear thinking and practical viewpoint, and, above all, the ringing honesty of his thoughts.

The greatest pleasure of associating with a man in a common cause comes from the comfort of being able to give full credence to that person's viewpoint, knowing that the sole actuating motive is the proper and real accomplishment of the purpose; thus we find true friendship—we can be in complete sincerity. Such a man was Fay Holbrook, as we have time and again observed in his committee deliberations and in his statements and conduct in our Conferences.

His great pride was this Annual Conference and the Committee on Specifications and Tolerances, over which he had long acted as Chairman. He gave himself entirely to it, and its conclusion found him, each year, a tired man. To the credit of the Conference, may it be said that your respect for his judgment and integrity gave him real pleasure and to him was ample compensation for his labor.

Our last Conference fatigued him very much, and before leaving Washington I bade him what proved to be our final farewell. He was in a happy mood and appreciative of the accomplishments of the Conference. His untimely passing leaves a distinct void in our group, which will not easily be filled.

His lifework was weights and measures, and had its beginning in the State of New York. Here he pioneered and then advanced to the Federal Government to expand the doctrine of weights and measures. His zeal and honest effort gave impetus to the creation of many State departments of weights and measures. The work is deeply his debtor.

He was a gentleman and friend in the true and complete sense of the word; of such friendship as his, the poet has said: "Friendship, mysterious cement of the soul, sweetener of life, and solder of society." We feel keenly his loss, and to us all he is of happy memory.

REMARKS OF JAMES O'KEEFE, SEALER OF WEIGHTS AND MEASURES, CITY OF CHICAGO, ILL.

I knew him but a few short years. I was one of the favored in our line of work who was privileged to see his kindly smile and to feel his friendly hand-clasp—but my colleagues throughout the Nation, who have profited by his advice and counsel, will miss him as will you and I.

In life we are confronted with many problems, and it is always a comfort to know that we can carry those problems to men such as was Fay Stanley Holbrook.

He was a man. His sympathetic character and his unlimited patience have made our lives and our work so much easier and happier.

How fleeting is time, and how transitory and temporal is the applause of the people or the honors and dignities conferred upon man in the short span of human life, and what a stern realization of that fact we have before us today as we listen in vain for the voice of him we knew so well, who but a short yesterday was an active participant in the deliberations of our body and who wielded vast and far-reaching influence in our work.

Then may I say to the memory of Fay Stanley Holbrook for the sealers of the Nation:

There is a word, of grief the sounding token;
There is a word, bejeweled with bright tears—
The saddest word fond lips have ever spoken,
A little word that breaks the chain of years.
Its utterance must ever bring emotion;
The memories it crystals cannot die.
'Tis known in every land, on every ocean.
'Tis called, Goodbye.

REMARKS OF CHARLES C. NEALE, MANAGER, WEIGHTS AND MEASURES DIVISION, WAYNE PUMP CO.

It is most appropriate that we join in this memorial hour dedicated to the memory of our good friend, F. S. Holbrook, who is separated from us for a while; and he has left this institution, the National Bureau of Standards, which he devotedly loved, and in the service of which he spent every working day of his life after reaching manhood maturity.

A span of years, in his case all too short. But it was his good fortune to realize fulfillment of his hopes and ideals to a much greater degree than is granted to most men of any age.

A lawyer by education, the records show that he graduated in law with highest scholastic honors, as a magna cum laude student of that splendid law college, the Georgetown Law School.

As a close personal friend of his in those days when he was taking law and I was in weights and measures enforcement work, I am in a position to know that the day after receiving his degree he was given the opportunity to enter active law practice at a much greater financial compensation to start with than could be afforded him by any available position in the National Bureau of Standards at that time.

Without hesitation, he decided to remain in the Weights and Measures Division of the Bureau. That determination was based on the fact that his eight years of service, up to that time, in Nation-wide contact with weights and measures work, had proved to him that chaos was almost the universal rule in regard to that all-important subject in this country, and, as he saw it, the most

available assistance at hand was the cooperative help offered by the National Bureau of Standards.

Fay Holbrook was not a theorist. While he fully recognized the almost sacred status of standards, in a metrological sense, yet he well knew that the material physical standards, and all the science essential thereto, are but a means to an end, and, in the finals, must be transformed into living things, so to speak, in the hands of men and women dedicated to service in behalf of others in every weights and measures jurisdiction in the Nation.

I shall always remember him as a true friend and Christian gentleman—a memory covering thirty-one years of close acquaintance. He was proud of his country and deeply appreciative of the privilege of citizenship. And above all, he was happy to be in a position where he could, to some degree, be of service to his fellow citizens, many of whom, by the nature of things, cannot protect their own rights or even know them in commercial business relations.

His life accomplishment in his chosen field will stand as a lasting monument to his memory, and is one that he would have desired more than any other.

REMARKS OF M. J. J. HARRISON, SUPERVISOR OF SCALES AND WEIGHING, PENNSYLVANIA RAILROAD

It is my privilege to speak in behalf of the representatives of transportation and industrial interests, members of this Conference, not represented directly by the previous speakers. My selection as a speaker was possibly influenced by the fact of my acquaintance with Fay Holbrook, personally and officially, over a period of some twenty-eight or twenty-nine years.

Our official contacts with him were, obviously, of a nature which partook of his status as an officer of the National Bureau of Standards, as well as his status with respect to the National Conference on Weights and Measures. In his dealings with and approach to the problems which he collaborated and assisted so materially in solving, certain of his attributes were conspicuous. He was the personification of a fairness and open-mindedness which were outstanding; he was devoted to his work and loyal at all times to his conception of his duty; he had a thorough appreciation of the relative importance of his field of work and its interrelation with the general scheme of things; he possessed an appreciation of due balance between theory and practice; he was absolutely honest; and he was unceasingly watchful of the reputation of both the National Bureau of Standards and the National Conference on Weights and Measures.

I think that Fay Holbrook's best monument is the high respect which he enjoyed, and the affection and regard in which he was held by all who knew him at all well. To these the words of us, his friends, attest, with pride in our friendship and association with him and sincere sorrow at his passing.

The CHAIRMAN. The Chair now wishes to recognize Ralph Smith, who has been associated with Mr. Holbrook at the Bureau for many years.

Mr. R. W. SMITH. Mr. President, I move you, sir, that a special committee be appointed by the Chair to bring before this Conference, by tomorrow if at all practicable, a suitable resolution memorializing

Fay Stanley Holbrook; and I would suggest, Mr. President, that this committee be composed not only of weights and measures officials but that there be included in its membership representatives of the other groups comprising this National Conference.

Mr. S. T. GRIFFITH. May I suggest that a page be set aside in the official minutes of this Conference for recording that resolution.

The CHAIRMAN. The motion is before you. I ask that it be accepted by a rising vote.

(The motion was seconded, the question was taken by a rising vote, and the motion was unanimously agreed to.)

NATIONAL UNITY IN THE ADMINISTRATION OF WEIGHTS AND MEASURES

By LYMAN J. BRIGGS, *Director, National Bureau of Standards, and President, National Conference on Weights and Measures*

It gives me much pleasure and satisfaction to welcome you at this thirtieth annual meeting of the National Conference of Weights and Measures—pleasure because I see so many friends in the audience, and satisfaction because your presence here is evidence that these Annual Conferences are contributing each year something definitely worth while to the advancement of weights and measures.

Last year you saw our 60,000-pound vehicle scale in the course of installation. I am glad to be able to report that this scale, thanks to the cooperation of the Work Projects Administration, is now completely housed in a substantial brick building. The driveway at each end of the building is so constructed as to be on the same level as the scale platform, thus paving the way for a future investigation of two-draft weighing.

The large vehicle scale is supplemented by two smaller platform scales for more precise weighing, one having a capacity of 10,000 pounds and the other a capacity of 400 pounds. An equal-arm balance provides for the precise comparison of 50-pound weights by the method of substitution. It is expected that all weighing operations involving masses of 50 pounds or more will hereafter be carried out in this new weighing laboratory. All smaller weights, and the standardization of our 50-pound master weights, will be handled as heretofore in the mass section of the Bureau, under the direction of Mr. Pienkowsky.

The Bureau has been fortunate in securing also a number of standard weights of different masses ranging from 50 to 10,000 pounds, sufficient in the aggregate to enable us to load the 60,000-pound scale to its maximum capacity, whenever this appears desirable for purposes of calibration. The heavy weights can be readily handled by means of a traveling crane which extends across the Scale House and travels the full length of the scale platform. I hope that you will all avail yourselves of the opportunity to see this equipment, which the Bureau has urgently needed for many years.

Across the street from the Scale House is the new High Voltage Building. One of the main features of this building is a great hall 64 by 60 by 134 feet long, which contains the high-voltage equipment. This room is completely lined with metal in order to prevent electric surges from disturbing electrical measurements in other laboratories of the Bureau. The new high-voltage X-ray tube, capable of operating at a maximum direct-current potential of 1,400,000 volts, is now

being installed. It will be used in part to calibrate dosage meters for X-ray installations in hospitals. Other equipment in the great hall will include a surge generator for simulating lightning strokes on transmission lines, and cascade transformers for producing high potentials for testing purposes.

The vehicle-scale survey has been in progress for over 3 years. The testing equipment is now in Arizona. To date, surveys have been carried out in 29 States which did not have adequate equipment for testing highway scales at the time the survey was made. In addition, an important survey was carried out in cooperation with the State of Texas where high-grade equipment of smaller capacity was in use. The reception accorded the Bureau's efforts to provide information regarding the accuracy of vehicle scales has been most gratifying, and a number of States are taking steps to secure testing equipment as a result of this work. It is estimated that about 1 year more will be required to complete the survey, and it may be possible after that time to carry out additional surveys in some of the States, on request, if this seems desirable.

I now wish to present to you a matter which I believe is of grave importance in the administration of weights and measures in this country. I refer specifically to the need of uniform weights and measures regulations throughout the country and their uniform observance and enforcement. In some totalitarian countries such uniformity is made mandatory through governmental edict. Our Government has chosen another course. The formulation of weights and measures laws has been left to the several States, together with their administration. That decision imparts to this organization of ours grave responsibilities. It lessens in no way the need for uniformity. It leaves in our hands the problem of securing it by democratic methods.

Within the past week I attended a technical conference on airplane development, in which it was pointed out that the mass production of steel in this country is seriously hampered by the multiplicity of types and kinds of steel demanded by the various industries. I believe thoroughly in individual initiative, but in times of stress this is initiative gone wild. I am convinced that this great list of special steels can be drastically reduced without impairing any important product, and that costs will be lessened and production increased thereby. Steps are already being taken to this end.

I cannot see why the specifications for types of weighing or measuring equipment in one State should differ from those in another. I cannot understand why it is not possible for this Conference to draw up specifications for gasoline pumps, for example, that will be satisfactory to all States and to the motorist who uses them, without the necessity of requiring special graduations or dials of a certain color in some jurisdictions. These departures, like special steels, cost money, slow up production, increase overhead.

I believe it is the job of this Conference, through careful consideration and study, to arrive at these specifications and to standardize the types of weighing and measuring equipment under its jurisdiction. I believe also that it is the duty of enforcement officials, once these standards have been openly arrived at and formally adopted, to support them loyally and live up to them, in the interest of national unity. I conceive this to be the primary function of the National

Conference of Weights and Measures. The National Bureau of Standards will assist you in technical matters in every way possible. But it is fundamentally your job, and its successful execution will redound immeasurably to your credit and national standing.

ANNOUNCEMENTS BY THE CHAIRMAN

The CHAIRMAN. I wish now to announce the personnel of the committees which the Conference authorized last year, and which will report to you later on.

As the Committee on Legislation: Rollin E. Meek, of Indiana, Chairman; Carlton L. Klocker, of Connecticut; John J. Levitt, of Illinois; R. M. Johnson, of Birmingham, Ala.; Alex Pisciotta, of New York, N. Y.; George M. Roberts, of the District of Columbia; and Louis G. Waldman, of St. Louis, Mo.

As the Committee on Publicity and Education: W. S. Bussey, of Texas, Chairman; M. A. Hubbard, of Virginia; A. J. Jensen, of North Dakota; James E. McHugh, of Allentown, Pa.; A. Edward Synder, of Terre Haute, Ind.; Robert Williams, of Nassau County, N. Y.; and H. G. Boutell, of the National Bureau of Standards.

Mr. Holbrook's death left a vacancy in the chairmanship of the Committee on Specifications and Tolerances. I have asked John P. McBride, of Massachusetts, to accept this chairmanship, and he has consented to do this. I have also asked Ralph Smith, who has been associated with Mr. Holbrook in this work, to become the Bureau member of this Committee and to act as Secretary of the Committee.

There remains one other announcement that I would like to make. You have long been familiar with Mr. Holbrook's position as co-Chief of the Division of Weights and Measures. That meant that he and H. W. Bearce occupied positions of equal responsibility in the administration of that Division. Mr. Bearce has now been appointed Chief of the Division of Weights and Measures, bringing the organization into conformity with that of other Divisions of the Bureau, and Ralph Smith has been appointed Assistant Chief of this Division.

Immediately after adjournment of the afternoon session, I should like to meet the officers of the Conference—that is, the six Vice Presidents, the Treasurer, and the Acting Secretary—in my office in the South Building.

THE CONSOLIDATED STANDARD-CONTAINER BILL

By H. A. SPILMAN, *Senior Marketing Specialist, Agricultural Marketing Service, United States Department of Agriculture*

The consolidation of standard-container legislation for fresh fruits and vegetables has been under consideration for several years. It was first discussed before this Conference in 1931. At that time, except for purposes of study, the idea had not been drafted into a bill, and thought was directed principally toward correcting recognized weaknesses and inconsistencies in existing laws and their administration. However, considerable thought was given to a suggested provision of particular interest to weights and measures officials, "devised in an attempt to make sure that the provisions of standard container legislation should not interfere with State laws or city ordinances respecting the sale of fruits and vegetables by weight."

Meanwhile, in 1934 and again in 1935, bills embodying the principles and purposes set forth in the preliminary study were introduced in Congress. [73d Congress, S. 3270; 74th Congress, S. 1460 and H. R. 8764.] This proposed legislation came to be known, and is still referred to, as the "Byrd Bill", the provisions of which were discussed at your 1935 Conference. This measure aimed not only to consolidate and equalize existing standard container laws and safeguard weights and measures administration, but also to extend the principle of standardization to cartons, crates, and boxes. The standardization of sacks was not contemplated at that time.

This bill was reported favorably by the Senate Committee on Agriculture, but on the consent calendar failed to pass that body on two different occasions. No action on the measure was taken in the House.

The bill now pending in the 76th Congress [H. R. 5530], was introduced by Congressman Somers, of New York, on April 14, 1939. It was written in the light of the public reaction to the Byrd bill, and reflects the constructive criticism and suggestions of the affected industries and further study by the Department of Agriculture during the intervening 4 years. Since the previous proposals were discussed before you, I will confine myself to the essential differences between this bill and the Byrd bill.

First, certain controversial factors, such as the provisions relating to the marking of containers and the submission of production reports by manufacturers, have been eliminated. The marking of containers is believed to be adequately covered by the Federal Food, Drug, and Cosmetic Act, and the gathering of production figures, while advantageous, is not vital to proper administration of container legislation.

Second, an attempt has been made in section 8 to clarify the purpose and to specify the procedure to be followed in the standardization of cartons, crates, boxes, and sacks, a major portion of which are used for products packed and sold by net weight or numerical count. For such containers the only approach considered feasible is through conference and cooperation with the affected industries, in which the Government, on the one hand, becomes a clearing house of ideas and, on the other, an agency for the enforcement of regulations mutually worked out prior to promulgation.

Third, sacks, not mentioned in the Byrd bill, are included because in recent years they have become increasingly competitive with other types of containers to which the bill relates.

Fourth, section 13 has been rewritten to clarify the relationship between State laws or city ordinances relating to the sale of fruits and vegetables and a Federal law establishing standards for containers for such products, and to reserve to the States the authority to regulate sales of fruits and vegetables and to police the use of standard containers for such products when made or used in any manner other than as specifically provided in this section.

As indicated in the discussion of this matter in 1931, we believe this section to be extremely important and one that should be thoroughly and mutually understood. The present phraseology has been developed through a process of evolution, and we believe, effectively accomplishes the desired ends. What are these purposes? (1) To prohibit the use of standard containers as *measures* in localities which prohibit the sale of fruits and vegetables by measure; (2) to establish standard containers as legal units of sale, but *only* when they are *properly*

packed with fruits or vegetables, and sold as *original, unbroken packages*; (3) to establish such containers, properly packed with fruits and vegetables, as legal units of sale irrespective of the weight of the contents; and (4) except in the above instances, to reserve to the States the authority to require fruits and vegetables to be sold by weight or count.

These purposes seem to be both logical and necessary, and, so far as has been indicated, are generally acceptable, but it has been suggested that this section may not be wholly effective in preventing or regulating certain undesirable merchandising practices, such as repacking berries to obtain an extra quart from each crate, or preventing the misuse of containers, as when quart baskets are used for the sale of large apples or pint cups for the sale of mushrooms by measure. We have given this matter considerable thought and feel that these ends can be accomplished administratively, at once or progressively as the needs arise, by judicious definition of certain terms in the regulations. For instance, the term "properly packed" might be construed to mean that the product shall be compactly packed in accordance with good commercial practice, that it shall not be slack nor overpressed, or loosely or insecurely arranged as by bridging. "Original, unbroken container" might be defined as one the contents of which have not been packed from bulk or other containers, or removed or repacked by the retailer. If such definitions would not be wholly effective, or if there are other loopholes that should be closed, we are sure the proponents of this legislation would appreciate having any constructive suggestion.

There are two proposals now being considered for the first time. One of these is designed to correct one of the prevalent evils of modern packaging, namely, overpacking to obtain excessive bulge. Present laws prohibit the use on containers of covers which reduce the capacity below that prescribed. Under section 9 of the present bill the use of covers to increase the capacity of containers would be subject to regulation within certain limits. It is believed that the growers of fruits and vegetables are entitled to protection against practices by which they may be defrauded, particularly when this would result in desirable stabilization of markets from which benefits to buyers, as well as sellers, are likely to accrue. In this instance also, the Government in cooperation with the affected industries, would serve as a clearing house for the coordination of ideas and as the enforcing agency for any regulations that might be adopted.

The second new proposal [section 12] would authorize the Secretary of Agriculture to waive prosecution in cases of minor infractions of the act, where it appears that the public interest would be adequately served by written notice or warning and where the necessary corrections are made. In such cases the offending containers could be placed under detention pending their correction, thereby furnishing a lawful means of cooperation between the Government and the manufacturer in correcting minor deficiencies without resort to legal action.

Now, from the standpoint of weights and measures, what are the merits of this proposed legislation? First, it aims to apply to cartons, crates, boxes, and sacks the same principles of simplification and standardization that now apply to barrels, baskets, and hampers for fruits and vegetables. For two decades, in the distribution of fruits and vegetables, we have enjoyed the advantages of a limited number of standardized barrels, baskets, and hampers, and it is be-

lieved that similar advantages and benefits will accrue from a reduction in the number of other types of containers used for the same purposes.

As defined in the Standards Yearbook for 1927, simplification or simplified practice means reduction in waste through the elimination of unnecessary diversity of sizes, types, and dimensions of manufactured products. This improved efficiency is likely to result in decreased production costs, decreased selling expenses, fewer misunderstandings, and lower costs to user, or consumer.

That is precisely what the proposed legislation is designed to accomplish. It does not propose that all fruits and vegetables in packages shall be sold by measure, or that they shall be sold by weight, or by numerical count. On the contrary, it recognizes that in the marketing of fruits and vegetables packed in containers all three methods of sale are employed. It simply aims to reduce the number of such containers to the lowest minimum consistent with acceptable and approved distribution practices. We believe that no one who would not be in favor of abandoning the standards for containers now in effect could seriously oppose the extension of that principle to cover the whole field.

Exception has been taken to some of the standard sizes prescribed, but it should be understood that except in the case of cranberry barrel subdivisions this bill merely reenacts the standards now in force, and that in some degree these standards reflect current usage in some part of the United States. These standards have been included in this bill to avoid, as much as possible, unnecessary controversy and disruption of present practices. If any of them could be eliminated, all well and good. We feel sure the Department of Agriculture would interpose no objection to such a proposal, provided the interests chiefly affected were in agreement.

But granting that some of the existing standards are less important, nationally, than others, the fact remains that they have been generally suitable, acceptable, and adequate. The nonuse of an occasional standard may be a less serious problem than is the promiscuous use of innumerable containers for which there are no standards.

Among other comments regarding the bill is one to the effect that "the power of the Secretary of Agriculture to cooperate with the State should be clarified," and another that "the bill should be so worded specifically that it does not apply to intrastate matters, but leaves intrastate laws on standards and their enforcement to State and municipal officials in State and local courts."

Now, the authority for the Secretary of Agriculture to cooperate with State, county, and municipal authorities is specifically set forth in section 16, and could be repeated in other sections, such as 8 and 9, if this were considered necessary. Certainly, there seems to be no desire or intent to minimize the effectiveness of the legislation through any failure to take any advantage of every constructive force, which in not a few instances could be expected to come chiefly from State officials.

According to the weight of precedent, it does not seem that the provisions of this kind of legislation should be limited only to interstate commerce. Of the three existing laws, only one is an interstate commerce law, while two were enacted under the weights and measures clause of the Constitution. The last of the three to be enacted—the

Standard Container Act of 1928—is a weights and measures law applying universally in intrastate and interstate transactions. It has proved to be a satisfactory, workable statute, under which there has been a minimum of conflict or interference with State regulations. Moreover, it has the outstanding advantage that an unlawful package is unlawful wherever found, and may be proceeded against on the spot, irrespective of whether it has crossed—or ever will cross—State lines.

The Standard Container Acts can be most effective if enforcement is preventive in nature. It must be applied at the source, that is, at the factories, before the containers are put into use or circulation. Under an interstate commerce law no legal action can be undertaken against an unlawful package until movement in interstate commerce has occurred, which may be weeks or months after the packages were manufactured. We know from experience how difficult and impracticable it is to keep such items under surveillance during that period, and to apprehend such shipments when finally made. This, and the fact that standard units of merchandising or sale should be uniform throughout the country, in our opinion far outweighs all other considerations. And, incidentally, this arrangement affords a better basis for State and Federal cooperation than where jurisdictions meet and possibly conflict at State lines. If we keep in mind that the purpose of this legislation is chiefly to limit the number and fix the standard sizes of containers, the advantages of universal application will be apparent.

Several specific questions have been raised which relate to marking the quantity of the contents on the container. This bill has nothing to do with marking or labeling or branding, the reason being that regulation in this field is a function of the Food and Drug Administration under the provisions of the Federal Food, Drug, and Cosmetic Act. The regulations under that act apply to all packages of fruits and vegetables, whether the containers involved are standardized or not. Again, let me repeat, this bill aims chiefly to reduce the number of such containers and to standardize those that are retained. There is a provision under which “irregular containers” may be used if, in addition to marking required by the Food, Drug, and Cosmetic Act, they are so marked. But this is applicable only to containers that are likely to be confused with an established standard with which some individual may not wish to conform. It is in the nature of a warning signal to the purchaser or to the weights and measures inspector.

In conclusion, the basic principle of this legislation is not new. It is an effort to keep container standardization abreast of the times—a recognition that this is the package age. Approximately 90 percent of all fruits and vegetables is put up in some kind of package—barrels, baskets, hampers, crates, boxes, or sacks. When barrels or baskets are used we know precisely what sizes are or may be used. But this is not true of the other types of containers which are used for much the larger portion of the total tonnage—approximately 70 percent. We know that such containers may be of any size, and that full advantage is taken of that privilege. At a recent hearing before the Interstate Commerce Commission, one exhibit contained the detailed dimensions of some 388 different crates and boxes used for railroad

shipments of fruits and vegetables in 1937 and 1938. How many others moved by motor truck is not known.

Everyone dealing with them agrees there are too many containers. For example, concerning lug boxes for juice grapes, the secretary of a western organization said: "It has been generally acknowledged that due to lack of uniform lugs for juice grapes, the trade has often been confused as to values. It is also generally believed that handlers, consumers, growers, and shippers have been injured by the use of many different sized lugs with different markings as to net weights."

Increasingly, the American people, through their legislative and regulatory agencies, see containers in general not merely as convenient merchandizing units, but as necessary factors in modern distribution to be assimilated into the weights and measures system. In the realm of fruits and vegetables this view is steadily gaining ascendancy over the older concept of sales based on bushel weight.

At the moment we are confronted with making certain adjustments in enforcing the existing laws, beginning July 1, because the proposed appropriation for such work has been reduced by 50 percent. What the effect of this curtailment of our activities will mean in terms of carelessness of manufacture, or in disregard of the requirements on the part of manufacturers, remains to be seen. If the cut becomes a reality, we will have to abandon a major part at least of the field work program begun in 1936, in which containers are examined and tested at the factory, and revert to the program of testing in the Washington office such samples as may be voluntarily submitted by manufacturers, or which they may be persuaded to submit.

The chief difficulty with this arrangement is that the conscientious manufacturer will cooperate, and the careless one will not. Heretofore, we have been able to reach such careless individuals in person, but under present prospects this kind of personal investigation will have to be held to a minimum.

In this situation, it may be that weights and measures officials will want to interest themselves to a greater extent than considered necessary heretofore in seeing that factories in their districts make containers of the proper size. We invite your assistance, and shall be glad to cooperate with you on the cases you bring to our attention.

DISCUSSION OF FOREGOING PAPER

The CHAIRMAN. This paper is before you for discussion.

Mr. KANZER. When this bill was introduced, we in the State of New York made an analysis of it and then directed 10 questions to Congressman Somers; we studied the reply, and then wrote Congressman Somers, as follows:

This is in reply to your letter of February 27 * * * containing also the letter to you from Mr. Kitchen, Chief of the Agricultural Marketing Service.

The following is my position and the position of this Department with reference to Somers Bill H. R. 5530: I am entirely favorable to the establishment by the Federal Government of legislation providing for uniform standards of filled or unfilled baskets of fruits and vegetables. I am opposed to the bill as written, in that it legislates with reference to intrastate commerce and therefore makes it more difficult for State officials to enforce intrastate violations in local courts.

There are minor objections which can be adjusted, I am sure, but we are opposed to the basic feature of enforcement through Federal courts. The wording of the present bill provides for cooperation with

State officials, but that is not adequate; it is in the present law, but it has never been followed. The regulations proposed were never fully discussed with the State departments, at least certainly not with that of New York State.

We take the position that we will follow through with the legislation, with minor variations and corrections, if the bill is an interstate bill, with a similar bill to be proposed as parallel State legislation, just as we have today in the case of food legislation.

The CHAIRMAN. Is there further discussion? Mr. Spilman, do you wish to comment?

Mr. SPILMAN. The only comment I would make would be a reiteration of what I said in my paper, that the principle of having this bill based on intrastate commerce is not new. We have it now in two out of the three standard-container laws that are on the statute books, and it is simply a question for Congress to decide whether they wish to abandon the policy which has been in effect for 20 years, for another policy.

Mr. PISCIOTTA. I am very much interested in having other members of the Conference express their views on this very important question, because it arises in connection with the report of our standardization committee and the bills that we are proposing. We should establish once and for all whether we are in favor of or against the introduction of measures to be enforced throughout the country. I have nothing to say one way or the other just now, but I should like to have others express their opinions for the guidance of our committee.

Mr. ROGERS. We have also opposed the bill on the same principle. We feel that there is set up a ponderous method of enforcement; it does not seem to allow flexibility in the individual jurisdictions. After we have developed the evidence in a case, I do not see how we can turn this over to the Federal Department of Agriculture and depend on the actions of the Federal courts. Much of our work is done in summary fashion—we must act quickly when we find a violation. We registered our objections with Congressman Somers on that very point. There may be a way of setting up in the bill some authority for local officials, in their own jurisdictions, to carry cases to their local courts; that should not conflict at all with the principles and purposes of the bill.

Mr. KANZER. Since the passage of the legislation in 1928 there has not been a single prosecution in the State of New York. I would be interested to know if any State or municipality has made any prosecution in connection with that legislation.

The CHAIRMAN. Has any member of the Conference an affirmative statement to make in that connection?

Mr. SPILMAN. I may say that since the passage of the act in 1928 there have been 29 prosecutions for violation of that act. I might further state that we attempt to administer our standard-container acts through securing the cooperation of manufacturers, so that prosecutions have not often been necessary. If we find containers of improper size, we endeavor to have those containers eliminated, and during the past 10 years we have destroyed more than a million containers by having them burned with the consent of the manufacturer. We feel that that is a much more practical and satisfactory way to enforce the law than to go through criminal prosecution; we eliminate

the faulty containers at the source and keep them from getting into the flow of commerce.

Mr. KANZER. Were any of those 29 prosecutions State or municipal?

Mr. SPILMAN. They were all Federal.

The CHAIRMAN. Is there further discussion of Mr. Spilman's paper?

APPOINTMENT OF SPECIAL RESOLUTION COMMITTEE

The CHAIRMAN. I now wish to announce the personnel of the Special Resolution Committee, authorized this morning in connection with the death of Mr. Holbrook. This Committee will be as follows: J. E. Tucker, of California, Chairman; Carlton L. Klocker, of Connecticut; S. T. Griffith, of Baltimore, Md.; William C. Witfoth, of Toledo, Ohio; C. P. Griffith, of S. F. Bowser & Co. (Inc.); J. W. Saybolt, of the Standard Oil Company of New Jersey; J. E. Woodland, of Jacobs Brothers Co. (Inc.).

The Chair regrets that unexpected duties concerned with the preparedness program will interfere with his attendance at all of the Conference sessions. He will ask H. N. Davis if he will kindly take the chair at this time.

(At this point, H. N. Davis, Vice President of the Conference, assumed the chair.)

(At this point, Rollin E. Meek, Chairman of the Committee on Legislation, was called upon, in regular order, for his report. Mr. Meek requested an extension of time, so that in the preparation of its final report the Committee might give due consideration to the discussions occurring during the meeting; to this the Conference agreed.)

THE FUNCTION AND OPERATION OF SIGHT-GLASSES

By C. D. BAUCOM, *Superintendent of Weights and Measures,
State of North Carolina*

In discussing this subject, I first wish to say that I have no brief whatsoever either for or against any design, make, trade name, or manufacturer. My remarks are intended only as being pertinent to a principle which I think is vital to weights and measures activities. Any conclusions drawn from the study of this principle must necessarily come as a result of experience, observations, and tests in conjunction with such equipment as is found in general operation and use. I shall be as nontechnical as possible. However, if any of you would like to go into the scientific phases of this subject and will see me after we adjourn, it will be a pleasure to follow through.

In order to get the proper perspective of this subject, let us first review the history and evolution of the so-called "visigauge." Originally, it was used on the "blind pump." In the early twenties, it was used in conjunction with the "dry hose" visible pump, placed in the discharge line immediately after the cutoff valve, adjacent to the glass bowl. In the late twenties, it was incorporated in the so-called "wet hose" visible pumps and the early models of the "meter pump." In 1932 the first model calculating pump came into being, still carrying the visigauge attachment.

Up to this time, the sight-glasses, or visigauges, were pretty much of the same design and being used for practically the same purpose,

mainly to show if and when the liquid, as measured, was being delivered to the customer. In 1938 the trend was towards "streamlining" everything, and the gasoline pump was no exception. The sight-glass adopted was of the "bull's eye" design, which design is incorporated in practically all of the 1940 models.

I have just stated that the purpose of the sight-glass has been pretty much the same since its first adoption. However, it is well to enumerate some of the specific purposes. In the case of the "blind pump", it was to show that each stroke of the piston delivered its full liquid measurement; in the "visible pump", to show when the delivery was complete; and in the "meter pump", to show that delivery was being actually consummated as indicated by the register. After the advent of the air eliminator, the sight-glass was to show that no air was being measured and delivered in conjunction with, and as a part of, the delivered liquid. It was also intended that the sight-glass show any discharge of the measured liquid, either through leaking foot-valve, hose, or any other outlet, prior to the beginning of delivery to the consumer. Another purpose of the sight-glass, which is commercial and not necessarily affecting weights and measures, but nevertheless is of vital importance to the purchaser, is that it enables him to observe the color of the product which he is receiving for comparison with the color of the product as advertised by the producer or the distributor.

To sum up, the real purpose of the sight-glass, according to my understanding, is to render visible evidence to both the operator of the pump and the purchaser of the petroleum product, of the proper functioning of the measuring device, including all of its component parts, so as to make a delivery culminate in a satisfactory business transaction, and give confidence that the transaction was based on the United States standard of measure.

Thus far I have confined my remarks to the first part of the subject of this discourse, namely: "The Function of Sight-Glasses," and I shall now take up the operations with regard to effects when the sight-glass, particularly, the "bull's eye" type as used with the present-day gasoline-dispensing pump, fails in its purpose. For some time the trend has been toward the minimizing of the purposes and usefulness of sight-glasses, and some jurisdictions even question the necessity of such a device. However, regardless of trend, when I discovered that the sight-glass assembly was being so designed and built as to make it possible to deliver 40 indicated gallons into a 5-gallon can without any visible evidence, contrary to the proper functioning of the pump as a whole, I concluded that it was time for a reckoning. A study of this situation revealed that the liquid in the "bull's eye" was dormant, or practically so, due to the very design of the sight-glass, that the spinners were mechanically attached to a shaft driven by a propeller, not visible, in the main flow of the discharge line, which would operate as readily with air as with liquid, and that the liquid in the "bull's eye" proper is behind the spinner. You all know, from your physics, that two bodies cannot occupy the same space at the same time, and the sight-glass assembly is no exception. The very construction of the assembly, including bearings, baffles, spinners, and reflectors incorporated in a dormant liquid, helped to prevent any circulation other than eddy currents created by the rotation of the spinner itself, and even the

every design of the glass helps to minimize visibility of inside contents. Consequently, any air or vapor which may, for any reason whatsoever, pass through and be measured by the measuring device would, naturally, follow the line of least resistance and never be discerned in the "bull's eye."

Further study of this assembly showed that it would not drain automatically below one-third or one-half of its capacity, this making it possible for the assembly including the hose, to be completely empty, without such fact being observed as a fact by the purchaser, and, therefore, it does very definitely become an aid in the perpetration of fraud. As an example, were the purchaser to call attention to the sight-glass not being full, the unscrupulous operator would reply that he had a slight leak and would make up for it by giving an over-registration, knowing that he had drained the system partially or completely before delivery was begun. The present-day "bull's eye" design of sight-glass also shows that the spinner is placed as close as possible to the inner surface of the "bull's eye" glass and is of such color and design as to act as a screen, thus causing any air bubbles which might possibly pass through this assembly to travel back of the spinner and not be noticeable. Another factor of considerable importance, is that the spinner is motivated by means other than the flow of liquid in the "bull's eye" glass itself, and that a spinner being thus driven will so agitate the liquid in its immediate area as to break up and minimize any air bubbles coming in contact therewith, which, together with the minimizing effect of the "bull's eye" glass, will render visibility ineffective to such an extent as to be deemed as creating an optical illusion.

In summing up this phase of my subject, the "bull's eye" design of sight-glass does not aid in the visibility of operation, is so designed as to create an optical illusion, is deceptive in operation, and, therefore, can be considered as an aid in the perpetration of fraud.

Now then, what conclusions can be drawn from the summaries related?

First, sight-glasses are very necessary in order to protect the purchaser and operator in the buying and selling of gasoline and petroleum products dispensed by the present design of gasoline pump.

Second, a very accurate and all-inclusive set of specifications and regulations should be drawn by the National Conference on Weights and Measures, making mandatory the use of sight-glasses.

Third, these specifications and regulations should be approved and recommended by the National Bureau of Standards for adoption by the States, cities, towns, and other jurisdictions, so as to have uniformity throughout the United States.

Fourth, in order to cope with the situation as found, we in North Carolina have drawn the following rules, regulations, and specifications:

All liquid-measuring devices commonly known as gasoline dispensing pumps for retail trade shall be so designed, built, and operated as to render visible evidence of the functioning of all its component parts, which shall meet the following requirements:

1. A discharge, leak, drain-back, or release by any other means whatsoever, of seven cubic inches of measured liquid shall become immediately obvious.
2. A discharge, leak, drain-back, or release by any other means whatsoever, of one quart of the measured liquid shall show the visible indicating device to be not less than 90 percent empty when the pumping element is not in operation.
3. In a delivery of five gallons, as indicated by the liquid-measuring device, if, and/or when seven cubic inches of said indicated quantity is air, vapor, or

other gas being discharged simultaneously with the liquid and throughout the period of time required for making said delivery at normal rate of flow and under normal pressure, the fact shall be readily discernible by a casual observer from any reasonable position taken by said observer.

4. These requirements shall be in addition to those which are now applicable and/or those which may hereafter become applicable to liquid-measuring devices.

I shall now endeavor to reproduce tests showing reasons resulting in conclusions as drawn, and in support of rules and regulations promulgated in my State.

I hope my discussion of this subject has been worth your time, and that when you go home you will give it some real study of your own accord, and if after making a study and test you do not agree with my conclusions, that you will communicate with me by letter, setting forth your findings, so that through cooperation of effort and coordination of ideas a true conception of the functions and operations of sight-glasses may be developed.

(At this point Mr. Baucum conducted a demonstration, with explanatory comments, of the effects discussed in his paper, utilizing an assembly comprising numerous elements of a commercial gasoline-dispensing unit together with certain special gages, valves, and other accessories.)

If there are any questions, I shall be glad to discuss them and to give you the benefit of my experience, after adjournment or while we are here during the week. As I said, I may be wrong in some of my conclusions; if I am, I shall be glad to be shown, because we are all here trying to work toward the end of doing the very best for the consumer.

Mr. NEALE. As I see it, this apparatus is entirely without an air eliminator, and in order to produce some of the results that Mr. Baucum has shown it is necessary that there be no air eliminator to take out air and also that air be let in.

Mr. BAUCUM. What Mr. Neale said is correct; there is no air eliminator. If the air eliminator is functioning properly there is no intake of air, and the pump works naturally.

The ACTING CHAIRMAN. Mr. Smith has an announcement to make before we adjourn.

Mr. R. W. SMITH. An effort has been made to procure advance copies of all papers which are being delivered to the Conference. Where we have been able to get these, they have been mimeographed, and after papers have been presented, copies will be available to those desiring them, both here at the Bureau and, on Thursday and Friday, at the hotel. The Conference Committee on Publicity and Education has encouraged us to do this, so that you might have copies of these papers to take home for immediate study, not having to wait until publication of the Conference report to review what has been said.

(At this point, at 1 p. m., the Conference took a recess until 2:15 p. m.)

SECOND SESSION—AFTERNOON OF TUESDAY, JUNE 4, 1940

(The Conference reassembled at 2:15 p. m., at the National Bureau of Standards, Lyman J. Briggs, President of the Conference, in the chair.)

AUTOMATIC-INDICATING SCALES—PRINTED WEIGHT INDICATIONS AND REMOTE WEIGHT INDICATIONS

PAPER OF J. F. CRUIKSHANK, GENERAL SCALE SALES, FAIRBANKS, MORSE & CO.

The general characteristics and fundamentals of the dial as a weight-indicating device are, we believe, quite generally understood by those interested in weighing equipment. It will therefore be necessary to mention only such features as are exclusive in the Fairbanks design, and we will confine our discussion principally to the construction and operation of the printing device, which will be referred to under its trade name "Printomatic Weigher."

We have two standard types of dials, the single column, as shown in figure 1, and the cabinet shown in figure 2. The Fairbanks dial is of the double-pendulum type but differs from other designs in that the pendulums, instead of swinging away from each other when the load is applied, swing in toward each other. As with all pendulum dials, the pendulum movements are actuated by a cam and steel tapes. Our standard dials have a 20-inch diameter at the reading line and are limited to a maximum of 1,000 graduations, so the capacity that may be placed on the dial chart proper depends upon the minimum graduation required.

When capacities are required in excess of what can be placed on the dial chart, it is necessary to use a capacity beam or bottle weight with the single-column dial, or if the entire weight is to be indicated on the dial chart, the cabinet-type dial is used with drop weights for the additional capacity.

With the cabinet-type dial and drop weights, each drop weight has a value equivalent to the capacity of the dial chart, so when the load to be weighed exceeds the chart capacity, weights are dropped onto a carrier connected to the beam lever, by means of a mechanical device operated by a wheel on the outside of the cabinet, as shown in figure 2. This same operation rotates a back chart to indicate the additional capacity at a series of windows in the face of the dial directly adjacent to the numbers shown on the dial chart, as illustrated in figure 3, so no mental calculation is required. This is an exclusive feature. The removal of the drop weights from the carrier is accomplished by a reverse movement of the wheel to which reference has been made.

The Printomatic Weigher is attached to the side of the dial housing, as shown in figures 1 and 2, and is purely a mechanical operation entirely independent of the weight-indicating mechanism of the dial; in other words, the dial can be operated as a plain dial or as a dial and printer.

Our standard Printomatic Weigher mechanism consists of four selector wheels mounted on the dial-indicator shaft, a horizontal selector wheel, a small motor, a clutch, cams, cam levers, type sectors

and connection, ribbon feed, etc., most of which can be seen in figure 4.

The selector wheels are separated by spreader bushings but securely fastened together, so they rotate with the indicator as one unit. Three of the selector wheels represent numerical digits; the first, or one nearest to the dial face, represents units; the second, tens; and the third, hundreds. The fourth is termed the "star" or "locking" wheel.

Teeth or notches are cut in the peripheries of the wheels, and on each tooth of the first wheel there are 9 notches or steps; on the second wheel there is 1 notch for each 10 notches on the first wheel, and on the third wheel there is 1 notch for each 10 notches on the second wheel. The periphery of the fourth wheel is very much like a fine-toothed circular saw, and has a tooth for each graduation on the dial chart. This wheel and its finger comprise the locking device for the dial indicator.

The selector fingers are mounted in a guide and have the same horizontal spacing as the selector wheels, so that the point of the finger, which is cut to fit exactly the notches on the wheel, will properly engage the notches. The other end of the finger is attached to one arm of a bell crank, which may be seen in figure 4. To the other arm of this bell crank is attached the type sector by means of a vertical bar. Each selector finger is actuated by a horizontal coil spring in tension. The selector fingers are adjusted so that the fourth or locking finger which engages the "star wheel" is advanced slightly farther than the other fingers, but all fingers are held back clear of the selector wheels (until the printing operation starts) by means of a cam-actuated bar under one arm of the bell crank, as shown in figures 4 and 5. This leaves the dial indicator and selector wheels free to rotate to the proper weight indication.

Figure 5 shows a side view of the type sectors, the printing platen, and the arrangement for printing records on a continuous tape. The type sectors are suspended from a shaft as shown, and are rotated thereon by the vertical movement of the connections to the bell cranks shown above the type sectors.

The standard Printomatic Weigher prints the record on a ticket; however, it can be furnished for printing on an original and duplicate tape, on a ticket and tape, and also on special record forms that may be used by the industry. The weight is always printed in full digits, as shown in figure 6.

The operation of the standard Printomatic Weigher is semiautomatic. The operator inserts the weigh ticket when the load is applied to the platform, and when the dial indicator comes to rest, a push button is depressed with the finger; this starts the motor and at the same time releases the clutch which starts the camshaft rotating. As the cams rotate, the bar holding the selector fingers back from the selector wheels is dropped, releasing the selector fingers to find the proper notches on their respective selector wheels.

The locking finger being set ahead of the other fingers finds its position on the "star wheel" and locks the dial indicator and selector wheels against any further movement during the printing cycle; the other selector fingers, which move forward at the same time, find their respective positions on the selector wheels, at the same time setting up the type sectors to a position where the digit on the sector corre-

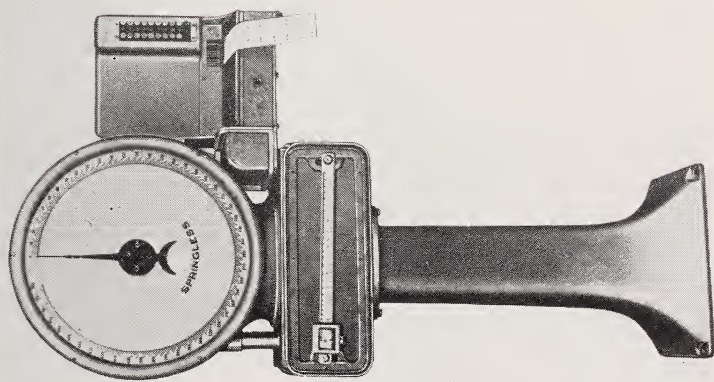


FIGURE 1.—Single-column dial.

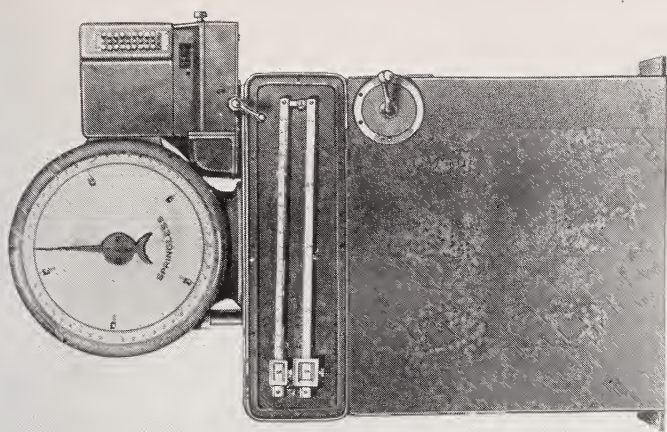


FIGURE 2.—Cabinet dial.



FIGURE 3.—Cabinet dial, showing drop-weight indications.

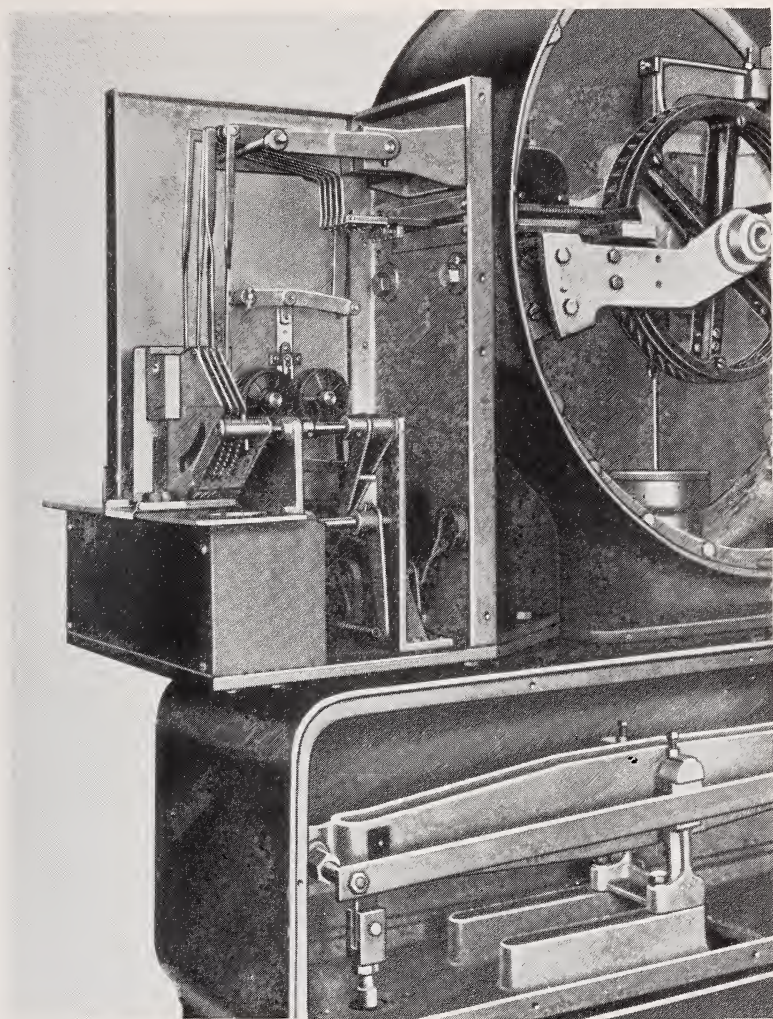


FIGURE 4.—*Printomatic Weigher mechanism.*

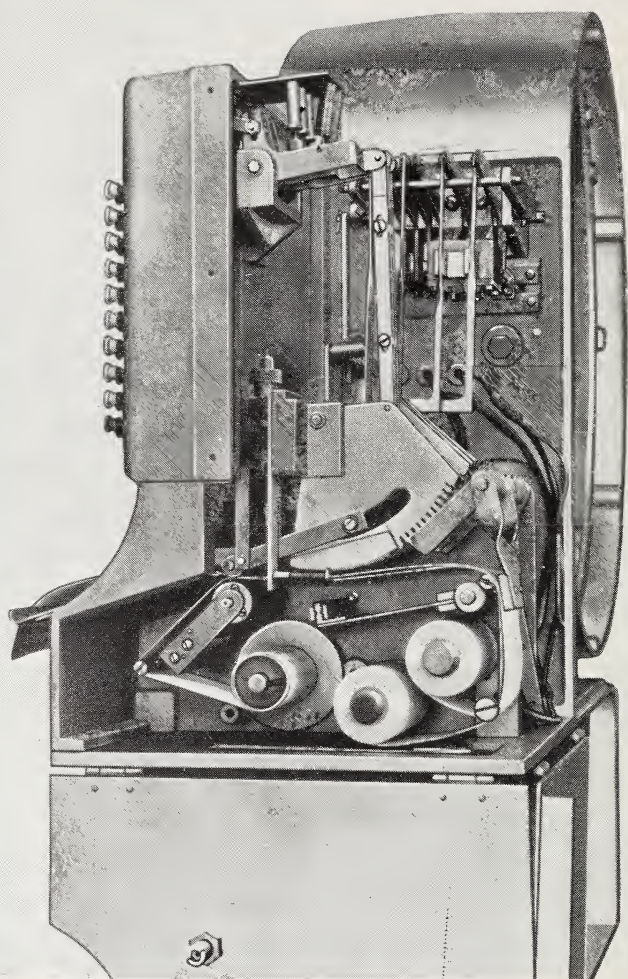


FIGURE 5.—*Printomatic Weigher mechanism, side view.*

sponds to the notch on the respective selector wheel. A further rotation of a cam releases the printing platen, which prints the weight by means of an inked ribbon, very much the same as on a typewriter or adding machine.

The entire printing cycle is completed with one rotation of the cam-

Number _____		Date _____	
Customer's Name _____			
Address _____			
Commodity _____		Remarks _____ _____ _____ _____ _____	
6 6 6 6 0 lbs. Gross			
1 1 1 1 0 lbs. Tare			
5 5 5 5 0 lbs. Net @ _____			
Per lb. Price _____			
Shipper _____			
Weigher _____			
FORM S J 2114 □			

4 0 8 5	B
4 0 9 0	B
4 4 2 5	B
4 6 7 0	B

FIGURE 6.—Weight ticket and section of roll tape showing printed records of Printomatic Weigher.

shaft, after which the clutch disengages and the motor is stopped automatically until called upon for the next printing operation.

The push or starting button on the standard Printomatic Weigher is usually located in the front housing plate of the printer, as shown in figures 1 and 2; however, this can be located for remote control at any place away from the printing device.

By the use of electrical gadgets, such as time delays, photronic cells, relays, solenoids, etc., and different combinations and arrangements, remote automatic weight control and printing can be accomplished.

The application and uses of the Printomatic Weigher are almost unlimited, but the purpose of this discussion has been to explain its construction and operation; like many of our modern automatic machines, this may appear to be complicated and hard to understand, but a little study of the device will reveal its surprising simplicity.

PAPER OF HARRY M. ROESER, MANAGER OF SALES AND SERVICE,
STREETER-AMET CO.

The primary purpose of an automatic weigher is to eliminate the faults of observations and functions that devolve upon frailty of human faculties necessarily used in determining weight. Machines for the purpose are found in a variety of forms, depending principally upon the purposes for which individual machines are used; and secondarily, perhaps, upon the price level, or what amounts to the same thing, the economic value of the weighing service to the user. So far as complete accomplishment of the primary purpose is concerned, the most advanced form is one which translates the value of the weight applied to the load receiving element into printed figures in the weigh office. This form is known to the trade as the Automatic Weight Recorder.

Generically, automatic weight recorders are of two kinds, each with its identifying characteristics which depend upon the basic principles of design. For the purposes of discussion these may be identified as (a) the typewheel machine, and (b) the selector-finger machine and, as will be shown, the names are cognate with the methods by which the machines translate the value of the weight to be printed and index it for printing.

Historically, the typewheel machine is the older, and in the form now found in trade its origin is contemporaneous with that of the Streeter-Amet Co. over half a century ago. The selector-finger machine began to find a market about 15 years ago at a time when the development of manufacturing methods made its economical production possible.

THE TYPEWHEEL MACHINE

In principle the typewheel machine is quite simple. In the conventional form of dial instrument, weight is indicated by a pointer which moves along a chart and stops at a position established by the applied load. An equivalent system may be imagined readily in which the dial or chart moves and the indicator remains stationary. Since the latter system comes to equilibrium with the weight indication of the applied load at a fixed point, the automatic weight recorder becomes a reality if means are provided for transferring from the dial to a tape or weigh ticket the indicated value of the load that appears opposite the fixed pointer.

Although the conception of the typewheel machine is no more complicated than just related, the mechanical details require some smart design and exacting workmanship to produce the practical results required by trade demands. Figure 7 shows a portion of the rim of a wheel from a 350,000- by 100-lb.-capacity machine. Those mechanically minded will quickly conclude that such a wheel must be as light as possible, consistent with the necessary strength; be accurately balanced about the axis of rotation; be truly circular; and that application of the type to the rim can become a tricky problem. Aside from the means for manipulating the wheel by the weighing mechanism, producing an automatic weight recorder of this kind depends upon satisfactory treatment of the details just mentioned. Such details, however important they may be to the builders, do not

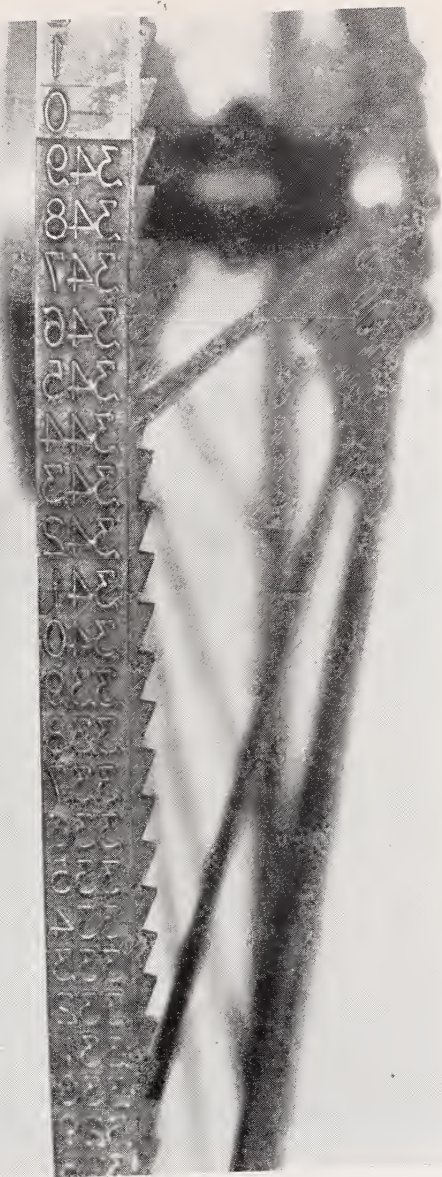


FIGURE 7.—Portion of rim of typewheel from a 350,000- by 100-lb. capacity automatic weight recorder.

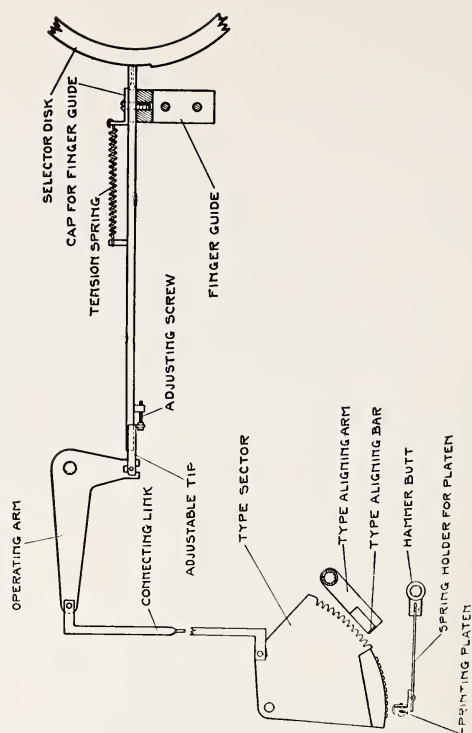
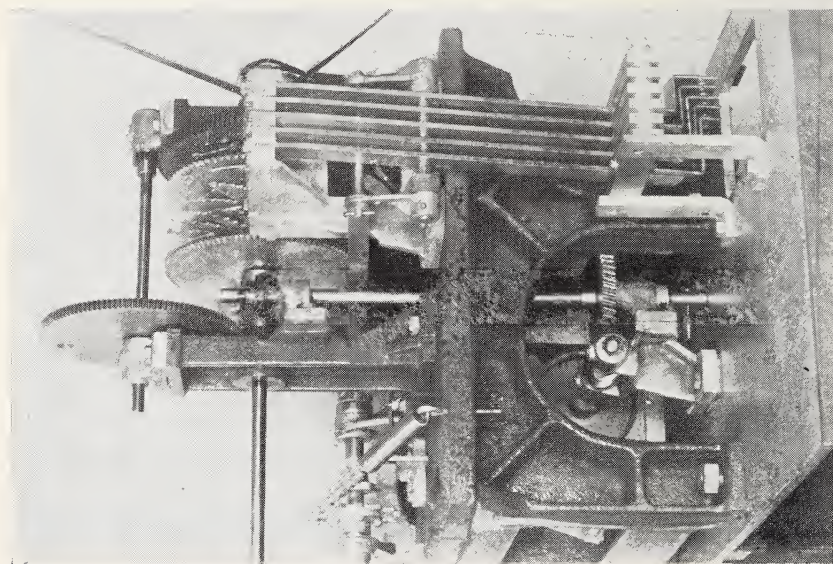


FIGURE 8.—Practical and schematic arrangement of a selector-finger automatic weight recorder.

greatly concern those interested in practical weighing results, and thus may be glossed over for the purposes of general discussion.

In figure 7 the type is on the rim or tire of the wheel. A wheel might be made, of course, with the type arranged radially on the side of the wheel; and, in some contemporary forms of the typewheel machine, instances of this construction are found.

In the operation of a typewheel machine the load on the scale is equilibrated in the conventional manner against a spring or other means. When this is done some member of the lever mechanism, such as a weighbeam, causes rotation of the typewheel about its axis. When equilibrium is reached a figure on the wheel that represents the amount of load is opposite a fixed indicator. A printing hammer is caused to strike a tape or card against the type at that point. The figure at the indicator is impressed upon the tape or ticket. Thus a permanent and legible weight record of the load is obtained without the participation of human faculties in the determination; a practical achievement of the primary purpose of the machine.

THE SELECTOR-FINGER MACHINE

In the selector-finger machine the essential processes of transmitting load to the indicating mechanism and bringing the weighing system to equilibrium are conventional. The distinctive features are in the weight indexing and printing mechanism. For a five-place machine, that is, one between 9,999- and 99,999-pound capacity, there may be five disks or type bars, one for each place, that carry the digits 0 to 9. The indexing mechanism is designed to arrange the type bars so that the number representing a given load on the scale will be alined in proper sequence for transfer to a tape or ticket. Figure 8 shows a schematic arrangement and a practical development of the indexing mechanism. The diagram illustrates one type sector, selector finger, and selector disk. In the upper central part of the photograph the notched members are the selector disks, or "step cams," for a five-place machine. For each weight value that can be printed by the machine there is one and only one position of the step cams uniquely determined when the system comes to equilibrium under the load on the scale. Thus the weight to be printed is "indexed" for printing at the step cams or selector disks.

In the photograph the selector fingers are not visible. They lie in a horizontal plane between the upper end of the vertical bars and the step cams. When a handle is pulled or a button pushed, the upper end of each bar is caused to move toward the step cams, and to continue the motion until the end of the selector finger to which each bar is connected is stopped by making contact with the surface of the corresponding step cam. This causes the lower end of the bar to move in the opposite direction and draw members hinged to the lower ends each carrying the digits 0 to 9 into line at the printing hammer. In this machine the type is on straight bars, and in that detail differs from the diagram where the type is shown mounted on a sector. When the motion is completed the printing hammer strikes against the type, causing a transfer of the alined figures to a tape or ticket. One other necessary function is performed immediately. After the weight is indexed, the first action in the print-

ing cycle is to automatically lock the indexing mechanism at the position of equilibrium to prevent destructive effects on the fingers and linkage while the printing mechanism is at work. Otherwise, a sudden change in the load on the scale would set up a motion of the step cams and cause the risk of shearing off the fingers as they move in to make contact.

Thus the recording functions of a selector-finger machine are a sort of hop, step, and jump affair. First, the weight to be printed is indexed by the load on the scale; second, the indexing mechanism is locked in the position of equilibrium; and third, the weight is printed. In the operating cycle of the typewheel machine the second step may be omitted, since the mechanical hazards that make it necessary may not occur.

In figure 9 is illustrated a 40,000- by 20-pound-capacity automatic weight recorder of the selector-finger type. The dial and recording mechanism are "full capacity"; that is, the use of unit or drop weights is unnecessary to determine the weight of any load between zero and the capacity of the machine. The dial is of the clock type. The small hand shows full thousands on the inner circle, and the large hand shows intermediate values on the outer circle. Weight records are obtained at the ticket guide below the dial face. A duplicate record of weights printed is kept on a tape that rewinds inside the housing. A device that totalizes the weights struck by the printing hammer is shown at the right of the head. At the left is a keyboard "identification" system by which truck numbers or other data associated with the weight are set up manually on the keyboard and automatically printed on the card and tape with the weight. A bull's-eye signal on the face of the machine shows when the weighing function is completed and the mechanism released for printing.

FORM OF RECORDS

Two forms of records from automatic weight recorders are illustrated in figure 10. The three samples at the right are the "line and index" form of record in which the weight values are established by the position of a fixed line opposite printed figures and lines from the typewheel. In this form, which is characteristic of the record from a typewheel machine, values intermediate to the main graduations may be read, and thus for certain purposes it has outstanding advantages. The form at the left is from a "full figure" printer and is characteristic of the records from a selector finger machine. No weight values intermediate to the graduations are possible.

A typewheel machine may be made either as a line and index printer or as a full-figure printer, although the latter is far less common. The selector-finger machine by the nature of its construction is a full-figure printer.

REMOTE INDICATIONS

The vast developments in the mechanization of industry inevitably brought about a demand for specialized weighing machinery. Among these is a fairly common requirement to deliver weight indications at an office desk or control panel too remotely located from the weighing station to permit the conventional train of levers between the scale and indicator.

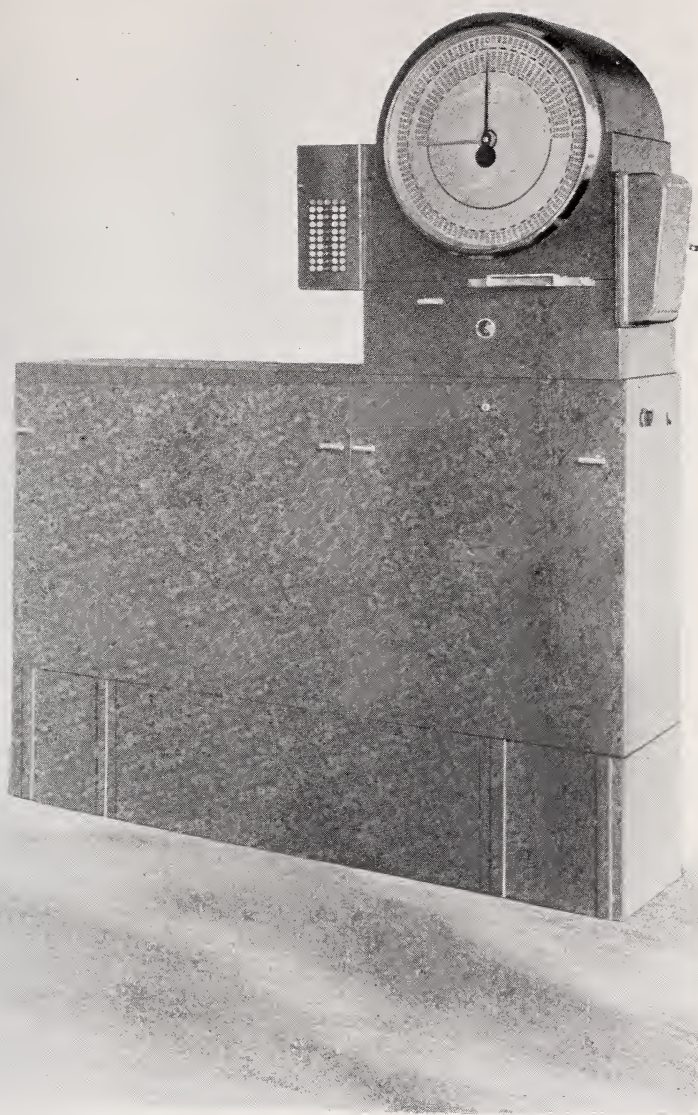


FIGURE 9.—*Selector-finger automatic weight recorder, equipped with accounting accessories.*

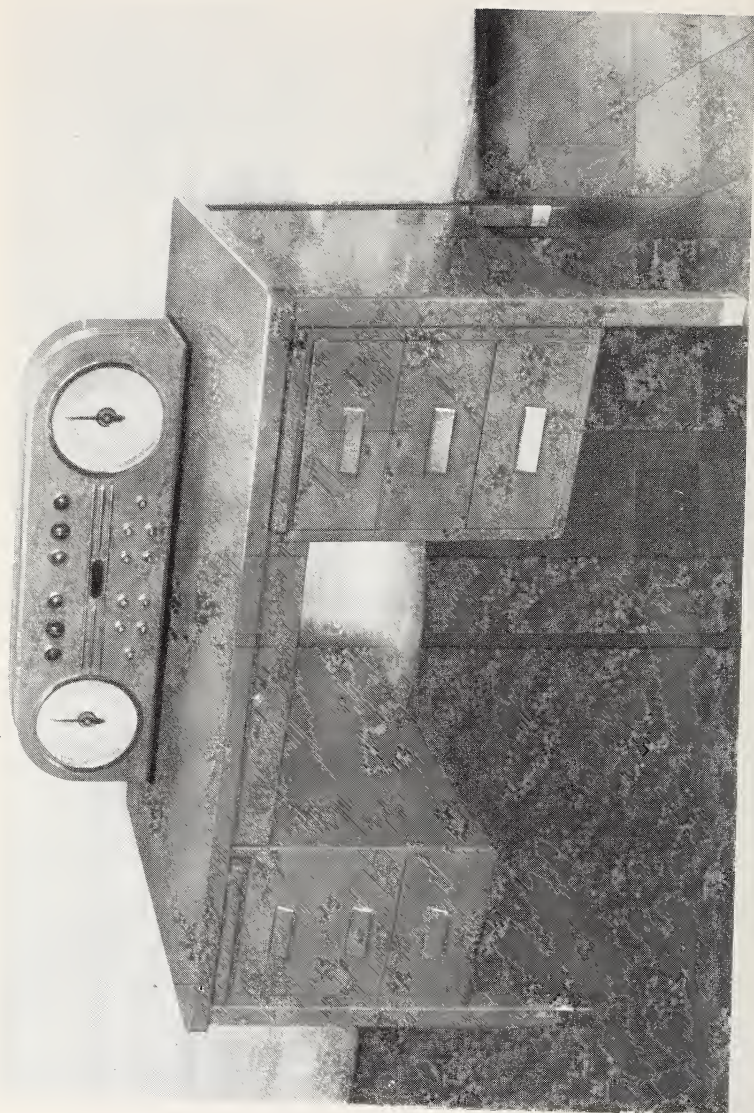


FIGURE 11.—Double-head remote indicator for two scales.

This has been worked out, using as a primary instrument at the weighing station a regular machine such as shown in figure 9. By an electrical hook-up the weight indications at the primary station are identically reproduced at the remote or secondary station. The possibilities are limited somewhat by the power facilities and electrical

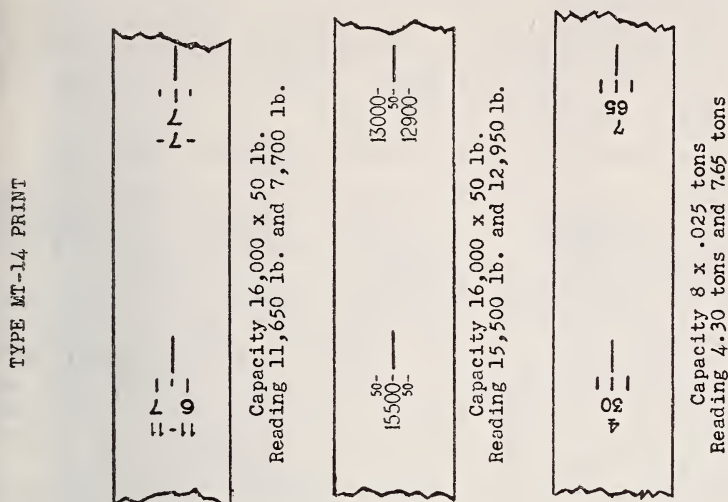


FIGURE 10.—Forms of printed records from automatic weight recorders.

properties of the necessary circuits, but generally speaking, the practical limits are broad enough to greatly enlarge the utility of weighing machinery.

In figure 11 are shown two remote indicating heads in the same panel that reproduce the weight indications from two primary weighers at remotely located scales. At the desk the operator may not only determine the load on each scale, but also may perform the

incidental functions of correcting the zero balance and locking down the weighbeams when the scales are not in use.

Remote indicators may be either recording or nonrecording. If the former, the recording function may be performed either at the remote station or the primary station or both. In any case, the function is controlled by the operator at the remote station. Usually, however, the recording is done at the primary station, since at that point weigh tickets have to be delivered to a truck driver, or a stock ticket has to be placed with the material being weighed. The machine in figure 11 is not a recorder.

PAPER OF H. W. HEM, ENGINEER, TOLEDO SCALE CO.

The success of the dial-type automatic scale has been due to the proved fact that this type of scale makes weighing more accurate and more rapid than did the ordinary beam-type scale, which the automatic scale has so generally replaced.

But between the accurate *indication* of weight on the dial of the automatic scale and the *record* of that weight, there still exists the human element, which is responsible for the most frequent and most serious mistakes and discrepancies in weights. Anyone with any knowledge of the limitations of human beings will agree that, as long as human beings must read, remember, and write down weight figures, then some errors in weight records are inevitable.

Just as the automatic dial scale has been a great improvement over its predecessor, the beam scale, so today the automatic weight-printing scale represents the next great step in the elimination of mistakes in weighing. The Printweigh delivers permanent printed weight records. It eliminates human errors, delays, and guesswork in the determination and recording of weight figures. And yet the Printweigh is not a complicated mechanism. It is electrically operated and can be used with practically any Toledo automatic dial scale not over 10 years old.

In the automatic dial scale, an indicator revolves around a fixed dial or chart. In the Printweigh, this lightweight indicator is replaced by an equally lightweight aluminum-alloy disk, as shown in figure 12. This disk weighs no more than the indicator, and therefore imposes no burden on the weighing mechanism. This is important both from the standpoint of accuracy and durability. The weight figures are printed from a row of raised figures which are etched on the face of this lightweight disk.

Referring to figure 13, the weight ticket or paper strip (1) goes between the printing disk (2) and a squeeze platen (3). An inked ribbon (4) passes between the ticket and the platen. This ribbon, similar to a typewriter ribbon, is automatically fed through and automatically rewound; it has a useful life of many thousands of impressions. Opposite the squeeze platen is a back platen (5). At the touch of the Printweigh operating button, the squeeze platen and back platen press together, with the aluminum disk, the paper strip, and the inked ribbon between them. The printing is positive and instantaneous. The entire operation requires less than one-tenth of a second.

The great advantage of this type of construction, which is obvious, is the simplicity of it. In addition, the Printweigh is exceedingly flexible in the variety of its applications. For instance, one single ticket may be printed each time. Also, this ticket can be ruled with

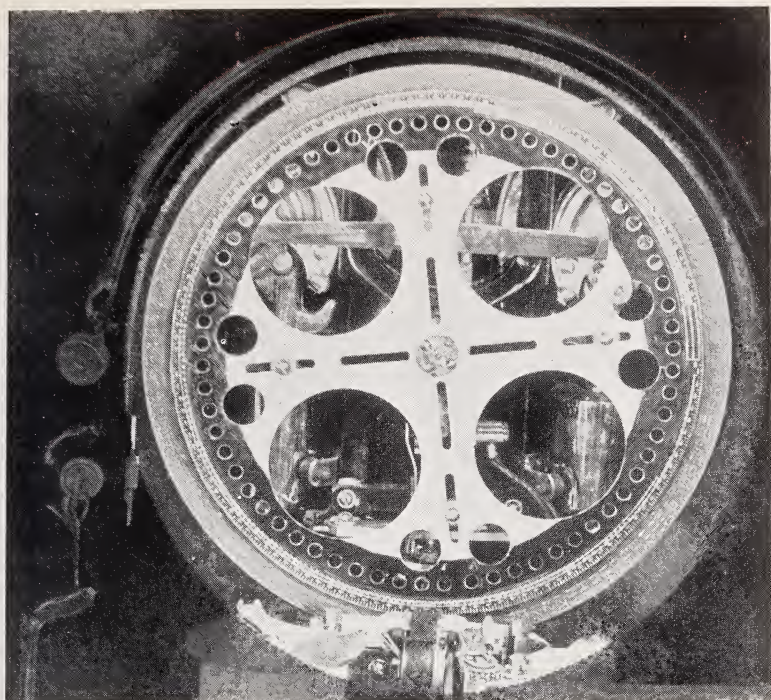


FIGURE 12.—*Printweigh disk.*

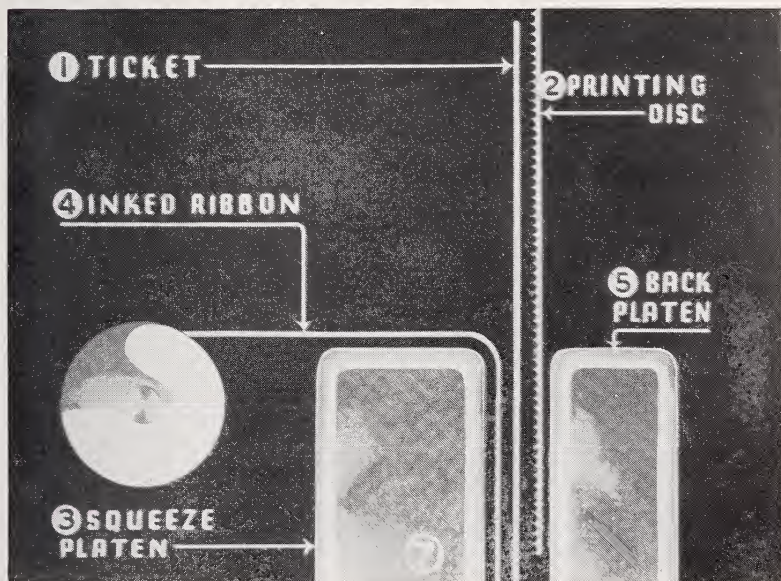


FIGURE 13.—*Diagram of Printweigh printing operation.*

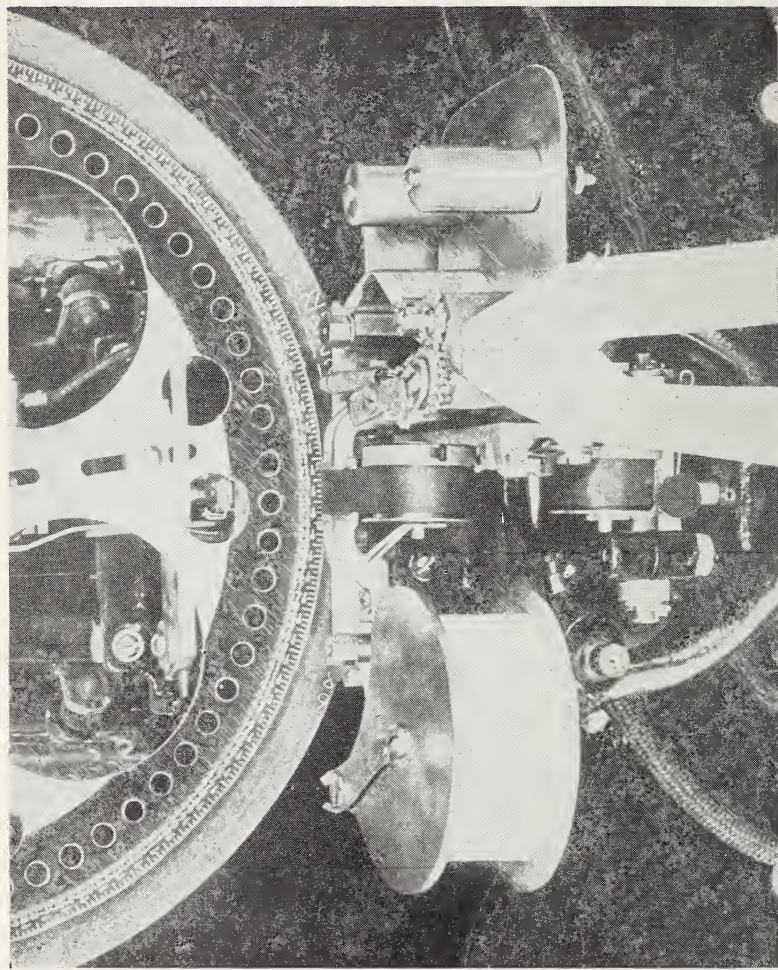


FIGURE 14.—*Printweigh double-strip record.*

ines, so that a series of weights can be printed on one ticket, using both sides if desirable. Where large accounting forms or long tickets are desired, these also can be accommodated. In fact, tickets of any length can be used.

In addition, it is equally possible to use a continuous strip of paper like an adding-machine tape. The roll of paper is inserted in the Printweigh and is automatically fed through the printing mechanism with the printing records evenly spaced on it. This strip can then be allowed to come out through the door so it can be cut off each hour, each day, or each week. Or this continuous strip can be automatically wound up inside, under lock and key, to be taken out at the proper time by one authorized person.

Also, a double strip can similarly be used, which provides a duplicate record on separate strips of each printed weight, as illustrated in figure 14. Here also, both strips can be allowed to come out through the door for immediate removal, or both of them can be wound up automatically inside, or one strip can be wound inside and one come out through the door. Furthermore, a combination of single weight tickets and a strip record can be used. As many as four copies of the weight record can be printed with one impression.

The operating control button is usually placed in a convenient position on the scale. But it can be easily located at some remote point entirely away from the scale. The control can also be automatically synchronized to operate with a conveyor line. In such cases the weight of the load passing over the scale automatically makes an electrical contact, which operates the Printweigh.

The Printweigh can be used with any type of electric current. All electric connections are fully protected by fuses, which are conveniently accessible and easily renewable.

The Printweigh can be positioned to face the platform of the scale; or it may face away from the scale; or it may be set at right angles to the long axis of the scale facing either way, as preferred. The Printweigh is available in any weighing capacities from 50 to 500,000 pounds.

This type of weight-printing scale is being used by an increasingly wide list of different businesses and industries. It is particularly valuable in all transactions in which the public is involved. For instance, a great many modern laundries use a Printweigh with a ticket which is given to the customer when the laundry is delivered, as positive printed evidence of the accurate weight of her bundle of laundry. (See fig. 15.)

Many coal yards use Printweigh records to show their customers that they do not depend on hand-made pencil figures for the accuracy of the weight of the coal they buy.

In coal mining the miners' compensation is usually based on the amount of coal delivered to the mine tippie. In such cases, Printweighs are widely used to avoid disputes between the miners and the management. In such cases it is possible to print not only the weight of the coal in the mine car, but also the hour at which the car is weighed, whether the hour is a. m. or p. m., and the miner's number or identification. As a result, both the miner and the mine office can have an accurate, machine-printed record fully identified, the weight of the coal and the time it was delivered to the tippie, with the identification of the miner who is to be credited with the load.

Similarly, in the dairy industry the farmers are paid by weight for the milk they bring to the dairy. Here again the possibilities of dispute are eliminated by furnishing each farmer with his individual weight ticket, on which is printed, each time, the weight of the milk he delivers. And, at the same time, a continuous strip inside the Printweigh makes a duplicate record of each weight with each farmer's number or identification on it, for use by the dairy in paying the farmer for his milk.

In many large distilleries and other large plants where bottled goods are shipped in cartons, the weight of each carton is automatically Printweighed and the printed record pasted on the carton, with a duplicate for the office record. This serves as an automatic check against claims for broken bottles, and protection for the bottler against thievery after the cartons leave the shipping platform.

These are just a few of the many practical uses for Printweigh records. It seems inevitable that ultimately this automatic, rapid, accurate, and reliable method of determining *and recording* weights will be universally adopted throughout business and industry.

The Printweigh is furnished in either the graduated type or the figure type. The graduated type prints a section of the dial showing the exact position of the indicator in relation to the graduations. The printed weight record is read the same as the visually indicated weight. For instance, on a 1,000-pound dial, which would normally show 1,000 graduations, the value of each graduation is 1 pound. If the visual indicator should come to rest between these 1-pound graduations, the same exact position would be shown on the printed weight.

The figure-type printer prints only one figure. (See fig. 16.) On this type of machine, if the dial prints 1,000 figures for a 1,000-pound dial, it prints to the nearest 1-pound figure. If the visual indicator comes to rest at the "critical point" exactly half-way between the even-pound graduations, the "weight selector," which is necessary on all figure-type printers, will select either one of the two nearest figures. For instance, if the scale should indicate $751\frac{1}{2}$ pounds, the figure printed will be either 751 pounds or 752 pounds. This, of course, happens when the indicator is exactly at the changing or critical point. This selection of figures on the Printweigh is made only on the lowest figure, which in this case is 1-pound on a 1,000-pound dial. So the maximum error that can ever exist from this cause, with the Printweigh, will be one-twentieth of 1 percent, which is well within tolerance.

The Printweigh and the continuous strip recorder, as well as the visual dial, can be used to operate a remote head. Remote heads are used when it is desirable to have the indicating mechanism at a distance away from the scale so great that it is impractical to use extension levers. They are used on dynamometer scales when it is necessary to have the regular dial head next to the machine being tested and at the same time have the remote head mounted on the instrument panel with the numerous other instrument dials necessary for this particular work.

Remote heads are also invaluable on calender or other large machines when it is necessary for two operators to read the indications.

Remote heads furnished by the Toledo Scale Co. are generally operated by two Selsyn motors. The motor on the remote head takes



FIGURE 15.—Commercial operation of Printweigh.

a position corresponding to that of the motor which is actuated by the scale head, which is in turn operated directly from the scale mechanism.

The CHAIRMAN. Have you any questions to ask of Mr. Cruikshank, Mr. Roeser, or Mr. Hem?

Before proceeding with the next item, I should like to call your attention to the equipment which the Service Station Equipment Co., of Muskegon, Mich., has brought to the Conference for your inspection and interest. The trailer carrying their exhibit will be found adjacent to the North Building, and I believe you will find it of interest.

I should now like to call Vice President Jensen to the chair.

(At this point, A. J. Jensen, Vice President of the Conference, assumed the chair).

REPORT OF COMMITTEE ON PROPOSED FEDERAL LEGISLATION TO PROVIDE ASSISTANCE FOR THE STATES IN ADMINISTRATION OF WEIGHTS AND MEASURES LAWS, PRESENTED BY JOHN P. MCBRIDE, CHAIRMAN

You will recall that the action of the Twenty-ninth Conference was against the adoption of a specific bill, a copy of which had been submitted by mail to all members of the Conference, but to have the Committee direct its efforts so that some appropriate action might be taken before the Congress to increase the appropriation of the Bureau for the specific purpose of operating testing equipment both for railway track scales and vehicle scales, to send representatives to State meetings and to assist the States, counties, and municipalities as might be requested from time to time.

After conference with the Senate Subcommittee on Appropriations, before the termination of our Twenty-ninth Conference, it was found that nothing could be accomplished for the fiscal year 1940, as the legislative session had completed matters of this nature and was ready for adjournment. The suggested method of procedure was to acquaint the Department of Commerce and the Bureau of the Budget with the desires of the Conference in this matter, and on July 27, 1939, the following letter was sent to the Secretary of Commerce.

Hon. Harry Hopkins,
Secretary of Commerce,
Washington, D. C.

Dear Mr. Hopkins:

For several years, the National Conference on Weights and Measures has considered the problem of achieving the uniformity desirable in proper national and local weights and measures enforcement and has had a committee particularly assigned to this task. This committee is made up as follows:

John P. McBride, Director, State Division of Standards, Boston, Mass., chairman.
Frank L. Hammon, Director, State Bureau of Weights and Measures, Boise, Idaho.
Rollin E. Meek, Chief, State Bureau of Weights and Measures, Indianapolis, Ind.
Charles C. Read, Superintendent, State Department of Weights and Measures, Trenton, N. J.
S. T. Griffith, Chief, City Division of Weights and Measures, Baltimore, Md.
J. H. Meek, Director, State Division of Markets, Richmond, Va.
W. P. Reed, City Inspector of Weights and Measures, Atlanta, Ga.

Many methods, seeking to accomplish this purpose, have been suggested, but it appears to this committee that a very sure means, not involving too great an

expenditure, would be set in motion, if, through your good offices, you could see your way clear to add to the Bureau of Standards appropriation, a sum of not less than \$25,000, this amount to be set aside for the express purpose of enabling the Bureau of Standards to render services by agreement with or at the request of weights and measures or other proper officials in the several States and Municipalities.

The Bureau of Standards is the fountainhead of national enforcement and promotion of uniformity, and it has achieved marked success along this line. Special testing equipment is sent to the several States and Municipalities and the Bureau representatives have in the past attended State meetings of weights and measures officials and this work has brought about the present state of progress in this field of law enforcement. The State and Municipal officials are duly grateful for this assistance and feel that the above-suggested appropriation will guarantee a continuance and enlargement of this policy.

I trust that you will act favorably on this request and if evidence is desired as to the value of this work to the several States and Municipalities, I will be glad to furnish the same.

Sincerely yours,

(Signed) JOHN P. MCBRIDE,
Chairman,

Committee to Provide Assistance for the States in Administration of Weights and Measures Laws.

On August 5, 1939, Colonel J. M. Johnson, Assistant Secretary of Commerce, acknowledged this letter as follows:

Mr. John P. McBride, Chairman,
Committee to Provide Assistance for the States in Administration of Weights and Measures Laws, Room 194, State House,
Boston, Mass.

Dear Mr. McBride:

Your letter of July 27, 1939, suggesting an added appropriation for the National Bureau of Standards to enable the Bureau to render service to the States and Municipalities by cooperating with them along the lines of weights and measures administration has been received.

We will be glad to give consideration to your proposal in connection with the preparation of our estimates for the fiscal year 1941.

Cordially yours,

(Signed) J. M. JOHNSON,
Assistant Secretary of Commerce.

On November 13, 1939, a letter was directed to Harold S. Smith, Director of the Budget Bureau:

Mr. Harold S. Smith, Director,
Budget Bureau,
Washington, D. C.

Dear Sir:

For several years the National Conference of Weights and Measures officials have been considering means to restore to the States the cooperative service of the National Bureau of Standards somewhat curtailed by lack of funds in that Bureau. The Federal Bureau is a clearing house for weights and measures problems and has demonstrated its ability to handle this problem with a view of promulgating uniformity in the enforcement activities in the various States of the Union.

It is now doing cooperative work in sending out the railway track scale testing unit and the vehicle scale testing unit and annually conducts a national conference for discussion of problems preliminary to advising on promulgations of the specifications and regulations. The former practice of the Bureau was to send delegates to the State conference for the purpose of discussion and advice but this has been discontinued for several years.

A committee was formed at the last National Conference in June of this year and I am its Chairman. The purpose of this committee is to promote cooperation between the State and Federal officials to the fullest. There are many fields in which this work can be enlarged but this is impossible without sufficient funds. At the suggestion of members of the committee, I am therefore requesting that

the sum of \$25,000 be set up in the Bureau of Standards appropriation for the purpose of aiding the States of the Union in matters in which they may seek further aid.

Very truly yours,

(Signed) JOHN P. McBRIDE,
Director.

On November 20, 1939, this letter was acknowledged as follows:

Mr. John P. McBride
Director of Standards and Necessaries of Life
Department of Labor and Industries
The Commonwealth of Massachusetts
Room 200, State House,
Boston, Mass.

Dear Mr. McBride:

The Director has asked me to acknowledge receipt of your letter of November 13, 1939, concerning an increase of Appropriation for the National Bureau of Standards for expansion of its cooperation with the States in matters relating to weights and measures, and to thank you for the information therein contained.

Very truly yours,

(Signed) L. C. MARTIN,
Assistant Director, Estimates.

On May 2, 1940, the following communication was received from L. C. Martin, Assistant Director on Estimates:

Mr. John P. McBride
Director of Standards and Necessaries of Life
Department of Labor and Industries
The Commonwealth of Massachusetts
Room 200, State House
Boston, Mass.

Dear Mr. McBride:

In response to your inquiry of April 23, 1940, relative to an increase of appropriation for the National Bureau of Standards for the purpose of aiding the States in the testing of weights and measures, the Department of Commerce Appropriation Bill for the fiscal year ending June 30, 1941, as passed by the House and the Senate, includes no additional amount for this purpose. The amount contained in the bill will, however, permit the National Bureau of Standards to continue in the fiscal year 1941 such assistance to the States as has been furnished during the current year.

Very truly yours,

(Signed) L. C. MARTIN,
Assistant Director, Estimates.

That, of course, is what the Bureau is doing now. It is not what we sought, so the letter was rather disappointing.

Through the good offices and courtesy of Dr. Briggs, it was possible for our Committee to meet yesterday afternoon with Major Jones of the Bureau of the Budget. We placed before him the ideas which we had in mind. We probably spent 2 hours discussing the proposition, and I hope that we have properly impressed Major Jones, so that when the 1942 Budget is prepared we will get favorable consideration. The Committee recommended an appropriation of \$25,000. However, we are not insistent on that amount, as that properly should be as the Director of the Bureau of Standards shall ascertain. After all, he is the man who is going to spend the money; we are merely suggesting a figure in round numbers.

The thought of the Committee was—and I think it is the thought of Dr. Briggs and was also his thought at the time of the presentation of the matter during the Budget hearings—that for a beginning the ideal thing would be to provide certain employees of the Bureau who might visit the various States and municipalities at their requests

for the purpose of instruction and cooperation, realizing that many jurisdictions are more or less without outside assistance in their weights and measures activities. Further than that, there is the possibility of an enlargement of actual testing services, such as is now being carried on by the Bureau Vehicle-Scale Testing Unit.

The other thought which the Committee had in mind was the thing which we particularly want—having a representative of the Bureau in attendance at our State meetings. We expressed that thought to Major Jones. Such attendance has been a distinct advantage to those States that have weights and measures meetings; it may have been burdensome to those members of the Bureau staff who have attended, but I know that in our State it has always been very worth while. We have had the distinct advantage of having a Bureau representative at our meetings, listening to our problems, and in turn giving a paper, and allowing himself to be subjected to whatever questioning might grow out of the meeting.

That, gentlemen, is the report of the Committee. We have not been as successful as we had hoped. Perhaps the reason for lack of success is that your Committee was not sufficiently active; we are so much imbued with the merits of our cause that perhaps we do not talk enough about it. If it is your desire to continue the Committee, the Committee would have in mind a more active program, constantly bringing this matter before the parties who are considering our proposition. We shall undoubtedly need your support in making contacts with your representatives in Congress to inform them of the needs of our work and the value of this assistance to all of us.

Mr. S. T. GRIFFITH. I move you, sir, that the report of the Committee be approved, and that the Committee be continued for the ensuing year and report at the next Conference.

(The motion was seconded, the question was taken, and the motion was agreed to.)

Mr. KANZER. The State of New York offers its complete cooperation in this matter, but I think it would like to be more active in the proposition. The Committee in due time should let us know how we can help by making certain contacts, and we can then go forward. I appreciate that the National Bureau of Standards cannot do that, but if the Committee will keep us informed, each of us in turn can contact certain sources to assist in the matter.

Mr. S. T. GRIFFITH. With the permission of Mr. McBride, Chairman of the Committee on Proposed Federal Legislation, may I offer the suggestion that the Committee Secretary undertake what Mr. Kanzer has requested, and keep all members of this Conference advised as to progress.

A NOVEL FORM OF WEIGHTS AND MEASURES SCHOOL

By CLEO C. MORGAN, *Sealer of Weights and Measures, City of Gary, Ind.*

Dictator Hitler, with his 70-ton tanks, parachute troops, fifth columns, diving planes with death-dealing bombs or machine-gun fire, and all the other modern techniques of mass butchery may "educate" a lot of people, but in Indiana the weights and measures inspectors have found an old, time-tried method of instruction very helpful. Twice a year they use a method of fact-finding perfected 24 centuries ago by a chap called Socrates. Twice a year the Hoosier inspectors wage "blitzkrieg" on their own shortcomings by that good

old method of asking questions and answering them. Unlike the casual question-answer routines of many organizations, the question-box of the Indiana Association of Inspectors of Weights and Measures has been set up as a semiannual school, and by the time 25 to 50 live questions have been X-rayed, dissected, and given the concentrated thought of those in attendance, there is no doubt about the answers.

Going on the theory that a good question deserves a better answer, the Indiana Association makes special preparations for its question-box school. About 2 months before the school begins, its originator, Rollin E. Meek, chief State inspector and association president, issues a call for questions to all inspectors. They may deal with problems, doubtful points, mechanical difficulties—in fact, anything in the field. Every inspector sends in one question or more. Strange as it may seem, the inspectors show a keen interest, and this is demonstrated by the fact they all send questions. The queries are sent to the capitol where a committee of three experts, headed by the chief State inspector, revises them, making any necessary clarifications. All questions are mimeographed and a copy sent to each inspector, along with an assignment to prepare an answer to one of them. Each inspector figures out his answer in preparation for an oral report at the school.

Success of our school, I believe, lies in the careful preparation of questions and answers, as well as the resulting interest among the inspectors. To give each school a more lasting benefit, the final outcome—and by this I mean the correct answers to all questions—is mimeographed and distributed. Right here I want to offer a suggestion for making this last service more helpful. I am satisfied that an index, cumulative from year to year, would give inspectors and other interested persons a ready-reference textbook, and this would fill a real need.

Our president usually appoints two chairmen. Last time we had C. C. Neale, manager of the weights and measures division of the Wayne Pump Co., on liquids; and M. J. J. Harrison, supervisor of scales and weighing of the Pennsylvania Railroad, on scales. Both are outstanding in the field. Now, school is in session, and this is how it is conducted.

The chairman reads a question and calls on the inspector who prepared an answer for his remarks. Usually, the chairman detects a controversial point and directs the discussion, but often other inspectors are quick to offer suggestions. Of course, some questions are quickly answered, while others are debated for an hour.

Here is one question that not only aroused a heated discussion but interested one oil company in developing a product previously overlooked: "Should inspectors recommend to operators of vehicle scales that they periodically grease the knife-edges and bearing steels of such scales?" You have heard that one before, I am sure, and I hope all have the right answer.

To give you an idea of the questions and the ultimate answers, I shall quote several:

"Limburger cheese comes wrapped in tinfoil, approximately 3 ounces per package, with no net weight shown on the wrapper. Retailer weighs package 'as is,' and charges for the gross weight, claiming that it is not required that the net weight be shown. Is it legal to sell without the net weight being shown, and should not the

sale be made on the basis of the net weight only?" And here is the answer, gentlemen, an answer that resulted from the discussion and which was drawn up by a special committee, about which you will hear more in a few minutes: "Tests made by the U. S. Department of Agriculture have indicated that the net-weight declaration on packages containing soft cheese (due to large moisture content) is of little value; therefore, if the cheese is actually weighed at the time of sale, little fault should be found with packages not labeled with net weight. The only proper basis for sale is by net weight."

The following is a question with a different odor, so to speak. "Can set onions be sold by the quart or any other measure?" The committee's answer was, simply, "No."

Here is another: "Should inspectors be as careful to test person-weigher scales regularly as they are to test scales for commercial purposes? What consideration should be given to the fact that users of person-weighers are paying for a service?" And the answer: "The fact that a charge is made for the use of a person-weigher makes it definitely a commercial device. As such, it should be regularly tested and required to conform to the appropriate tolerances."

One of the thought-provoking questions propounded at the silver anniversary convention in Terre Haute was this: "Should an inspector, when testing a vehicle scale and finding it in error the same amount on both ends (or on all corners, according to the procedure followed in making the test) make a special effort to determine if the error is in the poise? Further, has an inspector fully performed his duty when he has determined whether a weighing or measuring device is in tolerance, leaving the matter of determining the cause of error, and its correction, to qualified mechanics?" You probably know the answer, but here is the one which came from the school: "Insofar as his mechanical activities are concerned, it is the duty of an inspector of weights and measures to inspect and test commercial weighing and measuring devices to determine officially their fitness for commercial use. When that determination has been made, the inspector has complied with the letter of both the statute and the instructions under which he is presumed to be working. On the other hand, in the light of the inspector's experience, a faulty condition may be perfectly obvious, and its localization and correction may require only a few minutes of his time. However, for an inspector to engage in repair work is not generally considered good practice, and, above all things, the inspector should avoid 'starting something which he cannot finish'."

Now a more technical question: "Is it advisable to prosecute when a computing scale at time of testing stands at from 1 ounce to 1½ ounces fast at zero?" Our ultimate answer was: "Regulation K-3 of the Indiana 'Specifications, Tolerances, and Regulations' requires a scale in commercial service to be maintained in balance. The condition cited in the question is strongly suggestive of intent to defraud. The advisability of filing a complaint will depend on the attitude of the owner, on the good judgment of the inspector, and possibly on other circumstances. In some cases a warning has a better effect than a prosecution."

At our last school we had as members of the question-box committee, the co-chairmen, Mr. Neale and Mr. Harrison; C. L. Richard, a technologist of the National Bureau of Standards; Charles L. Barry,

Jr., deputy attorney general and legal adviser of the Indiana Bureau of Weights and Measures; and President Meek. Now you may wonder if this sort of school is more beneficial than other types. As the Gary inspector of weights and measures, I have attended a number of conventions and schools, but in my estimation the Indiana school gives the inspectors something outstandingly worth while. Our sessions are so interesting and instructive that there is none of the boredom seen at many conventions. Everyone has a chance to participate and to learn, and our moderators keep the discussion from wandering.

Since the questions discussed are initially submitted by the members of the association, it follows that a discussion of them is of interest to the entire membership. This is borne out by the way the crowd "stays" with the session. Personally, I learned much from each school, and other inspectors have expressed the same opinion.

Permit me to quote Mr. Harrison, our question-box co-chairman at the last school, on this. "It certainly seemed to me the discussions were of informative interest," he told me in a letter. "I know that I learned a lot, and certainly there was no lack of diverse comment on controversial points, all of which served to bring out what to me seemed to be very valuable thoughts. And, finally, an especially important part of the whole thing consisted in the recording and distribution of the 'answers,' all of which were thoughtfully prepared and carefully checked and reviewed in the light of the discussion in open meeting."

The Indiana association didn't arrive at its present type of school without experimentation. As a matter of fact, we started out in the rut of the old system, with the inspectors writing and submitting questions on arriving at the annual convention. Then 2 or 3 hours were devoted to answering them. This, it soon became apparent, was a time-wasting method, for the arguments got off the subject, no record was made of them, the men were unprepared, and the whole procedure was something like taking medicine.

Coming next was this refinement: The inspectors sent in their questions ahead of time, but assignments for answers were not issued until the last day of the convention. In the rush of convention doings, the inspectors had inadequate time to prepare, and no opportunity for doing any research.

In connection with our annual convention, we have a question-box program which is carried on as you have heard this afternoon. But the question-box school, held midway between conventions, is devoted entirely to this form of instruction.

Although the Indiana question-box school may not be perfect, yet I say it ranks high as a method of instruction. As I mentioned earlier, an index of the final answers would be a useful addition. This, I feel, would mark a further refinement, and undoubtedly, as more schools are held, other improvements will be made.

REPORT ON TESTING OF VEHICLE SCALES BY THE NATIONAL BUREAU OF STANDARDS IN COOPERATION WITH THE STATES

By RALPH W. SMITH, *National Bureau of Standards*

This report is the fourth in the series begun in 1937, presenting the results of the tests of vehicle scales made by the National Bureau of Standards in cooperation with the States. Except where otherwise

stated, the data presented herein represent results from the beginning of the Bureau's vehicle-scale testing service in 1936 to the completion of the scheduled testing in the State of Texas in April of this year; the period covered is, therefore, from November 1936 to April 1940.

Since the report made to the last Conference, testing schedules have been completed in the States of Iowa, Wisconsin, Minnesota, North Dakota, Nebraska, Kansas, Oklahoma, and Texas, and in the city of Chicago, Ill. There have thus been completed testing schedules in 30 States and in two large cities in other States. (See fig. 17.) During the past year, as before, the cooperating officials have been officers in charge of weights and measures departments where such departments have been in operation; in the States of

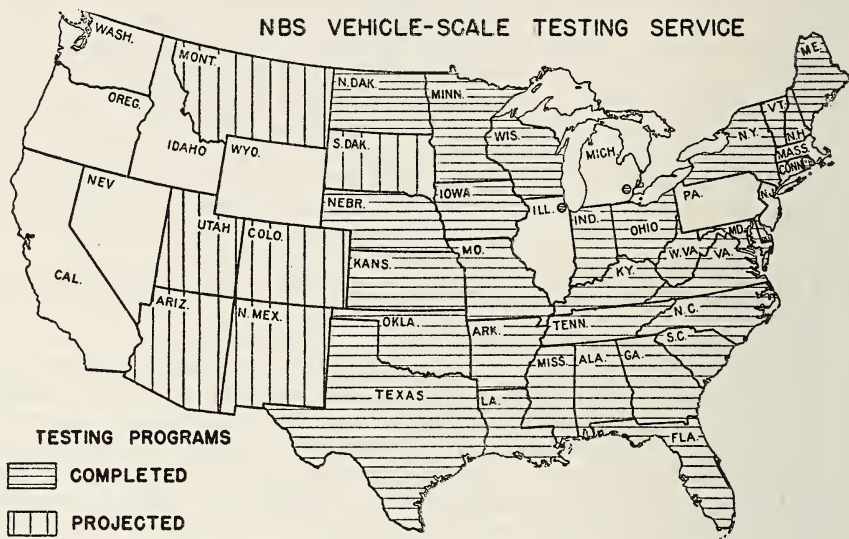


FIGURE 17.—*Distribution of tests.*

Kansas and Oklahoma the Bureau's program was carried on in cooperation with the State Board of Agriculture in each case. Whenever the unit visited a city having a local weights and measures official, such official cooperated during the tests made in his jurisdiction.

Although the Bureau has now made approximately 2,300 tests of large-capacity platform scales, this report is confined to the results of 2,161 tests, the remaining tests being on scales owned by the Federal Government or on scales not properly classified as "vehicle scales." In a very few instances a particular scale has been tested twice; in these cases each retest has been considered as a separate test for statistical purposes.

Of the 2,161 scales covered by this report, 735 scales, or 34 percent, have been wagon scales, and 1,426 scales, or 66 percent, have been motor-truck scales. Scales to the number of 538, or 25 percent of the total number involved, have been equipped with automatic-indicating devices. Of these, 472, or 22 percent of the total number

tested, have had automatic-indicating devices with substantial weighing ranges, while the remaining 66 scales, or 3 percent of the total, have been equipped with "over-and-under" attachments, the weighing range of which in each case represented only a small proportion of the scale capacity.

Accuracy.—Statistical data are presented in table 1, scales being separated first on the basis of type, and second upon the basis of ownership or principal use. Certain data are presented graphically in figure 18. Mean percentage errors are computed from the maximum percentage errors developed in the tests, regardless of the size or position of the test-weight load. Scales are classified as accurate or inaccurate upon the basis of the maintenance tolerance adopted by

NBS VEHICLE-SCALE TESTING SERVICE

NOVEMBER 1936—APRIL 1940

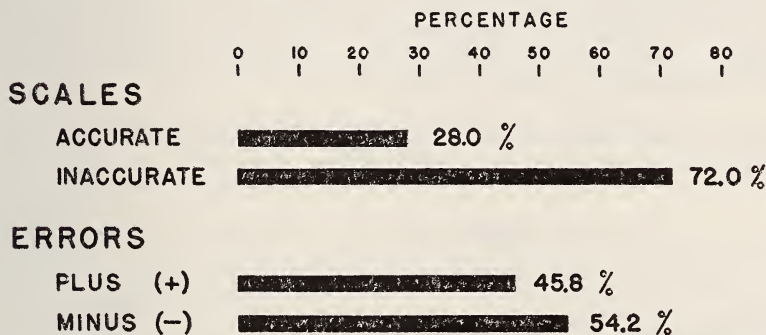


FIGURE 18.—Percentages of accurate and inaccurate scales and distribution of plus and minus errors.

the National Conference on Weights and Measures, which, in general, may be said to be ± 0.20 percent, applied to errors of the scale indications with respect to the standard-weight loads used.

TABLE 1.—Vehicle-scale test results, November 1936 to April 1940

Type, ownership, or use	Number tested	Found accurate		Found inaccurate		Numerical mean of maximum percentage errors
		Number	Percent	Number	Percent	Percent
Wagon scales.....	735	139	18.9	596	81.1	1.36
Motor-truck scales.....	1,426	465	32.6	961	67.4	1.02
State, city, town, or county.....	190	54	28.4	136	71.6	1.05
Coal or coke.....	1,143	291	25.5	852	74.5	1.00
Grain.....	237	108	45.6	129	54.4	1.01
Cotton or cotton products.....	221	65	29.4	156	70.6	1.52
Scrap materials.....	111	21	18.9	90	81.1	1.69
Miscellaneous farm products, including fruits and sugar cane.....	83	23	27.7	60	72.3	0.90
Stone, sand, or gravel.....	64	10	15.6	54	84.4	1.57
Public weighing.....	39	8	20.5	31	79.5	2.62
Miscellaneous.....	73	24	32.9	49	67.1	0.96
Total.....	2,161	604	28.0	1,557	72.0	1.13

The foregoing table discloses that more than 7 out of 10 of the vehicle scales tested by the Bureau have been found to be inaccurate, and that the mean of the individual maximum percentage errors developed is more than $5\frac{1}{2}$ times the basic tolerance of 0.20 percent. The average wagon scale was in error by more than the average motor-truck scale, and the percentage of wagon scales found inaccurate was approximately 14 percent higher than the corresponding figure for motor-truck scales.

As to scales used for particular purposes, it is again found that the two groups with the highest percentages of scales found inaccurate are the scrap material group and the building-materials group (stone, sand, and gravel), in each of which more than 8 out of 10 scales were found inaccurate; the group of nongovernment-owned scales used principally for public weighing is a close third, with almost 8 out of 10 scales inaccurate.

The scales reported upon include 49 scales found to have maximum errors in excess of 5 percent of the test-weight loads, 11 such scales having been encountered during the past year. If these 49 scales were to be disregarded because of their abnormally large errors and the data recomputed, the means of the maximum percentage errors would be reduced, as shown in table 2.

TABLE 2.—Numerical means of maximum percentage errors, November 1936 to April 1940

Type, ownership, or use	All scales	Excluding 49 scales having abnormally large errors
	Percent	Percent
Wagon scales.....	1.36	0.95
Motor-truck scales.....	1.02	.66
State, city, town, or county.....	1.05	.80
Coal or coke.....	1.00	.78
Grain.....	1.01	.54
Cotton or cotton products.....	1.52	.69
Scrap materials.....	1.69	.93
Miscellaneous farm products, including fruit and sugar cane.....	0.90	.71
Stone, sand, or gravel.....	1.57	.95
Public weighing.....	2.62	.79
Miscellaneous.....	0.96	.90
Total.....	1.13	0.76

Table 2 shows a material reduction in the magnitude of the average of the maximum percentage errors for each group, as a result of the elimination of those scales having abnormally large individual errors. However, even after these eliminations, the average figure for all scales is still almost four times the basic tolerance. The grain-scale group, which is shown in table 1 as having by far the largest percentage of scales found accurate, is shown in table 2 to have by far the smallest average of maximum individual scale errors after the exclusion of those scales having abnormally large individual errors.

A brief summary of the conditions prevailing in the 11 instances found during the past year, in which maximum individual errors exceeded 5 percent, will probably be of interest. Serious interferences between live and dead parts of the installations, frequently developing only under larger loads, were responsible for the abnormal errors in six instances, deflection of the weighbridge structure being

the proximate cause in each of three cases. Specifically, these six cases may be summarized as follows:

1. A wagon scale used for weighing coal, grain, and feed. Installed by owner 10 years ago; given field repairs by scale repair man within the past year. Maximum error developed, -25.17 percent. The weighbridge deflected under half-capacity load applied at the center of the platform, causing interference between platform and frame. Bad mechanical condition throughout.

2. A motor-truck scale used for weighing cotton, hay, and corn. Installed under the manufacturer's supervision 6 years ago. Maximum error developed, -36.23 percent, when tested under strain load. There were wholly inadequate clearances between lever system and foundation piers, and deflection of parts under load is assumed to have caused interference between levers and piers.

3. A motor-truck scale used for weighing grain. Installed by the manufacturer 2 years ago. Maximum error developed, -10.31 percent, when tested under strain load. Weighbridge deflection caused interference between weighbridge structure and lever system.

4. A motor-truck scale used by a State for weighing highway loads. Installed by a contractor 6 years ago. Maximum error developed, $+7.33$ percent, with weighing performance bad throughout. There was interference between platform and pit walls under small as well as large loads. The dial and unit-weight mechanism was badly out of seal and in poor condition.

5. A motor-truck scale used for weighing grain. Installed by a contractor 5 years ago. Maximum error developed, -5.79 percent, when tested under strain load. Out-of-plumb conditions in the lever system caused one lever to shift into contact with the pit structure when the scale was heavily loaded.

6. A motor-truck scale used for public weighing. Installed by the owners 2 years ago. Maximum error developed, -6.33 percent, but the test was interrupted because of the serious interference existing between scale platform and pit copings; the platform planks were swollen and were binding tightly on the copings.

One wagon scale used by a State for weighing cattle and grain, and installed originally by the owners, developed a maximum error of -18.20 percent, and one motor-truck scale used for weighing sand and gravel, and installed by the manufacturer 12 years ago, developed a maximum error of $+7.00$ percent; the weighing performance of each of these scales was bad throughout, and each scale was in bad mechanical condition.

One motor-truck scale used for weighing grain and for general public weighing, and installed 3 years ago by the owners, developed a maximum error of -6.63 percent under strain load, and one wagon scale used for weighing grain, and installed about 30 years ago, developed a maximum error of -21.83 percent, the weighing performance being bad throughout. In neither of these cases was the lever system accessible for inspection, so the causes of the abnormal errors could not be determined; however, ice in the scale pit may have been responsible for the errors of the second scale mentioned, and the field report on this scale notes the probability that the conditions found at the time of test had existed for several weeks prior to that time, during all of which period the scale was in regular use.

The final scale of this group of 11 developing abnormally large errors was a motor-truck scale equipped with an over-and-under indicator which was seriously inaccurate; exclusive of this automatic-indicating element, the errors of the scale were not abnormally large.

A study of the test results discloses that in the case of approximately one-fourth of the scales tested, there was faulty agreement among the several bars of the weighbeams (on scales not utilizing counterpoise weights), weighbeam indications were inaccurate independent of scale

ratio errors (on scales utilizing counterpoise weights), or weighbeams which were subordinate to reading faces were inaccurate.

There were encountered last year only 2 scales utilizing regular counterpoise weights, bringing the total of such scales to 143, or 7 percent of the total number of scales tested. There were utilized on these scales a total of 730 regular counterpoise weights of which 293, or 40 percent, were found to be accurate, 79, or 11 percent, were found to be heavy, and 358, or 49 percent, were found to be light; these percentages are unchanged from a year ago. During the past year, however, there were tested 14 scales on which "extra" counterpoise weights were in use; these were usually home-made weights or weights belonging to some small scale of low multiple, and hence incorrectly marked for the scale on which they were being used.

Sensitiveness.—Sensibility-reciprocal requirements were applicable to and SR data are available for, 1,617 scales, or 75 percent of the total tested. Of these scales, 645, or 40 percent, were not sufficiently sensitive; 959 scales, or 59 percent, were found to have SR values within the prescribed limits; and 15 scales, or 1 percent, were found to be in neutral or unstable equilibrium.

Zero-load balance.—Information is available for 2,119 scales as to the condition of their zero-load balance as found. Thirty percent of this number, or 630 scales, were found to have zero-load balance errors in excess of 5 pounds, and, in addition, 43 scales, or 2 percent, were found to have been balanced at zero load by means of weighbeam poises, these scales being in reasonably good zero-load balance condition as found, but having serious zero-load balance errors when all poises were returned to zero positions.

Loads weighed.—Upon the criterion that a wagon scale is suitable for the weighing of motor-truck loads only up to 60 percent of its "wagon" capacity, the percentage of wagon scales which have been overloaded in use has risen to 70 percent, representing 511 of the total of 735 wagon scales tested. Motor-truck loads equaling the "wagon" capacities of scales were reported as being weighed on 158, or 21 percent, of these wagon scales, while in 51 instances, or 7 percent, the motor-truck loads being weighed exceeded the "wagon" capacities of the scales. Again during this past year there was tested a 12,000-pound wagon scale on which motor-truck loads of 20,000 pounds were reported as being weighed, representing an overloading of 178 percent. It is to be remembered that when the Bureau tests a wagon scale, the test loads are limited to those which would be applied under conditions of proper use in accordance with the loading criterion previously stated; we are without information as to the errors which may be developed when these scales are overloaded as stated.

At the opposite extreme, we find many vehicle scales being used for the weighing of loads of less than 1,000 pounds, a practice contrary to the regulation adopted by the National Conference in 1937. Data on minimum loads being weighed on scales tested by the Bureau are available on 1,534 scales, of which number 806, or 53 percent, are reported as being used for the weighing of loads of less than 1,000 pounds. The weighing of loads of 100 pounds or less has been reported in the case of 427 of these scales, or 28 percent of the number on which minimum-load data are available. The present record for smallness of loads weighed on a vehicle scale was established during the past

year when one owner reported weighing 5-pound loads on his vehicle scale, presumably scrap material which was being purchased.

Results of inspection.—From the beginning of the Bureau's testing of vehicle scales, an inspection of the lever system and other parts of each scale has been a regular part of the Bureau testing routine. Inspections of lever systems are made in all cases where access to such parts may reasonably be had, but because of the absence of means for access to the scale pits or because of the presence of water, mud, or excessive accumulations of dirt in scale pits, no pit inspection, or only partial pit inspection, has been possible in the case of 201 scales, or 9 percent, of those tested.

Some of the unusual conditions disclosed by the inspections of vehicle scales during the past year are worthy of special comment:

Several instances were found in which over-and-under balance indicators, supplied by the manufacturer with a single "zero" graduation line, had been hand-graduated so that they might be used as automatic-indicating devices.

On one scale the lever system was so badly out of alinement that parts had been wired together in order to keep one set of pivots and bearings in engagement.

One scale was installed close to a river bank, and one side had settled approximately 4 inches below the other side, throwing the parts of the lever system seriously out of level and alinement.

Cases were found in which grain-handling structures had been built into scale pits, with dangerously small clearances between these structures and parts of the lever systems.

One scale house had been built so close to the scale that the weighbeam was mounted almost against the near wall of the house; it was necessary that the scale-house door be left open and that the weigher remain outside of the house when making a weighing, and it was also necessary to crawl over the weighbeam assembly in order to gain access to the scale pit.

An accident had resulted in breaking all of the levers below the platform of one scale; these had been welded, but apparently without any effort to reseal the levers to correct gage.

One of the home-made, extra counterpoise weights found in use on a scale consisted of a bottle of mercury, to which a wire hook was fastened for attachment to the weighbeam; another consisted of a number of lead battery connectors strung on a wire, with the nominal counterpoise value of the combination indicated on a paper tag tied on with string.

The pivots and bearings of one scale had been "protected" with linseed oil.

There is one condition which is not unusual—in fact, it is all too common—to which the Bureau desires to direct special attention. This is the practice, followed by many scale owners and scale erectors, of building scale platforms with openings of considerable width between the planks, apparently in the hope of inducing pit ventilation and discouraging rotting of the under sides of the planks. It is submitted that whatever slight advantages might be gained in these directions are offset many times by the disadvantages which are brought about through the inevitable entry of a far greater amount of water, dirt, sand, gravel, and other foreign matter into the scale pit than would enter were the platform weathertight. Moreover, such material entering the pit through openings between adjacent platform planks will be sure to fall upon scale parts which otherwise would be protected. In reporting upon scales having timber platforms in which the planks are not closely laid, the Bureau regularly recommends platform repairs to eliminate the openings between the planks. Weights and measures officials, vehicle-scale manufacturers, and scale erectors and repair men are urged to join with the Bureau in promoting the installation and maintenance of weathertight vehicle-scale platforms.

The general percentages included in the following statistical data resulting from the inspections of vehicle scales are based upon the total

number of scales examined, except in the case of automatic-indicating elements, where the basis is the number of scales equipped with such elements. The data enclosed in brackets are for the past year only, being based upon a total of 712 scales and a total of 188 scales equipped with automatic-indicating elements. The faulty conditions found upon inspection are summarized in table 3.

TABLE 3.—*Vehicle-scale inspection results, November 1936 to April 1940*

[Data in brackets are for period April 1939 to April 1940]

Condition	Occurrence	
	Number	Percent
Accessibility of lever system:		
Reported as "bad".....	104	5
Reported as "poor".....	415	19
Reported as "fair".....	832	38
Reported as "good".....	643	30
Reported as "very good".....	164	8
No provision for pit drainage or information not available on this factor.....	1, 158	54
[Pit repairs needed.....]	36	2]
Scale approaches:		
Rough.....	131	6
Curved.....	278	13
Inclined to scale platform.....	1, 154	53
Inclined to scale platform at angle of 3° or more (included in preceding entry).....	590	27
Water standing in scale pit and/or clogged pit drain.....	263	12
Accumulation of dirt in scale pit ¹	905	42
Rusting structural steel in scale pit.....	723	33
Pivots and bearings of the lever system:		
No protection against corrosion.....	897	42
Only partial protection against corrosion.....	131	6
Rusting or dirty.....	1, 076	50
Worn.....	323	15
Displaced from proper relative positions, or displaced entirely from mutual contact.....	260	12
Levers out of level.....	392	18
Beam rod, bearing assemblies, and/or connections between levers out of plumb.....	835	39
Interference between, or inadequate clearance around elements of the lever system.....	287	13
Loose levers or lever extension arms.....	85	4
Faults associated with lever stands or supports.....	132	6
Faulty lever foundations.....	50	2
[Faults associated with weighbridge girders.....]	18	3]
Faults associated with platform checking means.....	452	24
Clearances between scale platform and coping too large, too small, or both.....	757	35
Platform in need of repair.....	598	28
Platform not in surface alinement with coping.....	228	11
Inadequate clearance around beam rod.....	89	4
Weighbeam assemblies:		
Dirty, rusted, or tarnished.....	489	23
Mechanical faults associated with some part of the assembly.....	360	17
Loose parts or insecure mounting.....	249	12
Automatic-indicating elements:		
Interference in the mechanism.....	96	22] based on total of 538.
Faulty indications (does not include weighing inaccuracy).....	58	
[Other faults associated with automatic-indicating elements—based on total of 188.....]	34	18]

¹ During the past year, 93 instances (13 percent) of actual interference of foreign matter with lever systems were reported.

It is interesting that of the 34 general percentages reported in table 3, 6 are the same as the corresponding percentages reported last year, and that the others differ from the corresponding percentages reported last year as follows: 7 were 1 percent higher and 9 were 1 percent lower than before; 1 was 2 percent higher and 1 was 2 percent lower; 1 was 3 percent higher and 1 was 3 percent lower; 2 were 4 percent higher and 5 were 4 percent lower; and 1 was 7 percent higher.

Mr. C. P. SMITH. When you know scales are being used with an overload, why do you not try them with the overload?

Mr. R. W. SMITH. Because we will not take the responsibility for possible damage to a scale part or to an installation resulting from

deliberately exceeding the rated capacity or the rated loading of a scale. There are times when we should like to do this, to learn the performance of the scale under actual conditions of use; but suppose we did do this, and our 40,000-pound truckload started on its way down to the bottom of the scale pit—we would be in serious trouble. We think it better to avoid such a situation.

Mr. C. P. SMITH. Is there any follow-up to your program, after you condemn 75 percent of the scales you test?

Mr. R. W. SMITH. In answer to that question I would remind you that the Bureau testing is carried on strictly in cooperation with State and local officials, and that we do not have any regulatory powers—we cannot condemn a scale. Moreover, we do not ask to have reports made to us on repairs made to scales subsequent to our tests, because our testing schedules do not permit us to return and make retests. It is the responsibility of the officials with whom we cooperate to take such steps as they deem appropriate to follow up on scales which we have found to be in need of repairs or adjustments.

In some cases, officials accept our tests just as though they had made them themselves, and accept or reject or condemn upon the basis of our results; in other cases they merely accept our results as information, and take no official action. Recently more officials have been sealing or condemning on the basis of our tests than was formerly the case, but such actions are definitely the actions of the officials themselves and not of the Bureau.

DISCUSSION ON INFORMAL MEETING TO CONSIDER METHODS OF SALE OF COMMODITIES

Mr. PISCIOTTA. I should like it if we could get together some time' perhaps tomorrow afternoon, to discuss certain problems confronting us. For instance, there are such questions as the proper method of selling cotton batting, whether toilet tissues should be sold by weight or count, and whether wrapping paper should be sold upon a gross or net basis. If it is at all possible to arrange such a meeting for tomorrow afternoon, and if there are those who would be interested—men who have already gone through the laboratories of the Bureau—I should like Mr. Smith to make suitable arrangements.

Mr. R. W. SMITH. I understand that a meeting has already been scheduled between certain representatives of the cotton-batting industry and weights and measures officials, for tomorrow afternoon.

Mr. PISCIOTTA. We know of that, and in view of the fact that that meeting is scheduled for 4 o'clock, it is suggested that we meet a little earlier to take up these other matters.

Mr. R. W. SMITH. Why is it not appropriate for discussions not specifically mentioned on the program to be held at the time that has been especially set aside for that? Since there is scheduled for tomorrow afternoon a tour of the Bureau laboratories, which certainly will be interesting to those who have not made the tour, it seems unfortunate to set up a definite counter-attraction in which the delegates might also be interested. We have a program item "General Consideration of Subjects of Interest and Questions Brought up for Discussion by Officials" scheduled on Thursday afternoon and on Friday morning, and the Friday sessions may be continued throughout the afternoon if necessary.

Mr. O'KEEFE. Another thing that is very important in Chicago at the present time, and is going to be important in other cities, is that showcases are being built all over the country with no provision at all for mounting scales. In Chicago you can see the indicator at all high showcases, but that is all that can be seen, as the scale is down behind the showcase. I do not know that we can do anything with the showcase manufacturers, but if we cannot talk about it here, I do not know where else we can discuss it. I am leaving here Friday noon or Friday morning sometime, and I should like to talk over some of these things with some of the State officials.

Mr. S. T. GRIFFITH. Item 29, Thursday afternoon, and item 32, Friday morning, both provide for the discussion that Mr. Pisciotta and Mr. O'Keefe have mentioned; these questions are of such vital interest to the whole body that I think we should discuss them here in open meeting as the schedule provides. The tour of the Bureau will be held tomorrow afternoon; that is always interesting even though one has seen it often, because there are always new features being discussed and we can learn something.

Mr. O'KEEFE. Mr. Pisciotta is merely asking if there are any gentlemen who do not want to make a tour of the Bureau who would give up their time to sit down with us a few minutes.

Mr. R. W. SMITH. In order that you may not misunderstand me, let me say that certainly I am not one to try to stop discussion. I think that is what we are here for; we may get more out of the discussions than we do out of some of the items on the program.

As far as the physical accommodations are concerned, there is no problem; if the committee room is not adequate to serve the purpose, larger rooms are available at the hotel. I shall be very glad to make any arrangements that you desire.

Mr. PISCIOTTA. I am afraid, Captain Griffith, that Thursday afternoon and Friday morning are going to be busy times. It is problematical how long the discussion on standardization will take. Although provision is made on the program for general discussion of unscheduled items, we may find ourselves without sufficient time to discuss these vital problems which we wish to talk about. If arrangements can be made, Mr. Smith, for some time tomorrow afternoon for those who wish to discuss these things, I hope that you will try to arrange it. I do not believe that we can possibly cover these matters on Thursday, and on Friday it is going to be as it has been in the past—everybody will be in a hurry to get away.

The ACTING CHAIRMAN. All of those who wish to participate in the meeting that Mr. Pisciotta and Mr. O'Keefe have proposed, please signify your intention by raising your hands.

(There was a considerable showing of hands.)

Mr. KANZER. In addition to the problems that have been mentioned, I can add several others involving cooperation and uniformity. For those who have already seen the National Bureau of Standards, I know of no better time than tomorrow afternoon to get together in a way that we feel would do us the most good; I am strongly in favor of the proposal.

Mr. McBRIDE. I think this is taking a good deal of time, but there appears to be a desire to hold this informal meeting. I think that the best way of disposing of the question is that the Secretary be instructed to ascertain at what time, either tomorrow or the next day, suitable

space can be obtained, and to announce this and let the group arrange to attend that meeting. It is entirely voluntary and anyone who wishes can skip the trip through the Bureau.

Mr. R. W. SMITH. There is no question of availability of quarters. I shall be glad to arrange for them at the hotel at any time and for as large a group as may gather.

Mr. PISCIOTTA. Will you arrange it for about 2:30 tomorrow afternoon at the hotel?

Mr. R. W. SMITH. I shall make those arrangements, and at the session tomorrow morning I shall announce just where the meeting will be held.

"SELECTION, INSTALLATION, AND MAINTENANCE OF VEHICLE SCALES"—A SOUND-SLIDE TREATMENT OF FORM NBS 256

By LLOYD ELLINGWOOD, *Toledo Scale Co.*

What I have to present is a recorded program, which will speak for itself. As an introduction, let me say that I believe everyone here is acutely conscious of the development which has been going on in the past 10 years in the use of and requirements for big scales for weighing trucks and truck loads. Unfortunately, the one fellow who should be here and who should be most conscious of big-scale requirements today is not here—that is the fellow who buys them. It certainly is true today as it never has been before that the purchase of a large scale is an important item that deserves serious consideration on the part of the purchaser. Quite obviously many of the difficulties which Mr. Smith pointed out, the things which his men have uncovered, are the result of indifference and carelessness on the part of the purchaser in years gone by, plus a big increase in the weighing requirements; this has led to the situation of many inadequate scales being used for large loads today.

If we can take the ideas and the information and the knowledge possessed by your group and project it among purchasers and prospective purchasers of vehicle scales, a great many of our problems now and in the future will be solved, or, certainly, lessened. This program is an effort to accomplish something along that line. In our opinion the best boiled-down summary of information on vehicle-scale data is National Bureau of Standards form NBS 256. Accordingly, we have taken this form and, with the full consent of the Bureau, have quoted from it and illustrated it in this program.

In addition, there is another angle which the purchaser should certainly keep in mind, and that is the matter of weights and measures activity in the policing of vehicle scales; as most of you know, and as we will show you in the latter part of the program, that phase of weights and measures activity has increased tremendously in the past 10 years, paralleling the increase in the use of big scales with big trucks and big loads. So there are two features of this program: First, an attempt to summarize and boil down still further and illustrate NBS 256; and second, to point out to the prospective purchaser the advisability of consulting his local weights and measures department and understanding the operation of weights and measures enforcement before he invests his important money in a new vehicle scale.

I will now turn on the sound and you can hear the program.

(At this point, the sound-slide film was projected.)

I should like to say that our company is greatly indebted to the National Bureau of Standards and to those State and local departments who furnished us with the pictures upon which this program is based. Additional films and records of this program are on file in 85 of our offices throughout the country, and they are available for showing, without charge, upon the request of any of you gentlemen.

(At this point, at 4:40 p. m., the Conference adjourned, to meet at 10:00 a. m., Wednesday, June 5, 1940.)

THIRD SESSION—MORNING OF WEDNESDAY, JUNE 5, 1940

(The Conference reassembled at 10:05 a. m., at the National Bureau of Standards, Lyman J. Briggs, President of the Conference, in the chair.)

APPOINTMENT OF COMMITTEES

The CHAIRMAN. I wish to announce the membership of the following committees:

As the Committee on Nominations: Joseph G. Rogers, of New Jersey, Chairman; G. K. Heath, of Maine; John J. Levitt, of Illinois; Howard E. Crawford, of Jacksonville, Fla.; R. L. Fullen, of Dallas, Tex.; Matthias A. Harrington, of New York, N. Y.; Tom Webb, of Nashville, Tenn.

As the Committee on Resolutions: Carlton L. Klocker, of Connecticut, Chairman; C. D. Baucom, of North Carolina; V. D. Campbell, of Ohio; Charles M. Fuller, of Los Angeles County, Calif.; S. T. Griffith, of Baltimore, Md.; B. W. Ragland, of Richmond, Va.; L. E. Witt, of Milwaukee, Wis.

I wish to call Mr. Pisciotta to the chair, if he is present.

(Mr. Pisciotta was not in the room.)

I will then ask Mr. Davis to take the chair until such time as Mr. Pisciotta may arrive.

(At this point, H. N. Davis, Vice President of the Conference, assumed the chair.)

ANNOUNCEMENTS BY THE ACTING SECRETARY

Mr. R. W. SMITH. I wish to call the attention of the Conference to the fact that the Report of the Committee on Specifications and Tolerances was made available yesterday in mimeographed form for your study. Copies are still available, and it is suggested that you provide yourselves with these and retain them for use when the report of the committee comes before the Conference on Thursday morning.

There are also available copies of the registration list of yesterday.

I think you will be interested to learn of a number of letters which have reached me in relation to the attendance of some of the State representatives who have found it impossible to be with us this year. Mr. Marcotte of New Hampshire was planning to come, but at the last minute he found that funds which he had set aside for that purpose were required to meet an emergency, so he had to cancel his plans. I have a letter from J. C. Tinkey in which he wishes the Conference a successful series of sessions, and asks to be remembered to all of his friends; Mr. Tinkey was the Deputy State Sealer of Ohio for many years, but is now retired.

Mr. Warner, of Wisconsin, says that his Department—not his immediate Division—has suffered a \$50,000 cut in funds, which necessarily made it impracticable for him to come. Mr. Dinsmore, of Nevada, wishes us a successful Conference. I am advised that

Mr. Hammon, who represented Idaho at our meeting last year, is no longer in the work, and that his successor has not yet been appointed. Mr. Walker of Alabama expresses his regret that he cannot be with us, and a similar letter has been received from Mr. White of Washington.

The State of Kansas has no agency which is active in all fields of weights and measures work, but Paul Ijams, Director of the Control Division of the Department of Agriculture, with whom we cooperated on our vehicle-scale testing program in Kansas, was hoping to attend the Conference this year. He now writes me that they are so interested in establishing general weights and measures supervision in the State that they are taking what they believe to be the necessary steps to that end; as a result of conferences which have been held among the State officials, it appears to have been decided that the Board of Agriculture will not be the most suitable agency to carry on such work, and therefore, Mr. Ijams said, it seemed inappropriate that a member of the staff of that Board attend our Conference. I am sure that you will be interested to know that Kansas is at least thinking seriously about putting into effect a comprehensive weights and measures control system.

Mr. REED. Mr. Wilson of Georgia regrets that he cannot attend this year because of an injury resulting from an accident, and asks to be remembered to the members of the Conference.

MEASUREMENT OF LIQUEFIED PETROLEUM GASES

PHYSICAL PROPERTIES AS AFFECTING MEASUREMENT, A PAPER PRESENTED BY E. R. WEAVER, NATIONAL BUREAU OF STANDARDS

Definition and Properties of Liquefied Petroleum Gas.—The awkward name "liquefied petroleum gas" is applied to hydrocarbon fuels which have boiling points below or at about the freezing point of water, but which are not too volatile to be transported and stored in liquid form without using excessively heavy containers. These materials, therefore, combine the simplicity and ease of use and control which are characteristic of gaseous fuels, with the economy of transportation in batches possible for a liquid; and it is this combination of properties that gives the liquefied petroleum gases their place in commerce.

Of the chemical compounds that occur abundantly in nature, only the two hydrocarbons propane and butane have the characteristics stated. Ethane, which is next to propane in the chemical series, requires excessively heavy containers if it is to be transported as a liquid in ordinary weather, while pentane, just beyond butane in the chemical series, requires facilities for vaporization or "carburetion" nearly as troublesome as those needed for still less volatile gasoline. However, both ethane and pentane may occur in solution in propane and butane, and commercial liquefied petroleum gas may be a mixture of two, three, or four of the individual hydrocarbons mentioned. The 4 carbon and 10 hydrogen atoms of the butane molecule may also be arranged in two ways to form the compounds, normal butane and isobutane, which are sometimes separated commercially and which differ materially with respect to physical properties. Liquefied petroleum gases from refineries may also contain significant amounts of the unsaturated hydrocarbons, propylene and butylene.

Some of the more important properties of the hydrocarbons mentioned are given in table 4. The properties of mixtures which are

important in connection with their use as fuels, heating value, vapor pressure, density in both gas and liquid phases, and air required for combustion, are all substantially linear functions of composition, expressed in mole-fractions, and can be easily computed with enough accuracy for many purposes from the data in table 4. Much more complete tables are given in the excellent Handbook of Butane-Propane Gases. [Published by Western Business Papers, Los Angeles, Calif.]

TABLE 4.—Characteristic properties of hydrocarbons which may be present in liquefied petroleum fuels

Substance.....	Ethane	Propane	Isobutane	Normal butane	Pentane	Propylene	Butylene
Formula.....	C_2H_6	C_3H_8	C_4H_{10}	C_4H_{10}	C_5H_{12}	C_3H_6	C_4H_8
Boiling point, °F.....	-127	-44	14	33	97	-53	20 to 34
Pounds per gallon of liquid at 60 °F.....	3.11	4.24	4.72	4.85	5.25	4.37	5.0 to 5.1
Heating value of the gas:							
Btu per pound.....	22,340	21,680	21,280	21,330	21,110	21,050	20,840
Btu per gallon.....	69,500	91,900	100,400	103,400	110,800	92,000	105,200
Btu per cu ft at 60°, 30 in. Hg.....	1,790	2,572	3,364	3,393	4,023	2,379	3,190
Specific gravity of gas.....	1.05	1.55	2.08	2.14	2.49	1.46	1.98
Vapor pressure, pounds gage, at:							
-44° F.....	88	0	-9	-12	-14	3	-12
0° F.....	206	24	-4	-7	-13	32	-6
33° F.....	343	54	7	0	-11	69	4
70° F.....	553	112	27	16	-6	135	21
100° F.....		196	55	37	4	218	43
130° F.....		271	93	64	11	323	74
150° F.....		346	128	87	21	420	116
Volume of air required to burn 1 volume of gas....	16.7	23.9	31.0	31.0	38.2	21.5	28.6

Requirements of a Satisfactory Method of Measurement.—When we come to discuss the measurement of liquefied petroleum gas, the first thing to be considered is what we want to measure. When a customer purchases a month's supply is he concerned with how much it weighs, how big a swimming pool could be filled with the liquid, or the diameter of the balloon necessary to confine the vapor? Obviously not; he is interested only in how much heat he can get by burning it. Satisfactory methods of measurement will give this information; at least, the same number of units of the same kind obtained as the result of measurements at different times or different places, must represent the same amount of fuel.

The essential fact that they sell energy is brought to public attention by those marketers of liquefied petroleum gas who state their selling price and bill customers in therms (100,000 Btu) or decitherms (10,000 Btu). Others sell by the pound, by the gallon, by the cubic foot of gas, or by the bottle. Companies using all five methods of billing may be in competition in the same community, as we learn from occasional letters from puzzled buyers.

Satisfactory methods of measurement in this industry must not only assure the purchaser that he is getting the commodity he wants at the price he agreed to pay; they should also permit him to compare offers made by different purveyors. Other things to be considered in selecting a method of measurement are adaptability to different systems of distribution, convenience, probability of serious error, and practicability and cost of checking measuring instruments.

Measurement of Gas Distributed Through Pipes.—There are several hundred small plants in the United States which distribute propane or butane in the form of gas, or mixtures of one or both of them with air, to small towns. Such service is a public utility, and its supervisor will ordinarily be undertaken by the public utility officials rather than by the weights and measures officials in States or cities having both offices. The measurement of fuel to the customers of these systems involves equally the use of gas meters and the determination of the heating value of the gas distributed. There is no practicable substitute for the gas meter in this service. The heating value of the gas sent out may be measured with a calorimeter; or its average value may be computed from the readings of a station meter and the weight of fuel introduced, with at least as high accuracy as would result from an occasional test with a calorimeter. If compliance with a heating-value standard is to be checked officially, the use of a calorimeter is probably the only practicable method. Obviously, any control of the measurements involves the whole program of maintenance of heating value standards and the maintenance and testing of meters included in the operations of the usual gas company. There is the added difficulty that a small utility cannot afford to maintain a shop for testing and repairing meters. If the utility is very small it cannot be expected, even, to do regular calorimetric testing, but the smallest plant should have a record of the weight of fuel used and the volume of gas sent out, from which the average heating value, at least, can be computed.

Measurement of Fuel to Individual Customers by Weight.—Ordinarily, liquefied petroleum gas is delivered in the liquid state to its users. Usually we measure liquids in commerce by volume because it is the simplest method and requires the least equipment, but the simplicity tends to disappear when the liquid is above its boiling point and must be completely confined in strong containers at all times. In the case of liquefied petroleum gases, it is easier to weigh than to measure the liquids in containers that are not too large or too inaccessible, and it is probable that much the greater part of these fuels are sold directly or indirectly by weight, at least to the ultimate consumer. It is fortunate that, as can readily be seen from table 4, the heating value of the liquefied petroleum gases per pound is nearly independent of composition. Of course it is entirely independent of temperature.

When it was stated that gas is sometimes indirectly measured by weight, reference was made to the practice of billing customers by the unit package, the wrapper of the package being in this case a steel cylinder usually referred to as a bottle. Bottles are probably always filled by weight, for safety does not permit them to be filled completely with liquid, and there is no other convenient method of measuring the amount of liquid in a cylinder. Usually two bottles are connected to the customer's piping, and gas is used from one of them until empty; then the fresh cylinder is opened and the empty one is sent back for refilling. We occasionally hear of dissatisfaction with this method of measurement on the ground that the bottles do not always contain their rated weight of fuel when delivered. In some cases it may happen that when the connections to the reserve cylinder are opened those to the nearly empty cylinder are not immediately closed, and that distillation takes place from the cylinder in use into the empty one. If the full cylinder is appreciably warmer

than the other because of different exposures to sunshine or otherwise, a considerable fraction of its contents may be transferred in the course of a few days. This fuel is likely to be returned to the gas company with the cylinder supposed to be empty.

If users were warned of this possibility they would probably be careful to avoid it. In some systems a "change-over valve" makes it impossible to have both cylinders open at the same time. Nevertheless, there would be more certainty of correct measurement of the fuel actually used, and probably customers would be better satisfied, if the bottles were weighed directly before and after use and bills rendered for the differences. Some of the companies which maintain periodic delivery service connect a full cylinder to the customer's piping at each visit, disconnect and weigh it at the next visit, and charge for the difference between initial and final weights. This is probably the best system in present use insofar as the accuracy of measurement of the fuel actually delivered is concerned. The objections to it are that a large fraction of the fuel initially delivered is hauled back to the filling plant and that the system can be used only where customers are close enough together to justify the establishment of a periodic delivery service.

A system that provided for equally good measurements was that employed by a large pioneer distributor who filled, from a service truck, a tank that was flexibly connected to the customer's piping and weighed it just before and after filling, without disconnecting. It is understood that the system has been abandoned because it limited the location of the customers' storage tanks to positions accessible to the weighing crane on the service truck, and because it took too much time to maneuver the truck into position, release the storage tank from its supports, lift it, weigh it, and again secure it in position.

Many consumers' storage tanks, perhaps a majority of them, are underground or too heavy to be lifted from their supports by a crane on the service truck. Obviously, the fuel can be weighed into these containers only by weighing the delivery truck itself or the tank on the truck. The first would preclude the delivery of fuel to more than one customer without returning to a vehicle scale; the second presents some of the difficulties of weighing the customer's tank and several additional difficulties, including that of determining with the desired accuracy, the weight of small deliveries of fuel from a heavily loaded tank, and the surging of the liquid in the tank after the truck has been in motion. I do not know that this method has ever been tried.

Measurement by Volume of Liquid or Vapor.—The volume of liquid fuel may be measured by gaging its depth in the tank on the delivery truck or in the consumer's storage tank, or by the use of a rotary meter of the type used in gasoline filling stations. The volume of the vapor may be measured with a gas meter.

In the preceding section nothing was said about the kind of scales to be employed in weighing fuel or their probable accuracy. Similarly, in what follows nothing will be said about the construction or characteristics of the gages and meters available for measuring volumes of liquid fuel or volumes of vapor. They will be discussed by the next speaker. In what remains of this paper we will not consider errors which result from the fact that we do not have perfect instruments, but we will assume that the observed or recorded volumes will be

exactly the volumes actually received by the purchaser. Instrumental errors, which will be treated in the next paper, are to be added to the errors discussed here.

The measurement of vapor, as it is being used, by a gas meter is a method of measuring the fuel that is frequently and apparently increasingly employed. This method is popular, partly because it has been made so by sales talk, of which the phrase "just like city gas" is perhaps the most significant part. It has the merit that the volume of vapor used is permanently registered on the meter dials and can be checked at any time by the purchaser. Even if a mistake is made in reading the meter, it is rectified the next time the meter is read. To check the weight or the volume of liquid fuel, the purchaser must be present at the time of delivery or make measurements for himself before any fuel is used.

The reasons for using gas meters given in the last three sentences were printed two years ago in one of our circulars. They were accompanied by a list of reasons for not using gas meters which I regard as an understatement; but vigorous objections were made to the reasons given. Accordingly, when I was asked to prepare this paper, I suggested that someone be invited to present the arguments for using gas meters. To my regret, it was not considered practicable to follow the suggestion. I do not wish to present one side of a controversial subject without affording opportunity for reply and shall present only points which have to do with accuracy of measurement, although my principal objections to the use of gas meters are of another character.

Even if the volume of vapor could always be measured exactly, it would not necessarily accurately represent the quantity of fuel delivered because of the effects of pressure, of temperature, and of composition of the fuel. Table 5 shows the relative volumes of the same quantity of vapor at different altitudes computed from the assumption that the total pressure on the vapor is the average barometric pressure at each altitude plus the usual gage pressure of 11 inches of water column, and that the temperature is 60° F., the meter temperature usually assumed in fuel-gas measurements. A correction, which is very small, has been made for deviation from Boyle's law. It accounts for the difference between the figures for propane and for butane.

TABLE 5.—*Relative volumes of the same quantity of vapor at different altitudes*

[Volume at sea level assumed to be 1.0000. Temperature assumed to be 60° F.]

Altitude	Relative volume	
	Propane	Butane
<i>Feet</i>		
0	1.0000	1.0000
500	1.0209	1.0215
1,000	1.0370	1.0373
2,000	1.0746	1.0762
3,000	1.1147	1.1165
4,000	1.1556	1.1587
5,000	1.1994	1.2027
6,000	1.2438	1.2488
8,000	1.3414	1.3460
10,000	1.4448	1.4503

Where differences of several hundreds or even thousands of feet exist in the elevations of different parts of the territory served by a company, individual corrections could be made for the altitude at the location of the gas meter. The contour lines of Geological Survey maps give the elevations in substantially all inhabited regions accurately. However, unless official action requires the contrary, it is probable that the fuel measured by gas meters will be uncorrected for altitudes—just like city gas. If the liquid is measured or weighed, barometric pressure is without effect on the measurement, of course.

Temperature affects the volumes of a given quantity of propane in the gas and in the liquid phase to almost the same extent. Butane in the liquid phase is affected only about 60 percent as much as in the gas phase. Table 6 shows the effect on the volume of each fuel of changes of temperature from 40° to 120° F, the volume of a given quantity at 60° F being taken as unity. Obviously, if the liquid is

TABLE 6.—*Relative volume of the same quantity of fuel at various temperatures*

[Volume at 60° F assumed to be 1.0000]

Temperature	Relative volume			
	Vapor	Liquid *		
		Propane	Isobutane	Butane
° F				
40	0.9615	0.9698	0.9789	0.9803
50	.9808	.9849	.9894	.9902
60	1.0000	1.0000	1.0000	1.0000
70	1.0192	1.0162	1.0123	1.0109
80	1.0385	1.0340	1.0246	1.0226
90	1.0577	1.0520	1.0387	1.0346
100	1.0770	1.0733	1.0528	1.0462
110	1.0962	1.0962	1.0669	1.0594
120	1.1155	1.1219	1.0827	1.0736

* Data of Dana, Jenkins, Burdick, and Timm, *Refrigerating Engineering* 12, 402 (June 1926).

measured, a correction should be made for temperature. This can easily be done, since the temperature at the time of delivery is the only one of interest. The best method of doing this will be discussed in the next section. Probably there is no practicable way of ascertaining the temperatures at which vapor is measured in gas meters with enough accuracy to make satisfactory corrections, and this very considerable source of error must remain uncorrected—just like city gas. In the Southern States, where liquefied petroleum gases seem to be most widely used, meters for city gas are very commonly installed outdoors. They are usually painted black and are by no means always shaded. In bright sunlight, in the midcontinent region, they may have a temperature 30° F above the temperature of the air. Or they may be on the wall of a closet on the south side of a dark-colored house, which is almost as bad; or in an unheated space more or less open to the weather on the north side of the house, which is bad for the gas company in winter. If the fuel used is butane, the meter must be inside, otherwise butane will condense in it at 32° F, a temperature reached at times in all parts of the United States, except the southern tip of Florida.

However, it is quite common in the midcontinent region to deliver different mixtures of hydrocarbons in summer and winter. This is done to insure a positive pressure from the supply tank rather than to prevent condensation in the meters, no doubt; but it does make possible a degree of exposure of the meters to weather conditions that would not otherwise be practicable. The use of mixtures and not pure compounds is, in fact, prevalent rather than exceptional practice. One of the chapters in a principal technical publication of the liquefied petroleum gas industry⁶ begins with the following words:

Since in actual practice pure propane or butane is almost never used, the chief value of the critical constants and properties of the pure liquids is for use in calculating the properties of their mixtures.

Most mixtures known as commercial butane contain propane, isobutane, and normal butane. The percentages of each depend on the gas from which they are obtained, the equipment used for their recovery, and the handling of the equipment to meet the user's specifications.

The fact that mixtures constitute a large part of the liquefied petroleum gas marketed is the principal reason, which has to do only with accuracy of measurement, why gas meters are not good instruments for measurements of this kind, outweighing in importance the effects of altitude and temperature. A pound of butane contains 1.6 percent less fuel than a pound of propane; a gallon of liquid butane contains about 12 percent more fuel than a gallon of propane at the same temperature; but a cubic foot of butane vapor contains 32 percent more fuel than a cubic foot of propane vapor. A change of 50 percent in the butane content of the fuel would probably pass unnoticed by the customer, since, if he uses mixed fuel, he is accustomed to operate appliances with a wide range of composition of the vapor between the replenishment and exhaustion of the fuel in his storage container, although in some cases special arrangements do not permit this change to take place. Liquefied-petroleum-gas fuel sold through gas meters is, therefore, subject to an actual alteration in price, at the will of the producer, by a method which does not change the nominal price, and one of which the purchaser would ordinarily have no knowledge—just like city gas.

At the present time prospective purchasers of butane are being warned—by salesmen for propane if not otherwise—that an adequate supply of butane will not long be available for the domestic market. Whether this is true or merely sales talk, I do not know. I know that the report is current because we have received several inquiries about it from widely separated parts of the country. If butane becomes relatively scarce or high priced it seems almost inevitable that the butane content of mixed fuels will be reduced. Perhaps, if this occurs, all purchasers will be notified and prices per cubic foot of vapor will be reduced accordingly, but precedent is against the supposition.

Correction for Changes of Temperature and Composition by Measurement of Pressure.—Although the amount of fuel represented by a gallon of liquid depends on temperature and on composition, by a fortunate coincidence it is possible to eliminate the error in the measurement of fuel caused by the variation of these conditions very simply and almost completely.

It is possible to approach the subject in a number of ways, but I believe it will be easiest to make the situation clear by repeating the mental steps I actually took in the first place. They were as follows:

⁶ Handbook of Butane-Propane Gases, 2d edition, p. 18.

Since the hydrocarbon liquids have a high coefficient of thermal expansion it would be desirable to correct readings of volume to some standard temperature. The easiest way to determine the temperature of a liquid above its boiling point is to measure its vapor pressure. This is not only convenient; it is conventional. We usually stop speaking of the temperature of water in a steam boiler when it reaches the boiling point and mention pounds of steam instead. Every delivery truck already has a pressure gage which shows the vapor

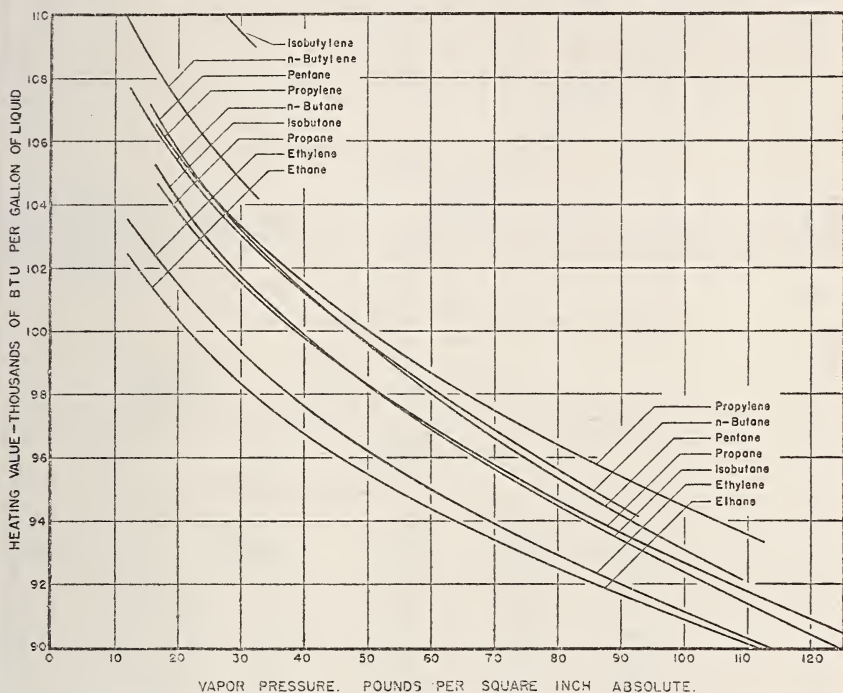


FIGURE 19.—Data for vapor pressure and heating values for isobutylene, normal butylene, pentane, propylene, normal butane, isobutane, propane, ethylene, and ethane.

pressure of the liquid within. If the composition of the liquid is known, it is possible to deduce the temperature from the reading of the pressure gage and to make a correction of the amount of fuel based on the variation of density with changes of temperature. Obviously, it would be preferable to make the conversion in one step instead of two by using a calibration chart which shows the correction factor for the amount of fuel directly in terms of vapor pressure.

Then the question arises, How will the result be affected by a change of composition? By the coincidence mentioned, the effect of even much larger changes of composition than could possibly occur accidentally is very small. This is true because at the different temperatures at which they have equal vapor pressures the heating values of two hydrocarbons are nearly the same. Some of the available data for vapor pressures and heating values per gallon of liquid were plotted for the following substances: Ethane, propane, normal butane, isobutane, normal pentane, isopentane, ethylene, propylene, 1-butylene, 2-butylene, and isobutylene. The result is figure 19. It will be seen

that at a given vapor pressure, the heating value in Btu per gallon of liquid is very close to the same value for all of the principal constituents of liquefied petroleum gases. Figure 20 is a more extended

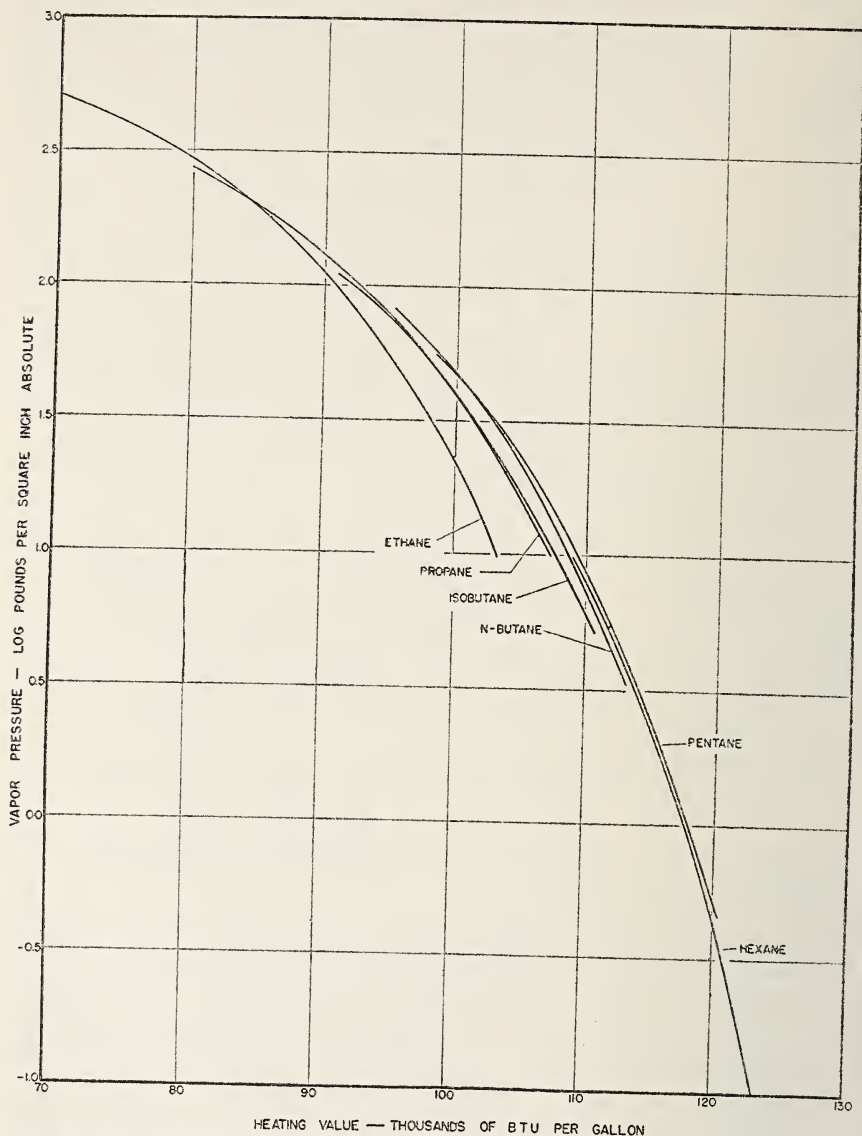


FIGURE 20.—Data for vapor pressure and heating values for ethane, propane, isobutane, normal butane, pentane, and hexane.

plot of the properties of the more abundant hydrocarbons. In the range represented by the figures, the curves for ethane and isobutane cross that for propane, the curves for normal and isopentane coincide and cross that for normal butane, and the curve for propylene crosses the curves for both pentane and normal butane. If they were suffi-

ciently extended, each pair of curves that cross in this way must cross again.

The application of the facts shown by figure 19 to actual measurement, using only vapor pressure as a means of correction, can perhaps be best shown by an example. It will be assumed that a mixture supposed to contain 70 percent of normal butane and 30 percent of propane actually contains the two hydrocarbons in the inverse ratio. The effect of measuring the fuel at various temperatures and by various methods is shown in table 7. The method of correction applied to the measured liquid volumes is simply that of correcting the heating value of a mixture containing 70 percent of butane for thermal expansion from 60° F to the temperature indicated by the vapor pressure.

TABLE 7.—*Effects of composition and temperature on measurement of fuel by various methods*¹

[It is assumed that fuel supposed to have the molecular composition, 70 percent normal butane and 30 percent propane, is actually 30 percent normal butane and 70 percent propane. It is further assumed that the heating value of the fuel is computed at 60° F. This table gives the ratio of the number of Btu actually available from the fuel to the number that would be computed by various methods of measurement at stated temperatures.]

Temperature of measurement	Ratio of actual to "measured" heating value. Method of measurement			
	Weight	Volume of liquid		Volume of gas
		Corrected by vapor pressure	Uncorrected	
° F				
0	1.0064	1.0089	1.0267	1.0125
10	1.0064	1.0082	1.0155	0.9910
20	1.0064	1.0084	1.0034	.9703
30	1.0064	1.0093	0.9908	.9505
40	1.0064	1.0088	.9784	.9315
50	1.0064	1.0087	.9652	.9132
60	1.0064	1.0087	.9523	.8956
70	1.0064	1.0069	.9388	.8787
80	1.0064	1.0066	.9244	.8624
90	1.0064	1.0043	.9098	.8467
100	1.0064	1.0010	.8948	.8316

¹ The irregularities in the table result from carrying the computation to more significant figures than the original data (or a graphical interpolation among them) would justify, except to show their degree of uncertainty.

Obviously, if this very simple method of correction, which requires no new instruments, not even a thermometer, is applied to measured liquid volumes, the amount of fuel can be determined without regard to temperature or composition with nearly the same accuracy as by weighing. Variations of composition which might occur through error will be entirely negligible, and any temptation on the part of the seller to change the composition of the fuel for the sake of its effect on consumption is eliminated. If gage readings are taken, as would usually be the case, against barometric pressure and not against a vacuum, the liquid measurement, when corrected on the assumption that the gage reading plus 14.7 pounds gives the absolute vapor pressure, would be slightly affected by altitude. To show the magnitude of this effect and also to show the combined effects of the several sources of error on uncorrected measurement with a gas meter, it is assumed that the measurements are made at an altitude of 4,000 feet. Conditions are otherwise the same as for table 7. The results are given in table 8.

TABLE 8.—*Combined effects of composition, temperature, and altitude on measurement of fuel by various methods*

[Assumptions as in table 7, except that measurement occurs at an altitude of 4,000 feet]

Temperature of measurement	Ratio of actual to "measured" heating value. Method of measurement		
	Volume of liquid corrected for—		Volume of gas
	True vapor pressure	Gage pressure +14.7 pounds	
°F			
0	1.0089	1.0056	0.8743
10	1.0082	1.0048	.8558
20	1.0084	1.0053	.8379
30	1.0093	1.0063	.8208
40	1.0088	1.0055	.8044
50	1.0087	1.0057	.7886
60	1.0087	1.0056	.7734
70	1.0069	1.0045	.7588
80	1.0066	1.0044	.7447
90	1.0043	1.0023	.7312
100	1.0010	0.9991	.7181

Even the small uncertainty remaining because of differences in composition of fuel can be eliminated almost completely by making a simultaneous reading of temperature and vapor pressure, estimating the composition of the liquid, and selecting the curve, from a group of curves like those of figure 19, from which the heating value corresponding to the observed pressure may be read. The most practical way to make the corrections would be to use a table of correction factors for temperature and vapor pressure, just as gas volumes are ordinarily corrected for temperature and pressure.

Table 9 is such a table. It was prepared by interpolating with the aid of the assumption that the density of a mixture of two pure hydrocarbons is intermediate between the densities of the two constituents when each has a vapor pressure equal to that of the mixture, and that the difference between the density of the mixture and that of one constituent is proportional to the percentage of the other constituent. The table was based on the properties of binary mixtures of the normal saturated hydrocarbons only. Other compounds will affect the figures a little if present in large amount. Time did not permit as careful study of the data as would have been desirable, and the table is subject to revisions with respect to even the hydrocarbons from which it was derived. Nevertheless, the table is probably applicable to the measurement of any mixture that would be considered a liquefied petroleum gas under any ordinary conditions of measurement, with an error of not more than a few tenths of 1 percent.

TABLE 9.—*Heating values of hydrocarbon mixtures*

°F	Vapor pressure. Pounds per square inch								
	1	2	4	6	8	10	15	20	25
	HEATING VALUE IN THOUSANDS OF BTU PER GALLON								
—30	118.1	115.5	112.5	110.6	109.2	107.9	105.5	103.7	102.2
—20	118.0	115.6	112.6	110.7	109.4	108.1	106.0	104.1	102.6
—10	118.0	115.7	112.8	110.9	109.6	108.3	106.3	104.5	103.0
0	117.9	115.7	112.9	111.2	109.7	108.4	106.4	104.7	103.3
10	117.8	115.8	113.1	111.4	109.8	108.6	106.6	105.0	103.5
20	117.7	115.7	113.2	111.5	110.0	108.9	106.8	105.2	103.8
30	117.7	115.7	113.2	111.6	110.1	109.1	106.9	105.3	103.9
40		115.6	113.2	111.6	110.2	109.1	107.0	105.4	104.0
50		115.5	113.1	111.6	110.3	109.2	107.1	105.5	104.1
60		115.5	113.0	111.5	110.4	109.2	107.2	105.6	104.1
70			113.0	111.5	110.3	109.3	107.3	105.7	104.3
80			112.9	111.4	110.2	109.3	107.4	105.8	104.4
90			112.9	111.4	110.2	109.2	107.5	105.8	104.5
100				111.3	110.1	109.2	107.5	105.9	104.5
110				111.3	110.1	109.1	107.4	105.9	104.6
120					110.0	109.1	107.4	105.9	104.7
130						109.0	107.3	105.8	104.6

°F	Vapor pressure. Pounds per square inch								
	30	40	50	60	70	80	90	100	120
	HEATING VALUE IN THOUSANDS OF BTU PER GALLON								
—30	101.1	98.6	96.8	95.5	94.2	92.6	91.7	90.6	-----
—20	101.4	99.0	97.2	95.9	94.5	92.9	92.0	91.0	89.4
—10	101.7	99.4	97.5	96.2	94.8	93.2	92.3	91.3	89.6
0	102.0	99.8	97.9	96.5	95.1	93.5	92.5	91.6	89.8
10	102.3	100.1	98.3	96.9	95.4	93.8	92.8	91.9	90.0
20	102.6	100.5	98.7	97.1	95.7	94.1	93.1	92.2	90.3
30	102.7	100.6	98.8	97.2	95.8	94.4	93.4	92.3	90.4
40	102.8	100.7	98.9	97.3	95.9	94.7	93.7	92.4	90.5
50	102.9	100.8	99.1	97.4	96.1	94.9	93.8	92.6	90.6
60	103.1	100.9	99.2	97.6	96.2	95.0	94.0	92.7	90.8
70	103.1	101.0	99.3	97.7	96.4	95.2	94.1	92.8	90.9
80	103.2	101.2	99.4	97.8	96.5	95.3	94.3	92.9	90.9
90	103.3	101.3	99.5	97.9	96.6	95.4	94.4	93.0	91.0
100	103.4	101.4	99.6	98.0	96.7	95.5	94.4	93.1	91.0
110	103.5	101.5	99.7	98.1	96.8	95.6	94.5	93.1	91.1
120	103.5	101.5	99.9	98.2	96.9	95.6	94.6	93.2	91.2
130	103.6	101.6	100.0	98.3	97.0	95.7	94.7	93.2	91.2

°F	Vapor pressure. Pounds per square inch									
	140	160	180	200	250	300	350	400	450	500
	HEATING VALUE IN THOUSANDS OF BTU PER GALLON									
—30	88.0	86.8	-----	-----	-----	-----	-----	-----	-----	-----
—20	88.2	87.0	85.8	-----	-----	-----	-----	-----	-----	-----
—10	88.4	87.1	85.9	-----	-----	-----	-----	-----	-----	-----
0	88.4	87.1	85.9	-----	-----	-----	-----	-----	-----	-----
10	88.6	87.2	85.9	84.7	-----	-----	-----	-----	-----	-----
20	88.7	87.3	86.0	84.7	81.8	-----	-----	-----	-----	-----
30	88.8	87.3	86.0	84.8	81.7	80.4	-----	-----	-----	-----
40	88.9	87.4	86.1	84.8	81.7	80.2	77.1	-----	-----	-----
50	89.0	87.5	86.1	84.8	81.6	80.1	76.9	74.2	-----	-----
60	89.1	87.5	86.1	84.8	81.6	78.9	76.7	74.0	72.4	70.4
70	89.2	87.5	86.1	84.8	81.5	78.8	76.5	73.7	72.2	70.1
80	89.2	87.6	86.2	84.8	81.5	78.7	76.3	73.5	71.9	69.9
90	89.3	87.6	86.2	84.8	81.5	78.6	76.2	73.3	71.7	69.6
100	89.3	87.6	86.2	84.8	-----	-----	-----	-----	-----	-----
110	89.4	87.6	86.2	84.8	-----	-----	-----	-----	-----	-----
120	89.4	87.6	86.2	84.8	-----	-----	-----	-----	-----	-----
130	89.4	87.6	86.2	84.8	81.4	-----	-----	-----	-----	-----

The ACTING CHAIRMAN. I will ask Mr. Pisciotta to take the chair.

(At this point Alex Pisciotta, Vice President of the Conference, assumed the chair.)

REPORT OF SPECIAL RESOLUTION COMMITTEE, PRESENTED BY
C. E. TUCKER, CHAIRMAN

The ACTING CHAIRMAN. I understand that Mr. Tucker, Chairman of the Special Resolution Committee to Memorialize Fay Stanley Holbrook, is ready to make his report.

FAY STANLEY HOLBROOK, 1887-1940

Eminent and distinguished physicist and metrologist, leader in the field of weights and measures, and a gentle, kind friend.

Whereas our Gracious God, the Almighty Ruler of the Universe, has seen fit in His infinite wisdom to call Fay Stanley Holbrook from our midst on February 4, 1940; and

Whereas this National Conference on Weights and Measures of the United States of America, assembled in its thirtieth meeting in Washington, D. C., June 4 to 7, 1940, profoundly realizes the deep loss which has been sustained in the death of Fay Stanley Holbrook, who served as its beloved and respected Secretary from 1922 to the time of his death, and who by his exemplary character and achievements as an engineer, lawyer, chief adjuster of weights and measures, inspector of weights and measures for the State of New York, Co-Chief of the Division of Weights and Measures of the National Bureau of Standards, organizer and founder of the Department of Weights and Measures for the Territory of Puerto Rico, Chairman of the Conference Committee on Specifications and Tolerances, endeared himself to all with whom he came in contact; and

Whereas it is the earnest and expressed desire of this Conference, at this, its earliest opportunity, and before entering upon its regular business duties, to properly acknowledge and record his notable and splendid achievements in the science of metrology and in furthering the cause of weights and measures, to convey its deepest sympathy to his surviving wife and children, to express its deep sense of grief at the loss of one who was always ready and eager to serve, who devoted himself to the advancement of the public good and freely gave of himself to those who desired his valuable assistance, and to indicate its love and esteem and respect for the sterling qualities of the man himself; and

Whereas it is the wish of this Conference to perform some act which will give permanent expression to the feelings and sentiments herein set forth: Therefore be it

Resolved, That this Conference hereby express its heartfelt sympathy to Mrs. Ann S. Holbrook and children in their bereavement; and be it further

Resolved, That this Conference, through a committee to be appointed by the Chair, procure a suitable memorial plaque to be presented to the National Bureau of Standards and to be hung in the office of the Division of Weights and Measures; and be it further

Resolved, That a copy of these resolutions be written and presented to Mrs. Holbrook, as a token to her of the respect of this Conference.

(Signed) C. E. TUCKER, *Chairman*.
C. L. KLOCKER.
S. T. GRIFFITH.
W. C. WITFOTH.
J. W. SAYBOLT.
J. E. WOODLAND.
C. P. GRIFFITH.
Special Resolutions Committee.

The ACTING CHAIRMAN. We shall adopt the resolution by a rising vote, and in memory of our coworker and friend, Fay Stanley Holbrook, we shall remain standing for a period of 30 seconds.

(The resolution was unanimously adopted in the manner indicated by the Acting Chairman, following which the Conference membership stood in silence for 30 seconds in tribute to the memory of Fay Stanley Holbrook.)

Mr. S. T. GRIFFITH. I move that a sufficient amount of money be appropriated from the treasury of the National Conference to purchase the bronze plaque called for by the resolution just adopted.

(The motion was seconded, the question was taken, and the motion was agreed to.)

MEASUREMENT OF LIQUEFIED PETROLEUM GASES—Continued

INSTRUMENTS FOR COMMERCIAL MEASUREMENT, A PAPER PRESENTED BY
H. S. BEAN, NATIONAL BUREAU OF STANDARDS

In the distribution of liquefied petroleum gas in retail trade, particularly to domestic customers, four methods of measuring the amount of gas delivered or used appear to be in use. These four methods are (1) By tank gaging; (2) by weighing; (3) by liquid meters; and (4) by gas meters.

Tank Gaging.—The volume of liquid gas in the tank is measured both before and after the customer's tank is filled. The type of gage generally used for this purpose is known as a slip-tube. Essentially it is a small, smooth-walled tube placed to slide vertically through a packing gland into or out of the tank, and equipped with a valve at the top. To determine the position of the liquid surface in the tank, the valve at the top of the tube is opened and the tube is lowered into or withdrawn from the tank until liquid first appears or disappears at the top. Then, by measuring between the top of the tube and a reference point with a suitable scale, the depth of liquid in the tank or its volume is determined. In some cases where this method is used the quantity of fuel delivered to a customer is determined from the mean of the measurements made on the customer's tank and the truck tank.

The chief advantage of this method is its extreme simplicity and low cost. This Bureau has had no experience with a gage of this type so we have no first-hand knowledge of its relative accuracy, nor have we received the results of any observations that may have been made by others. It is evident, however, that the accuracy of the measurements will depend upon the size and position of the tank, and in the case of horizontal cylindrical tanks, upon the position of the liquid surface in the tank. For the purposes of comparison with other methods let us assume that the position of the liquid surface can be established to within $\frac{1}{4}$ inch. Then, assume a horizontal cylindrical tank of 30 inches inside diameter. If the true depth of the liquid were 2 inches, the $\frac{1}{4}$ -inch error will represent an error of approximately 18.6 percent in the volume of the liquid. If the tank is half full, the error will be 2 percent, while if filled to within 2 inches from the top, the error will be only 0.6 percent.

Measurement by Weighing.—Two common methods appear to be used in measuring liquefied petroleum gases by weight. In one case the weighing is done at the filling station at the time of filling the cylinder or "bottle." In the other case the weighing is done at the

customer's premises with a portable scale of the single-beam or steel-yard type.

In the first case the cylinder is placed on a platform type of scale and connected to the filling line by means of a flexible connection. The tare weight of the cylinder is noted and liquefied gas is then run into the cylinder until the desired weight of gas has been introduced. Usually these cylinders are designed to hold 100 pounds of the liquid gas, and their weight empty is around 90 to 100 pounds. If the weight of the contents of the tank is to be known to within $\pm \frac{1}{2}$ of 1 percent it will require knowing the tare and gross weights within $\pm \frac{1}{4}$ pound, or 4 ounces. While it will require a little care and time to make weighings to this degree, it does not require anything unusual in the scale.

When the weighing is made at the customer's installation, the customer's storage tank is housed in a vertical position in a steel cabinet. The cabinet is of sufficiently heavy construction to support the steel-yard when making weighings. The tanks are connected to the customer's piping by a flexible connection so that service need not be interrupted. Since these tanks do not have to be handled after filling, they are usually of about 200-pounds capacity. This will require that the tare and gross weighings be made to within $\frac{1}{2}$ pound if the weight of liquid is to be known to within $\pm \frac{1}{2}$ of 1 percent.

The equipment and procedure of checking either type of scale will be the same as will be used with any commercial scale of the same type and capacity.

Measurement by Liquid Meters.—When a liquid meter is used the metering is done as the customer's tank is filled. The meter is mounted on the tank truck, close to, or actually in, the bottom of the tank.

Probably all of the meters used in this type of service are of the displacement type, although the details of construction and operation will vary with different makes. The operating characteristics of these meters are probably very much the same as those of meters used for gasoline by service stations and service-station supply trucks. From some tests made several years ago on meters for tank trucks with 2- to 2½-inch service connections, and designed for rates of flow not exceeding about 100 gallons per minute, it appears that the errors in the indications of the meters seldom exceeded 3 cubic inches per gallon for rates of flow over 20 gallons per minute, or about one-fifth the maximum designed capacity.⁷ In other words, the errors varied from 0 to 1.3 percent. At rates of flow below one-fifth the designed maximum meter rates, the errors in the meter registrations increased very rapidly. It is worth mentioning, that whereas gasoline and furnace oil have some lubricating properties, particularly the latter, it is reported that butane and propane have almost none. This means that meters for these liquids will probably require somewhat larger clearances initially and also may have a higher rate of wear. Furthermore, this makes it almost necessary that any equipment and method used for testing these meters should employ these liquids as the testing medium.

When using these meters, as well as when testing them, it is important to maintain the fluid in the liquid phase. This may be accomplished by placing the meter at the lowest point in the system or by

⁷ Eugene W. Jacobson, *Improved methods of testing volumetric meters for truck use*, Thesis to Graduate College, University of Nebraska (May 1938).

keeping a sufficient back pressure on the meter to prevent the formation of vapor bubbles. It is also necessary to have the meter shielded so that its temperature will be practically the same as that of the liquid in the tank.

Measurement by Gas Meters.—The fourth method of measurement is to meter the fluid in the vapor or gas phase with a gas meter. These meters will be connected on the outlet side of the pressure regulating valve which is on, or close to, the storage tank. While not necessary to do so, it will probably be most convenient to have the meter located in the cabinet housing the storage tank, where it will be readily accessible for reading by the service-truck operator.

The case of a meter designed for this service is either cast iron or pressed steel, in contrast to the sheet metal or "tin" case so generally used in city gas systems. In interior construction and operation, these meters are identical with the dry meters of the city distribution systems, with flexible diaphragms and slide valves. One manufacturer of meters has stated that the diaphragms in the meters supplied for this service are treated with a nondrying oil, the same as used for meters supplied to systems distributing "natural" gas. Also, there have been a few meters equipped by this company with diaphragms made from synthetic fabrics. However, the use of "dry" meters for metering "bottled" gases is so recent that we do not yet have any reliable indication as to whether the effect of these "bottled" gases on the meters will differ from that of the manufactured and natural fuel gases. An idea of what is known regarding the accuracy of meters in these latter services may be obtained from table 10, which gives results of routine tests in several localities, for the most part during the year 1935. Two of the groups distributed natural gas exclusively; two others, mixtures of natural and manufactured gas; the remaining groups, manufactured gas, chiefly water gas.

Where dry gas meters are used, it will be necessary to provide for removing the meters for testing and servicing at periodic intervals, the same as is done with meters in the large distribution systems. What the length of the period between tests should be cannot be determined satisfactorily until more experience has been accumulated. The average for most fuel gas systems is 5 or 6 years. Since most companies distributing bottled gases will not have enough meters to justify equipping and maintaining a gas meter testing shop, they will probably arrange to have such work done in the shop of some large fuel gas company. Adequate provision for this testing and servicing of gas meters should be included when making a comparison of the costs of measuring liquefied petroleum gases by the different methods, as well as in figuring the cost of the fuel to the customer.

One advantage of the dry meter which Mr. Weaver mentioned is that an error in reading the meter at one time will be corrected or compensated for by the next reading. Moreover the user may, by regularly observing the meter, keep track of the rate at which he is using the fuel.

In all bottled gas installations in which gas meters are used there is, or should be, an excess pressure relief valve installed between the pressure regulating valve at the tank outlet and the meter. The purpose of this pressure relief valve is to prevent, insofar as is practically possible, subjecting the meter to an excessive pressure in the event the regulating valve should fail to operate.

Research in Progress on Fluid Meters.—The use of liquefied petroleum gases has increased rapidly, and some method of measurement had to be employed, but its selection could not be based upon studies or the results of experience with these particular gases. This condition makes it difficult to evaluate the merits of the several measurement methods in use and to suggest suitable test procedures. However, with the cooperation of this Bureau and several universities, the Fluid Meters Committee of the American Society of Mechanical Engineers is sponsoring an extensive research program on volumeters. This program will include, ultimately, meters for liquefied petroleum gases in both the liquid and gas phases.

TABLE 10.—Summary of meter tests by several large groups

Group.....	A	B	C	D	E	F	G	H	I	J	K	L	M
Nominal interval between periodic tests, years.....	5	7	4	3	7	5	7	-----	10	5	5	-----	5
Thousands of tests in group.....	186	158	75	147	41	32	31	211	113	15	20	132	51
Average percentage error—all meters.....	+1.88	-0.24	+0.10	+0.14	-0.59	-0.4	-----	+1.08	-0.06	+0.37	-0.40	-----	-----
Average percentage error—"slow" meters.....	-4.15	-4.23	-2.78	-3.60	-5.9	-3.4	-----	-6.24	-4.5	-4.03	-4.74	-----	-----
Average percentage error—"fast" meters.....	+4.00	+3.96	+2.87	+3.93	+4.2	+2.9	-----	+4.66	+4.0	+4.71	+4.01	-----	-----
Percentage of meters: Inoperative (DR or St) ^a	4.5	2.0	-----	1.8	3.0	3.3	10.1	3.3	3.7	1.8	1.3	3.1	-----
More than 2% slow.....	16.78	-----	32.4	28.3	-----	20.4	23.2	9.5	5.8	17.8	12.9	16.7	10.1
3% or more slow.....	-----	5.0	-----	-----	9.6	-----	-----	-----	-----	-----	-----	-----	-----
5% or more slow.....	5.03	0.12	8.6	4.9	-----	10.2	-----	-----	-----	-----	2.5	-----	-----
10% or more slow.....	0.84	.07	0.18	0.33	-----	5.6	-----	-----	-----	-----	0.42	-----	-----
20% or more slow.....	-----	.05	-----	-----	-----	0.32	-----	-----	-----	-----	-----	-----	-----
More than 2% fast.....	30.51	-----	33.8	31.0	-----	-----	17.6	11.1	30.4	16.4	18.9	12.0	22.0
3% or more fast.....	-----	14.8	-----	-----	12.3	15.7	-----	-----	-----	-----	-----	-----	-----
5% or more fast.....	14.39	3.3	7.2	7.2	-----	5.0	-----	-----	-----	-----	5.2	-----	-----
10% or more fast.....	2.05	0.26	0.19	0.48	-----	0.14	-----	-----	-----	-----	0.56	-----	-----
20% or more fast.....	-----	.07	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

^a DR, does not register; St, "stuck."

MEASUREMENT PROBLEMS OF THE DISTRIBUTION INDUSTRY, A PAPER PRESENTED BY FRANKLIN R. FETHERSTON, SECRETARY-TREASURER, LIQUEFIED PETROLEUM GAS ASSOCIATION (INC.)

When we attempt to discuss measurement problems in the distribution of liquefied petroleum gases we are, of course, confronted with the necessity of understanding the conditions under which measurements are to be undertaken. We should know what gas, or mixture of gases is involved; what the physical characteristics of the gas are; what the conditions are under which it is stored; what kind of a container is to be used; and whether the measurement must be accurate or merely a general indication of approximate conditions. The industry measures its products for several reasons, and each measurement is made within the limits of precision considered necessary and consistent with the purpose of that measurement. The precision of measurements to check gas volumes in bulk, both received and delivered, to check inventories, to prevent overfilling of containers, and for the purpose of determining consumption by the user, vary in importance to the distributor. If looked upon purely from the academic or scientific point of view there could be endless argument over the accuracy or relative precision of measurement by any of the methods of determination commonly used. The cost of measuring devices, the number

of connections that have to be made, the amount of time required for calculating various values, the operation, maintenance, and repair of devices, and the degree of accuracy which is commercially necessary, are problems that the industry has to take into consideration. The industry, of necessity, has to be practical.

Measurement in Vapor Phase.—Liquefied petroleum gases are measured either in the liquid phase or in the vapor phase. Measurements in the vapor phase are accomplished with either orifice type or displacement type meters. The orifice meter is used in this industry, as far as I know, only in manufacturing plants or similar localities where large volumes are measured continuously. The displacement type meter is the well-known gas meter with diaphragms treated with a suitable leather lubricant oil. Ordinarily these meters are calibrated for gas at 60° F. Since the volume of the gas is directly proportional to the absolute temperature, the relation between the meter reading and the mass of gas passing through it will vary with the temperature; in other words, the heating value of a certain metered volume of gas will depend upon the temperature at which the gas is metered. If the gas temperature drops below 60° F, the volume registered by the meter after passage of a given mass of gas will be less than it would have been had that same mass of gas been metered at 60° F; under such conditions the actual measurement is "slow" with respect to volume at the standard temperature of 60° F. Conversely, gas volumes metered at temperatures above 60° F will be registered by the meter as in excess of their volumes at 60° F, the actual measurement in such cases being "fast" with respect to volume at the standard 60° temperature. In the practical use of meters, however, the variation in pliability of the diaphragm is said to serve as a partial compensating factor. The deviations due to the flowing temperature have been found to be considerably less than what would be expected from calculated temperature correction.

These meters must be adjusted to measure accurately at the flowing pressure of the gas delivered to them, this adjustment being effected in the gearing of the registering mechanisms. A meter is ordinarily installed on the downstream side of a sensitive pressure regulator, an essentially constant pressure being thus maintained on the meter.

The units in which gas meter dials are calibrated for use in this industry are numerous. Such units as cubic feet, therms, decitherms, Btu, and kilowatt equivalents are common. Occasionally, one hears of trade names or trade slogans as the arbitrary unit of measurement. It may be of interest to note that one meter manufacturer recently made a survey of the different types of indices used on meters furnished to their customers in this industry. It was found that 44 percent had been calibrated in thermal units, such as therms or decitherms; 20 percent in equivalents of city or natural gas of standard Btu values; 4 percent in cubic foot indices; 3 percent in pounds of gas; and the remaining 29 percent in a variety of special units, such as

1 unit.....	=0.85 cubic feet
1 kwh.....	=1.05 cubic feet
1 gallon.....	=32 cubic feet
1 butane unit.....	=1 cubic foot
1 unit.....	=2.9 cubic feet
1 unit.....	=4.25 cubic feet, etc.

Measurement in the Liquid Phase.—The determination of the liquefied petroleum gas content of a container by weight is, where

practical, a simple and relatively accurate method. Its usefulness, however, is confined largely to portable or semiportable containers.

Slip-tube and rotary-tube gages are means for determining liquid level in the storage container. They both have the disadvantage that a small amount of liquid or vapor must be bled through a tube so that the operator can determine the elevation at which the change from liquid to vapor phase takes place. These tubes should be small in diameter and so manipulated that the gaging is made in both an upward and downward direction. If large volumes are permitted to flow through this type of device, a falsely high liquid level reading may be obtained. It is now common practice to put a restricted orifice on the upper end of the slip-tube device to limit the maximum flow, and to prevent the escape of much liquid or gas. This refinement also improves the precision of the device.

With float type liquid level gages it is apparent that the specific gravity of the liquid, as well as the pressure and density of the vapor, will have much to do with the buoyancy of the float in the liquid. This is one reason why it is essential to know the conditions of storage and the characteristics of the gas involved. The action of the float would naturally affect the precision of such instruments. Counterbalancing, however, is being used with considerable success to overcome this difficulty. Pneumatic, hydraulic, magnetic, or mechanical means are employed to designate float elevations on calibrated dials.

Liquid level gaging methods are obviously more precise on certain shapes of vessels than on others; for instance, a vertical container of small diameter and considerable height can be read with greater accuracy than a horizontal container of large diameter and short length.

The fixed length dip tube is used to detect the level predetermined as the maximum to which certain storage vessels should be filled. It is, of course, identical with the slip-tube gage but is rigidly fixed in one position.

Visible gage glasses of the tubular type, or of the reflex type, are principally used in manufacturing plants. Such devices should never be used on tank-truck tanks. Being fragile and, therefore, subject to breakage with consequent leakage, unless equipped with sensitive excess flow valves, the practical use of these devices is limited. Furthermore, if the temperature at the gaging device is different than that of the liquid in the tank there may be vaporization or condensation in the gage glass compartment with consequent inability to read the liquid level accurately.

Meters were previously mentioned where used for the measurement of liquefied petroleum gas in the vapor phase. Metering of these gases in the liquid phase is also accomplished with extremely satisfactory results. When first attempted the industry experienced not only mechanical difficulties with the meters themselves, because their design was not suited to the service, but inaccuracies due to vapor registration. Experience has proved that some mechanical means must be provided to assure maintenance of a pressure on the outlet side of the meter during the complete transfer cycle that will be higher than the pressure in the tank from which the liquid is being withdrawn. Various systems for accomplishing this have been developed, some of which are patented.

The conditions under which liquefied petroleum gases are measured may be illustrated by a description of typical procedures. These gases are shipped from the manufacturing plant either in tank cars, or in especially designed tank trucks. (See fig. 21.) Tank trucks are used for this initial movement occasionally in areas adjacent to manufacturer's supplies and where delivery is made directly to the consumer. In such cases intermediate storage of the gas is eliminated. Tank-car shipments are made only to distribution plants or to consumer's storage of sufficient capacity to accommodate the entire volume of gas involved. (See fig. 22.) In the tank car the gas is measured as a liquid by a slip-tube device built into the dome of the car.

The measurements taken from the slip tube are converted into gallons of liquefied-petroleum gas at 60° F by the use of tank calibra-

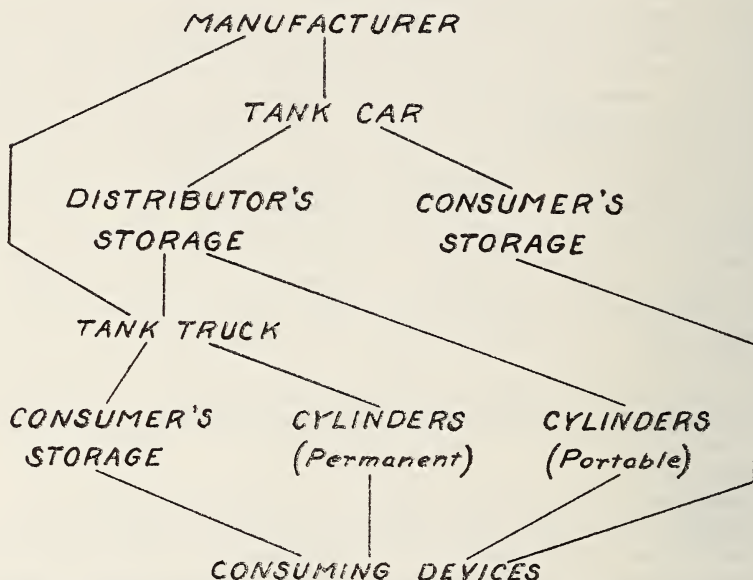


FIGURE 21.—Schematic diagram of distribution methods for liquefied petroleum gases.

tion tables and volumetric temperature-pressure factors calculated for that purpose. After transfer to the bulk-storage container the liquefied-petroleum-gas distributor computes his inventory and disbursements by tank gaging.

Because of the size of these containers, a slight variation in level or in tank shape may result in appreciable gaging errors. This could be overcome by having the tanks accurately calibrated at the time of fabrication. At the same time, permanent longitudinal and transverse leveling marks could be indicated on each container. For accurate gaging, temperature and pressure corrections have to be made. The pressure correction is necessary to account for the amount of liquid that vaporizes and fills the void left by the lowering of the liquid when withdrawn from the tank. The opposite is true in filling a container. The liquefied-petroleum-gas distributor requires fairly accurate measurement of these volumes to check gas receipts and deliveries. This information is also essential for accounting and auditing purposes.

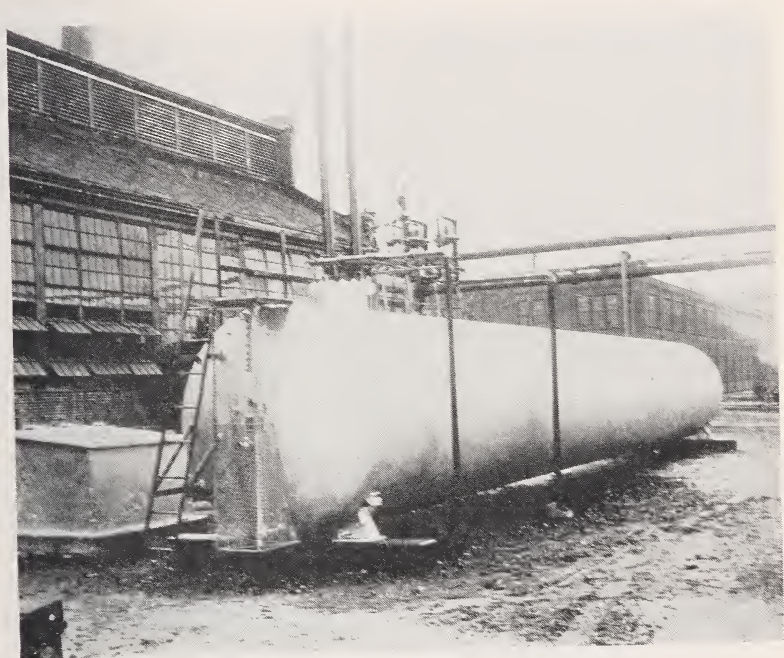


FIGURE 22.—*Typical industrial installation.*



FIGURE 23.—*Typical two-cylinder installation.*

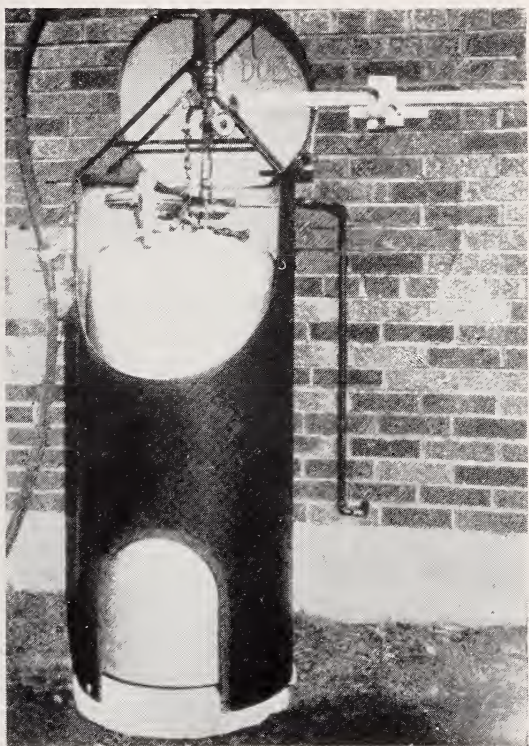


FIGURE 24.—*Single-cylinder installation, showing method of weighing cylinder contents.*

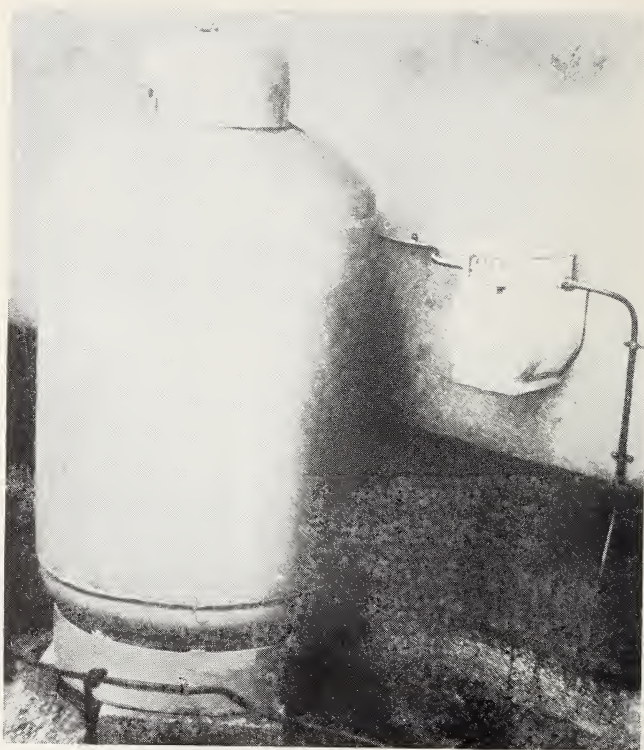


FIGURE 26.—*Single-cylinder installation, including meter, usually serviced by tank truck.*

From the distributor's storage container the liquefied petroleum gases are transferred either into tank trucks or to portable compressed gas cylinders. (See fig. 23.) Portable liquefied-petroleum-gas cylinders are universally filled by weight. This is not only an extremely practical method for measuring small volumes of these gases, but is probably the most precise method. It accounts for all gas in the container both in the liquid and vapor phases. Its accuracy depends upon the limits within which the tare and gross weights of the package may be determined. Its usefulness has been extended slightly beyond the application to portable containers. There is a class of permanently installed container whose contents are gaged by weighing at the point of installation. (See fig. 24.) Such containers are filled from a tank truck and are usually larger than the portable-type cylinders. The cylinder is lifted and weighed by means of a portable screw-lifting device and special beam scale which is carried on the gas delivery truck.

Weight determinations are neither practical nor satisfactory as a means of gaging volumes in relatively large vessels, buried containers, or such transportation equipment as railroad tank cars or automobile tank trucks.

The measurement of gas delivered to or withdrawn from the tank truck is accomplished either by use of a slip-tube gage, by rotary gage, or by the use of a liquid meter. (See fig. 25.)

Where tank trucks are used for the delivery of liquefied petroleum gases to consumers' tanks, the driver records the amount of gas delivered to each storage container according to the readings of his tank gage or liquid meter. Gage readings are converted into gallons, using a tank outage chart calibrated for each truck tank. Delivery figures obtained by either of these methods are later rechecked by comparison with the driver's records of the gage readings on the consumers' tanks that were filled from his truck.

In some systems of distribution the consumer owns the inventory. He is charged after each delivery for the volume placed in his tank. With other systems the inventory is owned by the gas distributor and the customer is billed at regular intervals for what he consumes. This latter system requires further measurement of the gas, but this time to account for relatively small quantities. These measurements may be accomplished by any of the methods previously mentioned, but public preference seems to lean toward the use of gas meters, and this industry is using many of them for that purpose. (See fig. 26.)

In some sections of our country large volumes of liquefied-petroleum gases are used for motor-fuel purposes. Even some of the fast streamlined trains of the West have replaced their former equipment with liquefied-petroleum-gas equipment. One of the problems that this motor-fuel use created was in connection with measurement through dispensing equipment. The filling-station equipment is operated much the same as gasoline-dispensing equipment, with the exception that the liquefied petroleum gases are under pressure and the pumping in the liquid phase has to be done through a system that will maintain a higher pressure on the outlet side of the meter than the pressure in the tank from which it is being withdrawn. The high volatility of liquefied petroleum gas is the cause for inaccurate metering without a means of holding a solid column of the liquid in the metering chamber. This is accomplished in various ways, some of which constitute the basis for patented equipment.

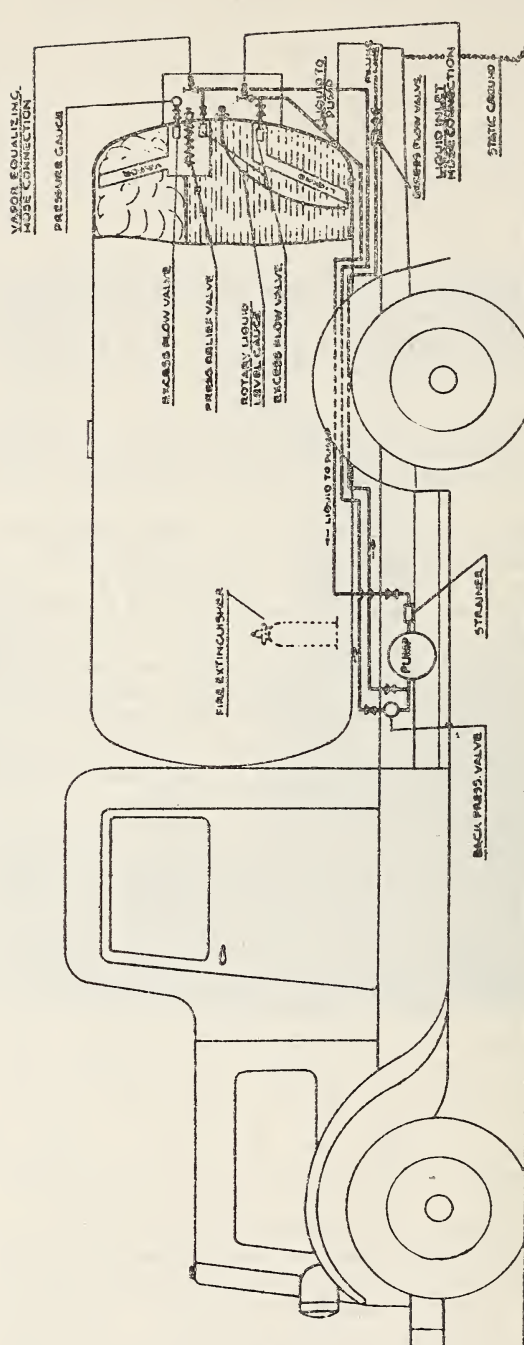


FIGURE 25.—Typical propane tank truck.

In this discussion I have tried to give a general picture of how the industry transports and stores its products and how it accounts for the volumes of gas handled. The liquefied-petroleum-gas industry has admittedly been confronted with many perplexing problems in the handling, storage, and measurement of its products. None of those problems, however, has been unsurmountable, and I am happy to say that within this industry everything is well under control.

WEIGHTS AND MEASURES REGULATION, A PAPER PRESENTED BY CHARLES M. FULLER, SEALER OF WEIGHTS AND MEASURES, COUNTY OF LOS ANGELES, CALIFORNIA

One of the best things about being a weights and measures official is the fact that it keeps you on your toes. There is always something new to challenge your interest. About the time you feel that everything is under control, that you have laws and regulations and testing equipment to take care of every requirement, up jumps a "horse of a different color" to be reckoned with.

The petroleum industry is our best friend in this respect. It does not intend to let us go to sleep on the job. Not satisfied with increasing the number of gasoline pumps and meters that must be tested by thousands and tens of thousands, it insists on being progressive by developing new kinds of fuel and new types of measuring devices. Keeping up with this development not only keeps us from going to sleep on the job, but also keeps us awake nights figuring out ways and means of inspection and test.

Our latest problem has arisen from the rapidly increasing use of that liquefied petroleum gas commonly known as butane. Sales in California, alone, have grown from some 6,000,000 gallons in 1932, to 63,400,000 gallons in 1939. Service stations are installing and using outfits to meter this product from storage tanks into the fuel tanks of passenger busses, transport trucks, and other automotive equipment. Some of the streamliners operating between Chicago and the West coast are now using butane instead of Diesel oil. There is a chap out in Santa Monica who has even adapted an airplane motor to its use, and is flying a plane using butane as fuel.

This is not merely a local problem. One of the foremost tank and pump companies in the United States has recently acquired the patent rights to a metered system for dispensing butane, which shows that they are planning its manufacture and distribution on a national scale. Before starting in to draw up regulations, we should secure an adequate method and equipment for testing these metered systems for accuracy. We will then be able to find out what they are capable of doing, and have definite information on which to base our rulings and regulations.

You have already learned from the preceding papers something about the characteristics of this liquefied gas. It must be kept under pressure at all times, unless it has been cooled to an extremely low temperature. If you were to open the nozzle of the dispensing hose into your test measure in the customary manner of testing a gasoline pump, not a drop of liquid would reach the bottom of the measure; it would vaporize immediately on leaving the end of the nozzle.

Some methods have been worked out for testing meters used in the measurement of natural gasoline, which would also be applicable to

liquefied petroleum gases. These keep the liquid under pressure and employ the downward displacement of water in a calibrated container. Two tanks are utilized in one type of apparatus, and one tank in the other. They are good methods when the outfit is built and maintained in one location, and the meters are brought there for test.

What we must have, however, is a portable outfit that can be taken into the field to test the meters exactly as they are used. We must ascertain not only that the meter itself is accurate, but that the entire outfit is installed in such a manner that correct measure will be delivered at the end of the hose. A "master" meter has been used by some companies for testing their field meters. But there you are up against the possibility that your "master" meter may become inaccurate, and it must be constantly checked and proven correct. Also, we are not unmindful of the fact that whatever make of meter is used for this purpose, every other manufacturer will be up in arms and claim that we are giving his rival a million dollars' worth of free advertising.

In working out the following contemplated methods, we have received the cooperation and assistance of engineers and experts from all branches of the industry—from the producers, refiners, and distributors of petroleum products, to the equipment manufacturers. I wish to take this opportunity of expressing my sincere appreciation to them for their splendid aid. Bear in mind that we have not as yet built this equipment. We expect to do so and conduct active tests in the field within the next few months. We will then be able to give you positive data based on actual experience. It is very likely that some changes and modifications may be found necessary.

In the past, the principal objection to utilizing a weight method in the field has been the difficulty of ascertaining the specific gravity, so as to know the weight per gallon, at the time of test. Methods of determining specific gravity of liquefied petroleum gases used a bomb-weighing procedure which required, among other things, a sensitive laboratory balance that could not very well be moved from place to place. It also necessitated the service of a laboratory man and took from half an hour to an hour.

The California Natural Gasoline Association has adopted a tentative standard method for determination of specific gravity of a liquefied petroleum gas by hydrometer. This was developed by a research engineer of one of the major oil companies, and they have been using it for several years with entire satisfaction. We have been trying it out, and it appears to be the answer to our problem. (See fig. 27.) Briefly described, it consists of cooling a sample of the product down to a temperature below its boiling point at atmospheric pressure. The sample is then introduced into a precooled vacuum flask and the specific gravity taken under equilibrium temperature conditions by means of a hydrometer. By the use of conversion tables, the specific gravity and weight per gallon are computed at the temperature of the liquid as it passes through the meter.

The sample is taken from a tank or line connection through a valve with a large opening to prevent vaporization due to drop in pressure through the valve seat. For the same reason, the line connection with the apparatus is short and made up of $\frac{1}{4}$ -inch pipe or larger. Cooling is accomplished by passing the liquefied gas through a coil of soft copper tubing. This coil is placed in a Pyrex-glass vacuum

flask, and CO_2 , commonly known as "snow" or "dry ice," is used for a cooling bath. In this manner, it is possible to lower the temperature of the liquid to 70° or 80° below zero Fahrenheit.

The sample flask, an unsilvered Pyrex-glass vacuum flask, is pre-cooled by filling it with a sample from the coil, which is allowed to

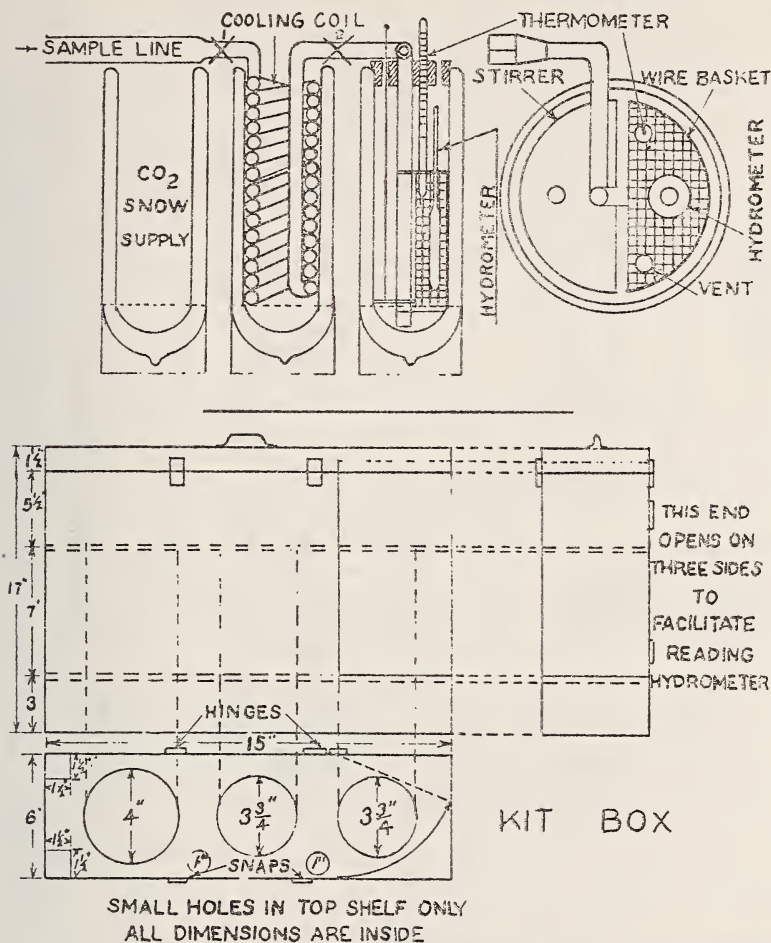


FIGURE 27.—Specific gravity kit for liquefied petroleum gases, taken from Bulletin TS-392 of the California Natural Gasoline Association.

remain for a minute or two and is then discarded. The test sample is then drawn; a period of about a minute should be taken in drawing, bringing the level up to a point where the hydrometer floats freely. The thermometer is adjusted so that the immersion mark coincides with the surface of the liquid. The sample is stirred by moving the stirrer through the full depth of the liquid until the temperature is uniform. Successive readings are then made until three identical gravities are obtained. This is really not at all complicated, and the kit can be taken out into the field. In this kit there are three open-top vacuum flasks. The first one is used merely to carry the supply of dry

ice; in the next one is a coil made up of some twenty feet of small-diameter copper tubing which leads into the third flask, where there

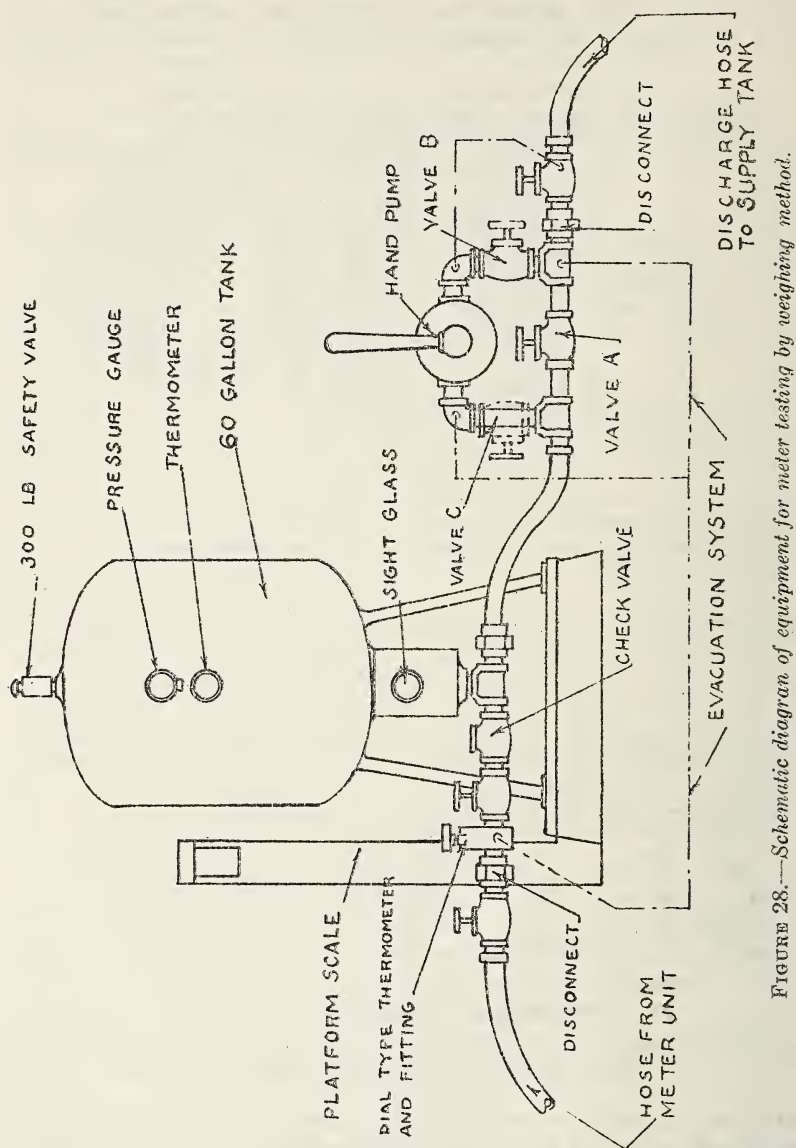


FIGURE 28.—Schematic diagram of equipment for meter testing by weighing method.

is a wire basket for holding the thermometer, the hydrometer, and the stirrer which keeps the liquid at the same temperature.

The vacuum flasks, special hydrometers, thermometers, and other pieces of equipment that make up this outfit, can be obtained from a number of supply houses. It is simple in construction and operation. Bulletin TS-392, issued by the California Natural Gasoline Association, includes a complete detailed description and set of conversion

tables. The sketch of the outfit, figure 27, is taken from the bulletin mentioned.

Now that we have a means of ascertaining the weight of a gallon of liquefied gas, there still remains the need of a container into which the product can be passed from the meter and weighed. We contemplate an arrangement as shown in figure 28. A portable platform scale will be used with an SR of not over two ounces. The diagram, for the sake of clarity, shows the hand pump and piping for emptying the container back into the storage tank, at one side of the scale, but this will be constructed and placed on the scale platform. The diagram is schematic; in other words, it is used to convey the general idea, but it is entirely probable that some changes in piping and valves may be found necessary when it is being constructed and placed in use.

In order to secure a uniform condition, we believe it advisable to fill the tank and discharge it immediately to secure a "wetted" surface in the equipment. Then determine the tare weight of the equipment. Deliver 50 gallons through the meter, close meter valve, disconnect line, and weigh. Subtract tare weight to obtain net weight of delivery and from the specific gravity determine the actual number of gallons in the proving tank.

Since the proving tank, when full, will be at a higher pressure than the supply tank, opening valve "A" should expel all liquid from the proving tank. The pump and valve "B" are provided should it be necessary to pump out the prover. The sight glass is provided to determine if the tank is empty. Unloaded or tare weight should be checked before starting each subsequent test.

If repeated disconnecting of delivery and discharge hose, with consequent spilling of small quantities of liquid to atmosphere, is considered a fire hazard, an evacuation system may be added, as shown by broken lines. With all valves closed, operation of the hand pump will vaporize and remove liquid remaining in hose coupling chambers.

This proposed weight method has many desirable features. You have ascertained the specific gravity and know the weight per gallon of the liquefied gas. You know that the delivery from the meter is in your container, and you know the net weight of that. You can now compute the number of gallons and compare that figure with the meter reading.

We will probably find some more obstacles to overcome when we build this outfit and put it in use, but that is the only way to work them out.

The other contemplated method utilizes a calibrated tank of peculiar form to provide an accumulator chamber for vapor. You will get a good idea of it from figure 29. A ribbed gage glass is set in the narrow column between the two chambers. The unit is constructed to provide a 50-gallon capacity between the zero starting line in the sight glass at the bottom of the container and the 50-gallon indication at the center of the gage. Pressure gages, thermometers, valves, piping, etc., are provided as shown. Here again, the diagram is schematic, and some changes may be necessary when the outfit is constructed and placed in use. It may be desirable to provide a connection on the accumulator chamber for initial charging of the system with vapor as a compression medium.

Deliver 50 gallons through the meter to secure wetted surface in equipment and discharge until the liquid level in the sight glass is at the bottom zero point. With valves A and B closed, deliver 50 gallons through the meter and read the true volume of delivery on the large gage glass. Drain to bottom zero and the system is ready for subsequent tests. The pump and valve B are also provided in this

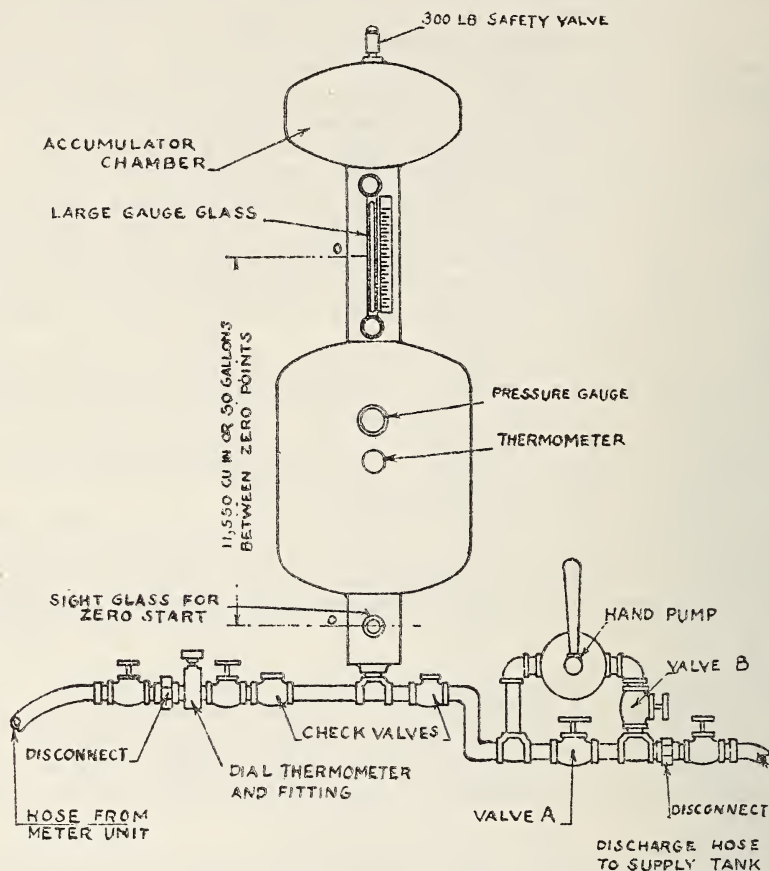


FIGURE 29.—Schematic diagram of equipment for meter testing by discharge to calibrated tank.

unit should it be necessary to pump out the container in returning liquid to storage.

There are a number of variables that must be taken into account in using these testing units. If readings of the thermometers show that the liquefied gas passing through the meter is at a different temperature from that in the proving tank, a correction must be made for that factor. If a pressure is built up that will cause some of the entrained vapor to liquefy, allowance must be made for that. Care must be taken to insure that the hose delivery line from the meter is full of liquid before the test is commenced. We expect to learn a lot in the next year. We are planning to build an experimental outfit that will combine both methods—a calibrated tank mounted on a scale. That

will give us a double check on every test run, and we will be able to decide which procedure gives the most positive results.

In considering liquefied petroleum gases, we are dealing with products that have many variables. Steps must be taken looking forward to the proper regulation of measuring devices used in its distribution, for the use and sale of butane-propane mixtures is increasing by millions of gallons each year. However, we must proceed with care and make sure that our requirements are reasonable, and that it is possible to comply with them, before issuing specifications, tolerances, and regulations. It is my recommendation that extensive study and experimentation be conducted on this subject during the year, so that at the next National Conference we will be prepared to consider a tentative code.

DISCUSSION OF FOREGOING PAPERS

The ACTING CHAIRMAN. Is there any discussion on the four preceding papers?

Mr. ENGELHARD. May I ask Mr. Fuller if, as a result of his experience, he would recommend liquid measure or gaseous measure as the basis for sale. In New Jersey we have a public utilities commission which regulates and supervises the testing of gas meters, and they are satisfied if there is a 3-percent deficiency at the time of test because the meter tends to give more as it is used. Is 3 percent a fair tolerance for butane gas, or could it be measured more accurately and within closer tolerances if it were always sold on a liquid basis?

Mr. FULLER. I believe that when these liquefied gases are measured and dispensed in gaseous form for heating and cooking purposes, their distribution is regarded in most communities as a public utility and is regulated by the utility commissions; in such cases the weights and measures official has nothing to do with it. What is going to concern all of us is the increasing use of these fuels all over the country in motortrucks, transport trucks, passenger busses, etc.; the commodity is now being sold and is going to be sold through pumps similar in appearance to our gasoline pumps, and it is sold in the liquid form under pressure and delivered directly into the consumer's tank. Our primary concern is to develop a method for proving that these meters are accurate.

The ACTING CHAIRMAN. Mr. Fuller, what would you recommend as a tolerance?

Mr. FULLER. At this time I am not ready to express an opinion on that matter. I believe that we should learn more about these dispensing systems before we make any definite recommendations for tolerances or specifications.

Mr. BAUCOM. I move that we extend to Mr. Fuller an invitation to present to us at next year's Conference the result of his experience and findings in this field during the coming year.

The ACTING CHAIRMAN. I am sure that at the time the program for the next Conference is being arranged your suggestion will be given consideration.

Mr. THOMAS (Phillips Petroleum Co.). For the benefit of weights and measures officials in the Eastern States, I would like to say that I do not believe that propane and butane will be found in use to any extent as a fuel for motor vehicles east of the Alleghenies.

The ACTING CHAIRMAN. May I suggest that the Committee on Specifications and Tolerances study this subject and determine whether or not recommendations should be made next year for specifications and tolerances on equipment handling liquefied petroleum gases.

ACTIVITIES OF THE NATIONAL SCALE MEN'S ASSOCIATION

By J. G. McCARTY, *President, National Scale Men's Association*

It is with great pleasure, as President of the National Scale Men's Association, representing some 400 men scattered throughout the United States, that I have the occasion of being present before such a great body of men who transact the business of weights and measures administration suggesting rules and regulations for adoption by the States.

No doubt many of you assembled here for the Thirtieth Annual Conference on Weights and Measures have a very good idea relative to the objectives of the National Scale Men's Association. To those of you who recently became affiliated with weights and measures, may I take a few moments to delve into the past history in connection with the formation of the NSMA. It was more than one score and ten years ago when Charles C. Neale, philosopher, statesman, teacher, scholar, and bard, brought about a meeting of scale men in the vicinity of St. Paul, Minn. These men organized, and called themselves the Northwest Association of Scale Experts. A short time later a group of scale men organized in St. Louis under the name of the American Scale Men's Association. In the year 1916, one year before the United States entered the great world conflict in Europe, the amalgamation of the two associations took place in the city of Cincinnati, Ohio. This combined unit was called the National Scale Men's Association. The Chief Scale Inspector of the Chicago Board of Trade, now Chief Weighmaster, was elected the first president. At that time there were 65 members in the organization, consisting of scale inspectors, erectors, testers, engineers, physicists, and students.

In those days, in the scale trade as well as in other trades, the knowledge of scales, such as it was, seemed to be enshrouded in a veil of mystery. The older men would not impart information to the younger generation because they felt that the experience involving all the headaches, smashed fingers, and backaches, deserved remuneration. These men were the pioneers of the scale industry, but more or less stingy in divulging information. I suppose they were conformable to their unwritten law, as many of us today feel there is no profit in yielding that which is so hard to attain. At that time came forth learned men who had lifted the shroud of scale mysticism and presented before the association articles of a technical nature relative to scales.

From that time on we have had presented at our conventions very interesting papers covering all phases of the scale industry—papers written by men in all walks of scale life. Since that time much has been written about scales. The young man entering the business at this date can find many important articles that have been written on the subject.

At the 1935 convention of the NSMA held in Toronto, Canada, a resolution was adopted to promote the extension of activities by holding local meetings. This was the nativity in comprising the Toledo

and Detroit sections, the Northwest in the Twin Cities, and the Texas Division. Throughout the year these divisions hold meetings, and reports of their attendance are most gratifying. In this manner, the scale men are kept in contact with each other in their respective locations. Through the medium of papers and discussions, those who are less fortunate in not being able to attend the National Convention, can view their problems in open discussion. During the twenty-fourth annual convention held in Chicago this past March, a revision of the by-laws was made to set up an advisory committee composed of one member from each local division of the Association. This was brought about to enable the local units to be closer to the parent Association and to have direct representation in each and every unit. Each member of the Advisory Committee is to be equipped with sufficient data for discussion and a report of local opinions made as a committee report.

We have found these local units to be attended by many State, county, and city sealers, also shopmen, roadmen, engineers, and representatives of industries who, in their daily activities, are brought into constant contact with weights and measures supervisory work. Throughout the year there are a great many interesting papers given at these meetings, not alone on scales. Industries have been very cooperative in offering moving pictures showing the high-light features in the manufacture of their respective products and offering speakers who present topics which the scale men find most valuable. A champion who desires to stay foremost in his field, must continue his efforts with all the zeal he possesses; the scale man who intends to stay on top or reach that which he desires, must discuss his trade and swap ideas with those who, he knows, have a wider range of experience. This opportunity comes to him through the medium of these local meetings and I must add since the inauguration of the local units, our membership has made great strides.

There may be many in this gathering who are not familiar with the purpose of the Association, and with this in mind, I would like to quote the objects:

A. To secure the cooperation of all concerned in matters of scale design, scale construction and installation, and scale maintenance and weighing.

B. To bring about discussion of everything pertaining to scales and weighing, the prime object being to bring about by education an improvement in scale construction, in methods of maintenance, and in weighing practices.

The objects may impress many of you with the fact a man has to be an engineer, a physicist, or a technician to become a member of this Association. Nothing is further from the truth, because in our present membership of approximately 400, almost 10 percent comprise directors, commissioners, chiefs, superintendents, inspectors, and sealers of weights and measures. The remainder consist of physicists, scale technicians, inspectors, engineers, service men, scale maintainers, weighmasters, supervisors, machinists, managers, designers, presidents, patent attorneys, representatives of weighing bureaus, members of lubricating companies—and I must not forget the congenial secretary of the Scale Journal; all working together, striving toward one end: To reach and maintain the highest degree of accuracy in weights and measures. Organization is needed now, more than at any other time.

With the advent of electrical equipment in scale design, which many find necessary for the operation of automatic scales, we have

been faced in the past few years with a more complicated type. Great strides have been made recently by the manufacturers of weighing machinery, with the result that the present day scale man has a wider field to cover. The dissemination of knowledge relative to all these new developments is accomplished in the meetings of the local units, where the repair and maintenance man, sealer, and supervisor can gain their desired information.

At the present time, the Association is confronted with current projects such as:

- Two-draft weighing on motor-vehicle scales.

- Motor-truck scale-testing practice.

- Glossary of scale terms.

- Specifications for overhauling and repairing of large-capacity scales.

- Tolerance committee on motor-vehicle scales.

Committees are now working on the aforementioned projects and since the last convention it has been suggested that a committee be appointed to have the NSMA sponsor a motion picture showing the complete cycle of scale manufacture, installation, testing, and weighing. All manner of scales will be involved from the two and four section pivot and plate fulcrum railroad track scale down to the analytical balance. It will take some time to get this into the four-reel stage, but the picture will be most interesting for engineering societies, schools, weights and measures conventions, and others.

Secondly, we are considering the compilation of specifications for vehicle, retail counter, and dormant or warehouse scales with intentions of combining AREA and NSMA existing specifications into a more positive form and to consider the advisability of inaugurating a seal of approval sponsored by the NSMA.

There has been much discussion for the past few years relative to dealers and repairmen of weighing and measuring devices obtaining a license in order that those in charge of weights and measures administration may have a greater means of control over second-hand dealers and so-called "fly-by-night" or itinerant scale repair men.

About 2 years ago in a large eastern city there was enacted an ordinance licensing second-hand dealers in weights and measures devices, also repairmen of such equipment. The annual registration fee is \$25.00 and a recent report from the weights and measures authorities in that city, discloses the fact that many second-hand dealers have discontinued this type of equipment rather than pay the fee, and the itinerant scale repairman, of small repute, is heading toward oblivion. With the gnashing of authoritative teeth in this manner, it can well be seen that the reputable and legitimate dealers and repairmen of weights and measures equipment can now carry on their business efficiently.

It is not for me to propose a change in the law, but by what I have just said, I mean it should operate against unreliable incompetency in the work as it was obviously intended to do.

Speaking, not as a President of the NSMA, but voicing a personal opinion, I do not believe representatives of reputable companies should be compelled to take out a license. A reputable company would not have a man in its service in whom they have no confidence and that should be sufficient to cover the repairman's credentials.

The Association has not yet taken any action regarding such licenses. As I have already mentioned, there has been much discussion in our conventions but no committee has been appointed to delve into the

matter; but such would be good food for thought. I predict the time is not far distant when the 48 States will adopt a similar control relative to the sale and repair of second-hand weighing and measuring equipment.

I notice the National Conference has passed its Silver Anniversary 5 years ago. The NSMA is to inaugurate its Silver Anniversary in 1941, convening in the city of St. Paul, Minn. To make this a gala event, and to recall as many pioneers in this industry as possible, there have been tentative plans to incorporate in our program, papers which were presented one quarter of a century ago. We expect to have on our program as many of these "stout fellows" as possible to present the same topic they submitted to the Association at that time. We know it will be more than a home coming, and to these good gentlemen the Association hopes that the hacking tooth of time will not hinder their appearance.

I have taken up much of your time giving you a synopsis of the history and activities of the National Scale Men's Association. In the event any of you gentlemen wish to join our Association, I am sure our corpulent secretary, whom I see in the audience, will be more than glad to give you an application for admittance to a really great association.

The ACTING CHAIRMAN. That was a very interesting paper, Mr. McCarty. With reference to the small dealer and the million-dollar concern, we have found in enforcing our law in New York City that the most reputable concern, the million-dollar concern, will in some cases have employees who pick up a scale in a trade-in and, instead of turning it in to the company, will try to resell it themselves in order to pick up an extra dollar. So, regardless of who employs whom and what their intentions may be, we find that all of them must be regulated.

TWISTED STRANDS

By JOSEPH G. ROGERS, *Assistant Superintendent and Secretary, Department of Weights and Measures, State of New Jersey*

Spanning mighty waterways of the world today, suspension bridges spring their graceful arches in answer to the practical dreams of a great engineer who applied the principle of twisted strands. In boyhood my wanderings often took me to the windows of the John A. Roebling plant, the cradle of the suspension bridge, in my home town of Trenton in New Jersey, where I watched in fascination the formation of the wire rope or cable that has found so many practical uses in the life around us. Each strand of the rope in itself may be a relatively small and weak thing, but twist a number of them together in such a fashion that each combines with the other in support, and we have something of prodigious strength that withstands the ravages of time and wear and can carry great loads.

There are many forms of twisted strands. Who of us has not gone out after a bad storm and observed the effects of the wind and the elements on our wired system of power, light, and communication. Once orderly and coordinated in action, we have seen before us a tangled mass of strands rendered useless for their intended functions, lying dormant or dead, retarding or paralyzing industry, causing trouble and inconvenience, and creating general havoc in our normal process of living,

Then there are the twisted strands of abrasion such as found in steel wool; the tangled barbed wires of obstruction in the barricades of the battle front; the twisted fibers and threads that are woven into cloth of many uses and patterns—twisted strands everywhere of both good and evil, each of which has its analogy in some element of human relationships. But for the purpose of my topic, the title of which is, of course, metaphoric, the first two types I have mentioned will suffice as parallels to the twisted stands that have particular application to our immediate relationship to weights and measures affairs and especially to the purposes of our Conferences here at Washington.

Let us for a moment consider the background and importance of these meetings, of which this is the thirtieth. Thirty years of conscientious striving for the advancement of weights and measures work throughout the Nation! Under the sponsorship of the National Bureau of Standards of the United States Government these Conferences were started and have since been maintained, and the prestige of this sponsorship should certainly not be doubted nor lightly considered. The men who first met here at the invitation of the Bureau were pioneers imbued with the fires of enthusiasm in the progressive movement of bringing quantity regulation up to the standard that its importance justified. They were answering the challenge of dishonesty in trade that was rampant, and were banding themselves for this purpose.

Before the attempt at coordination of effort was made, it was every jurisdiction, or I might say, every man, for himself, and each found it an uphill fight. Let us then think of what the refinements in the work have brought about during the last three decades, and largely as the result of these Conferences that have enabled group action. When States became alive to the urgency of doing something intensive about trade conditions from the standpoint of quantity determination, their first steps were confined mainly to the elimination of false weights and measures. The elimination was fast and thousands of pieces soon found the scrap pile. Then came the betterments in devices to weigh and measure commodities, through the development and adoption here of codes to govern such equipment. Reputable manufacturers, in keeping with the trend, lent their support to the movement for better weights and measures, and to my knowledge they have not, except in very rare individual instances, receded from that position. Their resources and facilities were liberally employed to place on the market better instruments. They worked hand in hand with the weights and measures group and out of this have come the great advancements that we find today in devices of all classes.

The promulgation of codes of specifications and tolerances naturally created problems for the manufacturers of equipment, but they have usually solved them. They have also encountered headaches along the way that seem to be accumulating, not because of the codes themselves, but because of the methods of application. And that's where these Conferences figure.

Those who adopted the first codes here had the primary purpose in mind of establishing uniformity, so that what was acceptable in one State would be good in another. They worked toward this end. Are we working away from it? Certain indications in recent years would seem to point that way. Why should this be? We are all committed to a common purpose—that of raising the standards for

equipment used in trade as well as for quantity regulation in general—and here in Washington we adopt recommendations, on majority decision and vote, after an outlay of much thought and effort. We do argue, it is true, and to good purpose. We cannot all be right all the time.

Some of us come here with pet projects that are not always met with favor. New Jersey has come down here with ideas of its own from time to time, and this has been common to all States that have had representation at these meetings. We have not always got what we wanted and believed to be right and necessary, but we have adhered to the codes adopted here—and they have generally been right from all practical standpoints.

There seems to have been manifested a trend away from Conference recommendations. Of course, it is generally understood that the actions of these Conferences are not binding upon any officials who attend them, but undoubtedly we, as weights and measures men serving in the interests of our people, will make more rapid and consistent progress if we proceed with a united front and maintain uniformity, at least in our technical requirements for commercial equipment. We meet here as a group presumably interested only in the advancement of quantity regulation in all its better phases. Should we not then uniformly maintain the constructive actions that these meetings produce? Or does individualism exist in our structure and motivate dissenters from these group actions? Of course, as individuals we are in no small degree responsible for what may be the result of these meetings, but the theory that we can act alone has gone into bankruptcy. Any thoughts of dominance in the work either from the standpoint of States or individuals should be dispelled, as these become nothing more than individualism that is to be avoided at any cost. There is glory enough for all in this great work of ours but it should be reflected upon us rather as a national body than as individuals or small groups. Arbitrary action on the part of one or a few can damage and possibly nullify the good efforts that have been made here by the many toward uniformity.

As a well coordinated body of officials we can be powerful. There lies the simile of the beneficent twisted strands that maintain in great structures. Taking the weights and measures fraternity as a whole, it is not a large group in comparison with its importance. That is all the more reason that everything we do should be group action and not individual action insofar as this may be accomplished. We realize, of course, all of us, that in our several State jurisdictions there are problems in our general work that arise, common to our locations and customs. I say this in relation to matters outside the province of codes adopted here.

But equipment is fundamental in our activity, and if in one jurisdiction we say that a device is acceptable because it substantially meets technical code requirements and in another jurisdiction it is rejected because we insist upon certain things outside of recommended code requirements, then our ultimate destination can only be a state of chaos. And where does the manufacturer stand in such a situation? He wants to go along, and he uses our adopted codes to guide him, but what must he think when he finds weights and measures men themselves pulling against each other? Undoubtedly he gets the impression that he is facing a stone wall that has no flexibility

whatsoever. And does our prestige suffer? Most assuredly! Can respect be entertained for any organization, whose actions are decided by vote, that does not recognize majority rule and abide by it? There is so much more to be gained by adhering to majority opinion rather than to individual opinion in a work like ours that its advantages are incomparable and inestimable. If we do not intend to be governed by the actions of these Conferences in code matters when we go back home, then there would seem to be little use of formulating technical requirements here and we might just as well confine ourselves to listening to a series of educational papers and some "pep" talks at these meetings, and let it go at that.

But this would be getting away from one of the primary purposes of these Conferences and I do not feel we want to get away from it. If what we may do here is wrong at any time we can change it, but let us change it together. While maintaining that the requirements we lay down should prevail, I say let us be consistent in these requirements. Let us at least maintain the equipment codes of these Conferences as our working "Bible." Under our prevailing weights and measures set-up there seems to be no better available guide. At least I have found none.

It would seem that those who dissent have little to gain in this situation. If we are not able to get the right perspective, we have authorities to help us. Of course, we may have honest differences of opinion, which is the right of every free man, but it will never do to exalt our differences.

It is not until one has entered sympathetically into the conception of the purposes of our gatherings here that he will gain the full import of coordination of effort. Those who have been tested in the fires of experience in the work know this. Those who are affected by our procedure look to us to tell them what we want and it is only natural for them to expect us to stick to our decisions. In this we should be fair.

There have been cases where individual arbitrary action in defiance of code recommendations on the part of officials has caused unnecessary inconvenience and expense to equipment manufacturing interests. It may have been only a slight change of little importance here or there in a device that interrupted the normal course of production and caused large outlays of money, without adding anything really of benefit to the workability or merits of the equipment from an official standpoint; and it is reasonable to assume that the ultimate purchasers and users paid the bill. I well recall a statement made to me by a manufacturer of a commercial device who claimed that to meet the requirements of all jurisdictions, State and local, where his equipment was being sold, over one hundred changes were required in an individual unit. Doesn't that give us something to think about? Just a screw here or there didn't suit or some other little item of construction was not favored—and at what a cost. In our treatment of equipment that comes before us, it would seem from these observations that our best judgment is needed in all situations of this kind, and if the salient requirements of our codes are met, we can afford to be liberal in our consideration of the small things of little consequence that would not be detrimental to general weights and measures policies and principles. Whether personal independence or individualism on the part of officials entered

into such situations is a matter of conjecture. We can assume that in some cases they did.

We should do our utmost to get away from steering a wobbling course that will get us nowhere and be a standing menace to the uniformity toward which we have striven so long. Working at cross purposes is a simile to the twisted storm-wrecked strands of power, light, and communication. We break the contact that produces what we need. I feel quite confident in stating that there is not a man here who, upon seeking help from any of his colleagues in the work on any issue, has not been accorded the fullest cooperation and assistance. That has been my experience.

It is, therefore, passing strange that as a group we should not have the same coordination. These Conferences constitute the only available clearing house we now have to equitably adjust our affairs relating to equipment. Where better could we bring our ideas into focus than here at the National Bureau of Standards in Washington with its splendid facilities and its helpful attitude? The Bureau has never attempted nor sought to dominate the deliberations of these Conferences. It has left matters very much in our own hands. It, therefore, becomes our greater responsibility to derive the most benefit from these meetings, and it is only natural that the Bureau should expect that we do this.

Now for every adverse condition there should be a remedy. If we have been inadvertently or otherwise getting off the path leading to our goal of uniformity, let us try to find it again, and in this not only we as officials but the manufacturers as well should do their part. What is this part? The equipment interests can be very helpful in this entire situation by so arranging the preliminary presentation of their new developments in weighing and measuring devices that their new features or innovations may be incorporated in our codes before such equipment is produced and offered to the various jurisdictions for consideration and approval. We all know that "out of a clear sky" has often come some new development for which existing codes have made no provision. Surely manufacturers must know far in advance of our meetings here what they have in contemplation, and if they would make preliminary representations sufficiently early for Conference action, many of their headaches would be avoided. We as weights and measures men are not mystics—we are too practical to devote ourselves to trying to find the future in the stars. We should be informed so that we may anticipate, adjust ourselves, and decide upon the features of devices that are to be offered to us for our approval.

Many of the difficulties encountered by manufacturers when submitting their devices for approval are, no doubt, caused by the fact that the provisions of existing codes are not always sufficient to include new developments in construction and design, with the result that officials with nothing specific to guide them in relation to innovations that appear in equipment from time to time, are faced with the necessity of exercising their own opinions and judgment, which, experience has taught us, have in many cases been so diversified and of such disparity that uniform action on the part of official interests in such situations is out of the question.

In situations that are brought about by lack of knowledge of forthcoming equipment, it will thus be seen that the weights and measures

officer in dealing with State approval projects is not always at fault. He can only conscientiously do his best and under such conditions must virtually write his own code. Perhaps some of our trouble in getting coordinated action also lies in our too infrequent meetings, but it would seem that this too can be remedied.

The thought has been expressed that the Committee on Specifications and Tolerances should be increased as a means to facilitate contacts between the weights and measures and the commercial and industrial interests. This brings up the subcommittee idea, which can be a good one if properly handled, as it would have for its purpose the providing of committee facilities whereby the manufacturing interests could at any time of the year place matters of correlative interest before committee members in the several sections of the country for hearing and consideration, the proposals or projects to be acted upon by the individual members for later reference to the general committee, and subsequently to the conference as a whole. This would undoubtedly reduce the volume of material that the Committee on Specifications and Tolerances must consider when it comes to Washington each year and when there is such a limited time to give full consideration to all proposals. It would simply mean that individual committee members sitting with representatives of the manufacturing interests would weigh the facts in all proposals, form their decisions and make their recommendations to the Conference accordingly. The extending of committee membership for any other reason would have no point and serve no purpose that has not already been accomplished.

It would seem that subcommittee procedure might be in line with efficiency in what we are trying to do. Membership on the Specifications and Tolerances Committee under this idea could be arranged with respect to geographical locations and districted, so that all sections of the country would be covered and a committee member be available in each section or district. The procedure outlined would, of course, necessitate the reposing of confidence in the committee membership and in their judgment and ability to act as fact-finding agencies. If the members of the committee have the proper background of experience, and whatever else it may take, they should as a general rule be in a position to advise any interests submitting their preliminary proposals whether such are likely to stand the test of general conference consideration and meet with the approval of the combined group majority.

At times, in order to meet emergent situations, it might even be necessary that arbitrary decisions be made to take care of matters that cannot wait, but actions of this kind should be taken only in cases of extreme urgency, and when taken should, if possible, be concurred in by all, the decisions as rendered to be disseminated among the general conference membership by a committee on education or publicity, for the government of the entire conference group. This would be one means of approaching uniformity of action in the various jurisdictions of the country and should go far toward accomplishing one of the fundamental purposes of our meetings here.

Other plans of cooperation and coordination can undoubtedly be worked out, and in all likelihood the members of the Conference have thoughts along this line. We should be able to develop a definite plan that would accomplish our purpose.

The germinal idea of my subject here today is that we bring ourselves into closer relationship, and that relationship should not be for the few but for all.

In the process of cooperation the officials of a number of State jurisdictions very active in the work have commendably endeavored through an exchange of correspondence to keep each other informed of their individual actions. The scope of this practice is not sufficiently extensive, however, to produce the desired results for our group as a whole, as the process is somewhat unwieldy. If carried to the ultimate, it would necessitate the manifolding and duplicating of correspondence and analyzed data; so it would seem that for a wide dissemination of information we would need a clearing house where this could be readily handled. We took a step in this direction down here last year when a Committee on Education was named, and what is needed now is a central point of contact for that Committee's work. If the National Bureau of Standards would be willing to function in that capacity and distribute to the members of this Conference throughout the year information on matters of importance in the various State jurisdictions, it would seem that we could all be kept very well informed of Nation-wide actions in the weights and measures field of endeavor. This may be wishing quite a job on the Bureau, but where in our work is there a more logical clearing agency, in view of our Conferences here.

However, while groping about for a means to a desired end, we can right here and now do something that will go far toward achieving the uniformity that is so necessary and desirable, and that is in resolving to at least accept the specifications and tolerances for weighing and measuring devices formulated and adopted at these annual conferences, and after all it is in the question of coordinating our views toward equipment that most of our difficulty now lies. We can in this way untangle some of our twisted strands of confusion and obstruction, and approach a singleness of thought and effort that will give us the strength of the cable, aid in the weaving of an orderly pattern in the fabric of progress, and not only simplify our general procedure as weights and measures officials, but do much in the way of lessening the troubles of industry.

It ain't the guns nor armament, nor the money that they pay;

It's close cooperation that makes them win the day.

It ain't the individual, nor the army as a whole,

But the everlasting teamwork of every bloomin' soul.

The ACTING CHAIRMAN. That is more than a pep talk. That is something that we all feel and we all agree with. It is about time that somebody got up and told us about it. Cooperation among weights and measures officials is an absolute necessity, and it is growing every day.

I think one trouble has been in the procedure on type approval. A manufacturer submits a new type to one State, and after it has been approved there he goes on to another official, and so on down the line. In the past few months we have adopted the system that Joe Rogers spoke about—we do exchange correspondence, not with everybody, but just with those we feel are most interested. Before we approve we tell each other whether we think a device is good or bad, and what our criticism may be, and after we have heard from everybody all around the circle, then and then alone do we take

final action. If we could adopt a system such as that throughout the Conference, as Mr. Rogers suggests, and perhaps make a clearing house of the National Bureau of Standards and insist upon the manufacturers submitting to everybody before final approval is given by anybody, then we could have uniform criticism and uniform action, instead of one fellow being the good fellow because he is very lenient and will accept anything and the other fellow being the tough fellow because he is pretty fussy about a screw or a dial or something else that he does not like. It is something to think about, and I hope that before we leave this Conference we shall give it further thought, and that some plan can be devised by which we will be able to bring about uniform action.

THE EFFECTS ON SR OF PACKING PIVOTS AND BEARINGS WITH GREASE

By C. L. RICHARD, *National Bureau of Standards*

The primary purpose of these remarks is to report the results of some experimental study of the manner and degree in which grease applied to the pivots and bearings of weighing scales may affect the sensitiveness or other performance characteristics of those scales.

Preliminary to discussion of the main theme, it is in order to review the circumstances which render the use of grease on pivots and bearings a generally necessary practice in the maintenance of certain types of scales. Railway track scales, vehicle scales, and other large-capacity scales, which usually are installed out of doors and in pits below ground level, generally are subject to physical damage and performance deterioration caused by corrosion of certain vital parts, particularly of the pivot knife-edges and bearing surfaces in the lever system. Surface water, rainfall, or melting snow draining into the scale pits, as well as ground water seeping through pit walls and collecting in the pits, inevitably produce damp atmospheres which readily corrode exposed metal parts; condensation of atmospheric moisture on metal surfaces is a common contributing factor. Moreover, in many instances, as at railway yards, coal yards, and certain classes of industrial plants, acids or other corrosive elements in the surface water or ground water accelerate the corrosion rate. Unfortunately, the most vital parts of the scale assembly, the pivots and bearings of the lever system, are those most vulnerable to damage by corrosion, partly because the high carbon or special alloy steel of which they are formed corrodes readily, partly because the concave or V-shaped bearings in which the pivots rest form natural reservoirs, or pockets, wherein moisture may collect, and partly because ordinary measures of protection or rust prevention, such as painting, are not practicable.

The primary effects of corrosion at the pivot knife-edges and bearing surfaces are to impair the sensitiveness of the scale, and produce inconsistent or erratic weighing performance. Secondary consequences, of no small importance to the scale owners, are the costs and delays occasioned by need for periodic renewal of the damaged pivots and bearings, a procedure which is especially costly and time-consuming in the case of large-capacity scales because the heavy levers must be removed from the pit, transported to and from a properly appointed scale repair shop, and subsequently reinstalled by experienced scale

mechanics. To summarize this preliminary review of the causes and consequences of pivot and bearing corrosion, it may be stated that corrosion, rather than usage and wear, is the chief cause of deterioration in pit scales and that corrosion prevention is the key to successful and economical scale maintenance. This opinion is well substantiated by the case histories of many railway track scales installed either above ground and under shelter or in artificially heated or ventilated pits where damp conditions do not obtain; invariably the pivots and bearings of these scales, even when unprotected by grease or other materials, remain in good condition several years longer than is the case in pit scales where damp conditions prevail.

A practical and simple method for suitably protecting scale pivots and bearings from damage by corrosion was developed some 20 years ago by one of the principal western railways and has since been adopted almost universally as a principle of scale maintenance on American railways. It consists in packing the pivots and bearings of the main levers and primary extension levers with cup grease, usually of a consistency designated as No. 4. For railway track scales this has been found to be a rather effective rust-preventing method and to have no serious effects on weighing performance or sensitiveness, provided that the grease is properly applied, that it is confined to the pivots and bearings of the main and primary extension levers, and that it is replaced with fresh grease when it dries or hardens.

However, in its field investigations of vehicle scales during the past $3\frac{1}{2}$ years the National Bureau of Standards has discovered that only about one-half of the vehicle scales tested have been given adequate protective treatment. Inquiry has developed information indicating that this aspect of vehicle-scale maintenance deficiency may be ascribed to two circumstances: (1) That vehicle-scale owners, generally speaking, are not informed of the need for rust-preventing measures; and (2) that there exists among many scale owners and weights and measures officials a belief that the use of grease on scale pivots and bearings may impair the sensitiveness, performance, consistency, or weighing accuracy of the scales treated. It was with a view to developing information regarding this latter consideration that the study herein discussed was undertaken.

Experiments were conducted with two types of grease: (1) A special grease said to contain rust-inhibiting ingredients and possessing very marked properties of adhesion or "stickiness"; and (2) ordinary commercial brand cup grease. Of this latter type, greases of No. 3 and No. 5 consistency were used.

Study of the effects introduced by packing pivots and bearings with the greases was conducted by observing the performance characteristics of four separate types of scales. In each of these four cases the loading conditions were kept constant in order that effects introduced by load change or by minor derangement of parts, occurring during removal or application of load, would not be reflected in the observed results. It should be noted here that the study was confined to observation of the effects which the grease had on performance and did not include any tests of the protective or rust-preventing properties of the grease. All experiments were conducted at ordinary room temperatures.

The first medium employed for study was an equal-arm balance of 2,500-pound capacity, which is regularly employed for precise

calibration of large weights at the Bureau Master Scale Depot, in Clearing, Ill. The beam is 72 inches long, is equipped with projecting pivots and loop bearings at the ends and fulcrum, and has a reading scale graduated in millimeters. Throughout the series of observations, the balance was loaded to capacity.

In the graphic record of results (see Fig. 30) the ordinates *A*, *B*, *C*, and *D* represent the four conditions of greasing at which performance data were observed, *A* denoting the normal condition of

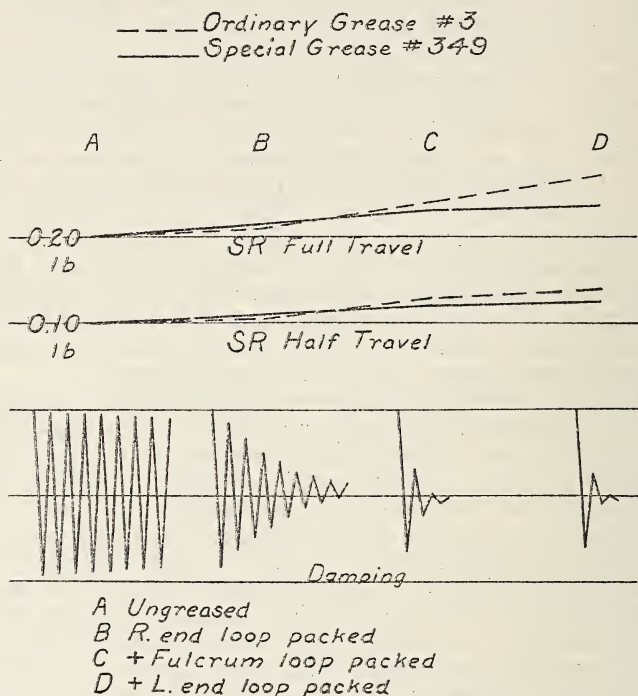


FIGURE 30.—Effects with equal-arm beam.

use without grease, *B* denoting that grease had been packed in the bearing loops at one end of the beam, *C* that grease had also been packed in the fulcrum-bearing loops, and *D* that grease had also been packed in the bearing loops at the other end.

The two uppermost lines illustrate the SR increase as packing progressed, the full line representing the data for the special grease, designated by the manufacturer's identifying number 349, and the dotted line representing the data for ordinary cup grease of No. 3 grade. It will be seen that the SR increase was at a reasonably uniform rate and was somewhat greater in the case of the No. 3 grease, the increase being from 0.20 to 0.28 pound for that grease, and from 0.20 to 0.24 pound for the special grease. These SR values were for the full travel of 1.5 inches which the beam has in normal use.

The two lower lines illustrate the increase in SR when travel was restricted to one-half the normal amplitude. It will be observed that the characteristics of the two lower lines are reasonably consistent

with those of the upper lines and indicate that the effect of the grease was independent of the beam amplitude.

An interesting and quite significant manifestation of the grease effects is seen in the graphs in the lower portion of the figure. These were plotted as the actual reproductions of the deceleration or damping observed by means of the balance pointer and graduated reading scale. Under conditions of normal use without grease, the beam movement was restrained only by the minor forces of rolling friction at the pivot edges and damped very slowly and gradually. As grease was added successively to the bearings, the friction introduced by the grease in the bearings produced more and more acute damping. It is interesting to observe that the damping characteristics are similar to those effected by the fluid friction in a dashpot connected to a scale indicating mechanism.

Further study was conducted with an experimental lever train composed of parts of a two-section narrow-gage track scale of heavy construction; the system consisted of one pair of main levers, an end extension lever, a transverse extension lever, and a weighbeam, the latter being provided with a reading scale graduated in millimeters. The compound ratio of the system was 2,000 and the amplitude or travel at the weighbeam tip was 1 inch; the vertical motion of the main load knife-edges was almost negligible, a material factor in the effect of grease on the pivots.

On the plotted results (see fig. 31), as indicated by the legend at the bottom of the figure, the ordinates, A to G, represent successive stages

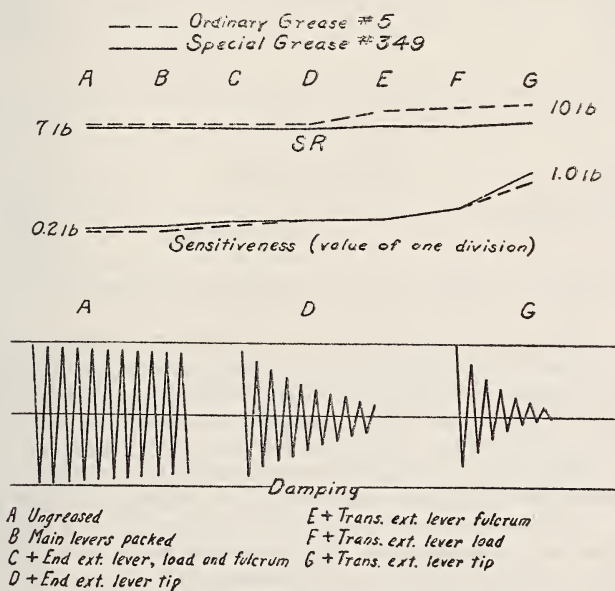


FIGURE 31.—Effects with experimental lever train.

of grease packing, beginning with the main levers and extending to the tip of the transverse extension lever. The full lines denote the results observed when the special grease was used and the dotted line the results with ordinary cup grease of No. 5 grade. The upper pair of

lines represent the SR values for the full weighbeam travel of 1 inch. It will be noted that there is no significant increase in the SR values until packing has progressed to the transverse extension lever, from which point moderate increase is noted for the ordinary cup grease and very little increase for the special grease. The actual total increases in the SR values were from 7 to 8 pounds for the special grease and from 7 to 10 pounds for the ordinary No. 5 grade grease.

A supplementary study of the grease effects on sensitiveness was conducted by observing, under various conditions of grease packing, the rest point change effected by a given change in weight on the scale. This is a common laboratory method for testing the sensitiveness of a balance and consists in observing the rest point of the scale or balance indicator and subsequently observing the rest point change caused by addition of a given amount of weight; from these observations the

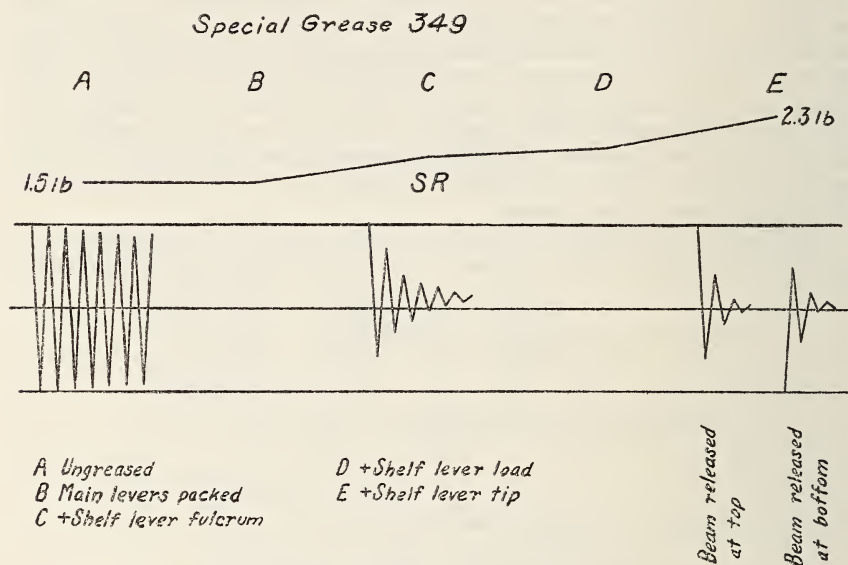


FIGURE 32.—Effects with 5-ton, A-lever, self-contained scale.

equivalent value of one division on the reading scale may be computed. Thus in the two lower lines there are illustrated the changes in the equivalent values of one division on the reading scale; the change was from 0.2 pound per division for the normal condition without grease, to 0.9 and 1.0 pound per division for the two greases. It will be noted that there, too, the results were reasonably consistent and not greatly dissimilar to those measured by ordinary SR methods of evaluation. In this general connection it should be explained that variation between comparable values for the two greases is not considered to be a definite index to difference in their effects; it will be appreciated that the degree or thoroughness of packing could not be exactly controlled and that, consequently, the variations may reflect that circumstance. I am inclined to feel that the performance and the effects of the two greases were the same, and that these differences resulted from the fact that there was a little more or a little less grease in the bearings under one or the other condition.

The damping characteristics under three conditions of packing are illustrated in the lowest graphs, and again in these, we see typical effects of fluid or plastic friction.

Figure 32 shows the results observed with grease on the pivots and bearings of a 5-ton capacity self-contained type scale. The lever system was of the conventional A-lever type, with shelf lever and weighbeam. A reading scale graduated in millimeters was used, in connection with a pointer, to register accurately the balance and rest

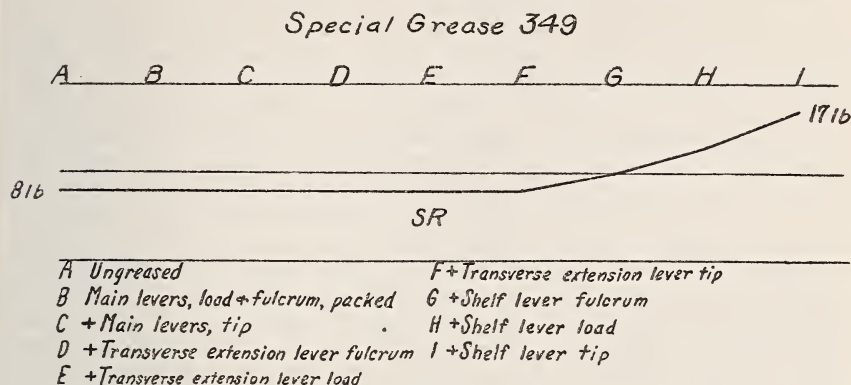


FIGURE 33.—Effects with 20-ton, motor-truck scale.

points. The scale was kept loaded to full capacity throughout the entire series of observations. Special grease No. 349 was the only material used on this scale.

It will be seen that the SR increased from 1.5 to 2.3 pounds as grease was packed in the pivot bearings, beginning with the main levers and concluding with the tip pivot of the shelf lever; it should be noted that no significant increase developed until packing of the shelf lever bearings was begun.

Special attention is directed to the damping behavior of the scale under condition of maximum packing. The two graphs illustrate that the deceleration of the weighbeam motion was quite rapid. It may be observed that when the beam was released from the two opposite extremes of its travel there was a difference of approximately one division in the rest point; that is to say, with all bearings, up to the weighbeam, packed there was a "lag" or "hysteresis" effect similar to that which characterizes the performance of some automatic-indicating scales with moving parts having considerable angular motion.

The fourth and final study (see fig. 33) was conducted with special grease No. 349 on a motor-truck scale of 20-ton capacity.

To summarize the information developed by these studies it may be said that the data indicate:

1. That the effect of packing the pivots and bearings of scales with grease is to reduce the sensitiveness and to produce a damping or decelerating effect on the weighbeam vibration.

2. That the SR effects, in a lever system, are in proportion to the angular motion of the levers treated, being very slight for the main levers, which have little angular movement, and increasing as packing progresses toward the weighbeam and shelf lever, which have, relatively, a considerable angular movement.

3. That the effects are somewhat greater in the case of loop bearings, where the pivots are entirely surrounded by grease, than in the case of plane or merely concave bearings.

4. That the effects are greater with greases of heavier consistency and, for a given grease, are greater at lower temperatures.

5. That if packing is carried too far toward the weighbeam, a lag or hysteresis effect causes minor inconsistencies in performance.

The practical conclusions to be drawn are the following:

1. That the practice of packing scale pivots and bearings with grease to prevent their corrosion, an essential principle of maintenance for many types of large-capacity scales, need not materially affect the performance of the scales if the packing is performed by a competent scale mechanic or other person familiar with the requirements.

2. That the grade and consistency of the grease used should be determined according to the temperatures prevailing in the scale pit and according to the angular motion of the levers treated and the form of the bearings in which it is packed. In this connection it may be said that certain greases having a lime-soap base are said to contain a certain amount of free moisture and that others are said to have some acid content, which increases with exposure to air. One manufacturer, it is understood, has developed a grease containing rust-inhibiting ingredients and, while the Bureau has developed no information as to its efficacy, it would seem that such a product would be a more positive rust-preventing agent than a grease containing free moisture or acid.

To conclude these remarks, it will be said that since, in any event, the incidental frictional effects introduced by grease are far less serious than those contributed by rusting of the vital scale parts, and since protective treatment with grease insures a longer period of satisfactory weighing performance and a material reduction in maintenance or renewal costs, it is recommended that the practice be adopted by large-capacity scale owners generally, and that it be advocated and encouraged by weights and measures officials and by scale manufacturers and scale repair agencies.

The ACTING CHAIRMAN. The balance of today's scheduled program, items 17 and 18, will go over until tomorrow morning. Mr. Smith has an announcement to make.

Mr. R. W. SMITH. Arrangements have been completed for the informal meeting requested by a number of officials yesterday afternoon; this will be held this afternoon at 2:30 o'clock, in the Chinese Room at the hotel.

The ACTING CHAIRMAN. Please do not let our meeting this afternoon interfere with the trip through the Bureau; we urge you to make that trip if you have not done so before, because it is very, very important. I would like to ask that as many others as possible attend the meeting, including those representing manufacturers of retail scales, because questions relating to the proper display and manufacture of those scales will be discussed.

(At this point, at 1:15 p. m., the Conference took a recess until 2 p. m.)

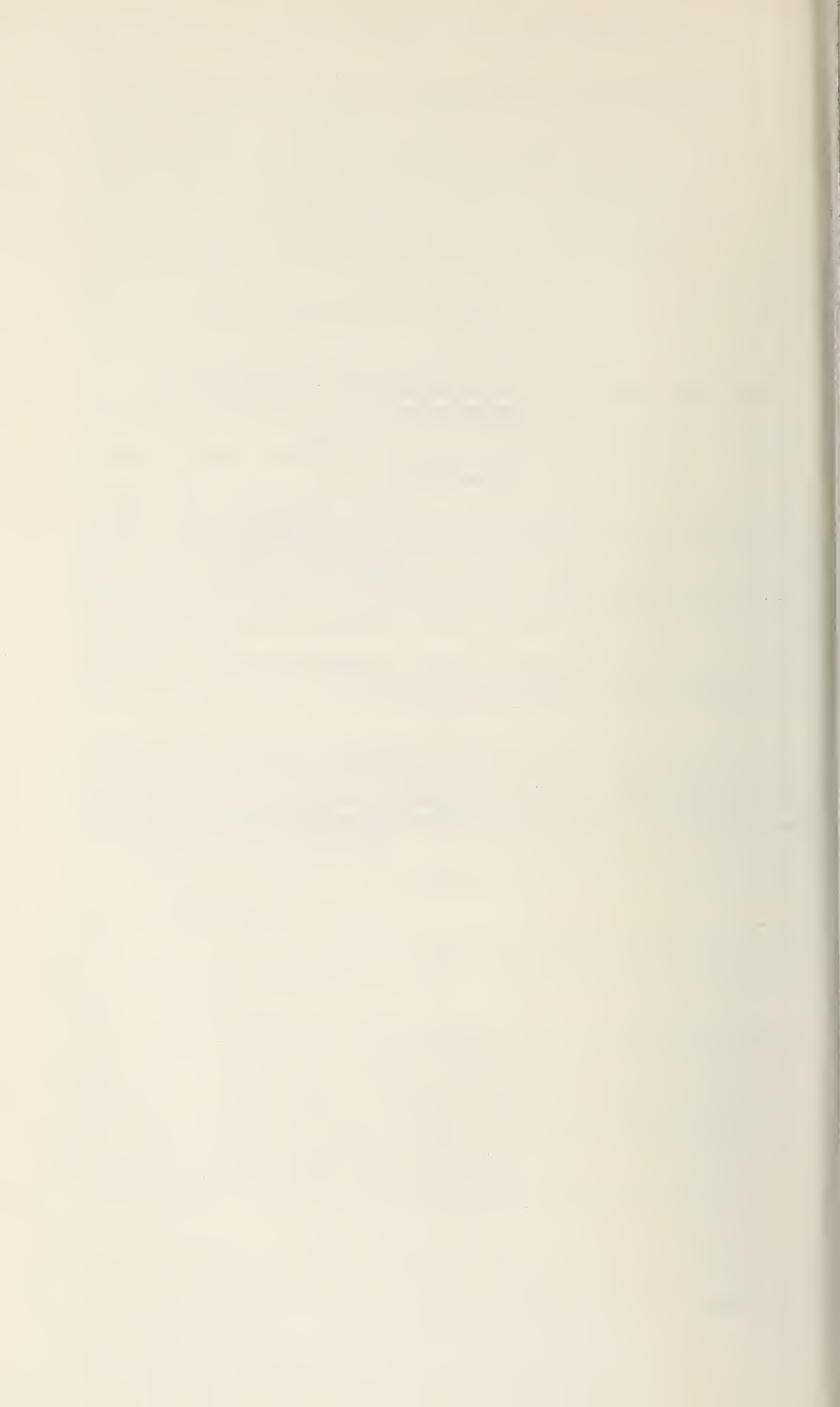
FOURTH SESSION—AFTERNOON OF WEDNESDAY, JUNE 5, 1940

TOUR OF THE LABORATORIES OF THE NATIONAL BUREAU OF STANDARDS

(The afternoon session of the Conference consisted of a visit to various laboratories of the Bureau, with particular attention to the laboratories of the Weights and Measures Division. The National Standards of Length and Mass were viewed in the vault where these standards are preserved. Visits were also made to the completed Vehicle-Scale House and to the new High Voltage Laboratory, a building of unique construction nearing completion. Those participating in the tour were divided into small groups, each in charge of a member of the Bureau staff who served as a guide.)

(There was also held on this afternoon the informal meeting of a group of weights and measures officials and others, agreeable to the request of a number of officials. This meeting was held at the Mayflower Hotel.)

SECRETARY'S NOTE.—On the evening of Wednesday, June 5, an informal party was held in the Italian Garden at the Mayflower Hotel, for the entertainment of those attending the Conference. Through the courtesy of the United States Secret Service there was shown a sound-motion-picture film, "Know Your Money." Dancing and other entertainment followed. Light refreshments were served.



**FIFTH SESSION—MORNING OF THURSDAY,
JUNE 6, 1940**

(The Conference reassembled at 9:45 a. m., at the Mayflower Hotel, James O'Keefe, Vice President of the Conference, in the chair.)

**REPORT OF COMMITTEE ON SPECIFICATIONS AND TOLERANCES,
PRESENTED BY JOHN P. McBRIDE, CHAIRMAN, AND DISCUSSION
THEREON**

The Committee on Specifications and Tolerances recommends to the National Conference on Weights and Measures the adoption of the Additions and Amendments to the Specifications, Tolerances, and Regulations for Commercial Weighing and Measuring Devices, copies of which have already been made available to the Conference. As these recommendations are read, explanatory comments will be interpolated from time to time.

(Signed) JOHN P. McBRIDE, *Chairman*,
CHARLES M. FULLER,
JOSEPH G. ROGERS,
GEORGE F. AUSTIN, JR.
RALPH W. SMITH,

Committee on Specifications and Tolerances.

Mr. McBRIDE. A new code, as follows, is recommended for tentative adoption. [Reading:]

**TENTATIVE SPECIFICATIONS AND TOLERANCES FOR SINGLE-
SERVICE MEASURE-CONTAINERS (EXCEPT MILK BOTTLES)**

Note.—The following specifications and tolerances are not to be construed to apply to measure-containers used for milk, cream, and buttermilk, these being covered by the code for milk bottles.

DEFINITION

A single-service measure-container, hereinafter referred to as a measure-container, is a container intended to be used once only, to determine at the time of sale the quantity of commodity comprising a retail sale made on the basis of liquid measure and to serve as the container for the delivery of the commodity to the customer.

SPECIFICATIONS

1. Capacity.—Measure-containers shall not be subdivided and shall be of one of the following capacities only: 1 gallon, $\frac{1}{2}$ gallon, 1 quart, 1 pint, $\frac{1}{2}$ pint, and 1 gill standard liquid measure.

2. Proportions.—The over-all inside height of a measure-container shall not be more than twice (a) the mean inside diameter (if conical or cylindrical) or (b) the length of the short side of a midsection (if of rectangular cross section).

3. Filling point.—The capacity of a measure-container shall be determined to a definite filling point, which shall be (a) the top edge, (b) a graduation near the top edge, or (c) the lowest portion of a shoulder, cap seat, or indentation near the top edge, of the measure-container. The filling point shall be sharply defined and it shall extend at least halfway around the circumference or across two opposite sides.

4. Marking.—A measure-container shall have its capacity conspicuously marked on the side in combination with the word "liquid" or the letters "liq" when the word "quart" or "pint" occurs. If the filling point is below the top edge, there

shall be on the side of the measure-container a conspicuous and suitable inscription clearly identifying the filling point provided. On the side or bottom of the measure-container shall appear the name, initials, or trade mark of the manufacturer. All required marking shall be clear and legible.

TOLERANCES

The tolerances to be allowed in excess or deficiency on measure-containers shall be the values shown in the following table:

Capacity	Tolerance	
	<i>Liquid drams</i>	<i>Cubic inches</i>
1 gallon.....	6	1.4
½ gallon.....	4.5	1.0
1 quart.....	3	0.7
1 pint.....	2	.5
½ pint.....	1.5	.3
1 gill.....	1.5	.3

SECRETARY'S NOTE.—At this point there ensued considerable discussion based upon a misunderstanding of the scope of the code. Objections to the proposed code were withdrawn when it was made clear that it did not refer to "prepacked" cartons and referred only to containers used at the time of sale for the measurement of commodities sold from a bulk supply.

(The tentative code as proposed by the Committee was duly adopted.)

Mr. McBRIDE (reading):

SECTION ON LIQUID-MEASURING DEVICES

The second paragraph under "Definitions" now reads as follows:

A liquid-measuring device of the retail type, hereinafter referred to as a "retail device," is a liquid-measuring device which, on account of the character of its primary indicating elements, is obviously designed for individual deliveries of less than 50 gallons.

Amend this paragraph to read as follows:

A liquid-measuring device of the retail type, hereinafter referred to as a "retail device," is a liquid-measuring device which, on account of its design and the character of its primary indicating elements, is obviously intended for retail deliveries to individual consumers.

The purpose of this change is to strike out the restriction of 50 gallons which was previously made, because of the fact that there are now many gasoline-dispensing devices designed for deliveries in excess of 50 gallons. As reworded, the definition is based upon the obvious intent and actual purpose of the use of the device, without any restriction in terms of gallons per unit delivery.

(The amendment as proposed by the Committee was duly adopted.)

Mr. McBRIDE (reading):

The third paragraph under "Definitions" reads as follows:

A liquid-measuring device of the wholesale type, hereinafter referred to as a "wholesale device," is a liquid-measuring device which, on account of the character of its primary indicating elements, is obviously designed for single deliveries of 50 gallons or more.

Amend this paragraph by changing the figure "50" to "100."

The Committee recommends this change to harmonize the third paragraph under "Definitions" with the second paragraph as this has now been amended.

Mr. S. T. GRIFFITH. Will this accomplish any particular good? We have always accepted 50 gallons or over as a wholesale device; why not leave it at 50?

Mr. McBRIDE. There are now in the field retail devices which have indicating elements up to 99.9 gallons; if we leave our wholesale definition at 50 gallons, then we are faced with an inconsistency.

Mr. S. T. GRIFFITH. Then you are not going to consider the wholesale device which is used for filling drums?

Mr. McBRIDE. Yes, we would.

Mr. S. T. GRIFFITH. That is 55 gallons.

Mr. McBRIDE. If the definition of a wholesale device is left unchanged, how can we get around the situation of a retail device which carries indications up to 99.9 gallons?

Mr. S. T. GRIFFITH. You have that very well covered, because of the design and character of the primary indicating elements of the retail device. The design of the indicating elements of a bulk meter is very definite too.

Mr. McBRIDE. Of course you will find bulk station meters with indicating elements having capacities running up to 500, 1,000, and 2,000 gallons. That device may be used for less than its capacity; you may deliver 50 gallons from a 500-gallon device, but that would not constitute it a retail device.

Mr. S. T. GRIFFITH. It certainly would when you change the minimum to 100.

Mr. McBRIDE. If we leave "50 gallons" in the definition of a wholesale device, how can we say that the retail device having a capacity of 99.9 gallons is not a wholesale device?

Mr. S. T. GRIFFITH. Because of its design and character.

Mr. KANZER. What is wholesale in one instance may be retail in another and what is retail in one instance may be wholesale in another. I think you are going to get into difficulties.

Mr. BUSSEY. Wholesale type meters are used extensively in our jurisdiction for filling iron barrels of about 55-gallon capacity. We still have specified in Handbook H22 a minimum test draft of 50 gallons, and it looks to me as if there would be a conflict there.

Mr. FULLER. The specification is for the purpose of defining the construction of the equipment and not the amount of gallonage that may be sold from it at one time. You may deliver 25 or 50 gallons through a wholesale device, and you may deliver 50 or 75 gallons through a retail device.

Mr. S. T. GRIFFITH. I move that the third-paragraph amendment be rejected, and that the paragraph be left as it now stands.

(The motion was seconded, the question was taken, and the amendment as proposed by the Committee was rejected.)

Mr. McBRIDE (reading:)

Add a new Regulation to be numbered 6, reading as follows:

6. RETURN OF INDICATING ELEMENT TO ZERO.—*Any liquid-measuring device used in making retail deliveries to individual consumers shall conform to the requirements of paragraph 34 relative to the return of the indicating element to zero.*

As our specifications presently stand, there is no requirement that the indicating element of a wholesale device be returnable to zero; the purpose of this Regulation would be to require that when wholesale devices are used for retail purposes, they be equipped with means for returning the indicating element readily to zero. This Regulation is intended to be nonretroactive.

Mr. KANZER. Is it required that the same legend be on the wholesale device as is now required on the retail device?

Mr. McBRIDE. No. This Regulation merely says that any liquid-measuring device, which would include wholesale devices, if used in making retail deliveries to individual consumers, shall have means for readily returning the indicating element to zero.

(The amendment as proposed by the Committee was duly adopted.)

The ACTING CHAIRMAN. I am going to interrupt the program for the purpose of picking up the two items which were carried over from yesterday's program.⁸ In introducing Mr. William Bruckart, columnist of the Western Newspaper Union, who will speak on "Dollar Justice," I wish to say that, I understand that Mr. Bruckart writes for more newspapers than any other writer in the United States.

DOLLAR JUSTICE

By WILLIAM BRUCKART, *Columnist, Western Newspaper Union*

Before I engage in any detailed discussion, I want to tell you folks about my hobby. My hobby is good government. I have preached and promoted the philosophy of good government, sound government policies, through a quarter of a century in Washington.

Sound government to me is a thing that cannot be talked about too much. It is a thing about which too much cannot be written. Moreover, sound government undoubtedly must be the vital consideration of every man, woman, and child in these United States. It was never needed more than it is today when the world is afire.

In promoting sound government policies, I have felt that I was arguing for justice. Without sound government, nobody gets justice. And you men are engaged in a field, a phase, of government which is designed to protect all consumers. You are the guardians of justice. You are the dispensers of justice. The type of justice that is within your custody is a justice that appeals to the great bulk of humanity. It appeals, probably, to 99 $\frac{4}{100}$ percent of all the people, because about that percentage is human.

Did you ever stop to think how the interests of people may be awakened? I think the easiest way is by discussion of matters that involve the dollar. Money!

As officials, you are protecting the public against crooks and chisellers in the field of distribution—protecting against short weight and against short measure. You ought not have a great deal of trouble in interesting the general public. You ought not have a great deal of trouble in gaining public cooperation.

Since you are protecting the consumers' pocketbook, you are dispensing justice—dollar justice. You are touching the two great interests of Americans—justice and dollars. It is a fine combination with which to work.

Now, as I said, I fail to understand why the agencies which you gentlemen represent have so many difficulties in getting your story to the people whom you seek to protect—whose pocketbooks you defend under our type of government. I know from personal contact that your problems in this direction are many; I know that your successes have been few, but I repeat that I do not understand why it should be so.

It always has been considered poor sportsmanship to shoot birds

⁸ For the continuation of the discussion of the report of the Committee on Specifications and Tolerances, see page 107 of this report.

on the ground. No hunter who may be called a sportsman will ever lift his gun unless the birds are on the wing. But today I am not going to be a good sportsman. I am going to take potshots at you folks while you are sitting here. I hope that some of the things that I am going to say will hurt. If they do, some good will result from my appearance before you.

In that spirit, then, let me tell you men that I believe about 75 per cent of your failures to gain public cooperation is chargeable directly to you and your own agencies. I believe with deep conviction that everyone here has the capacity to put over—to sell—the consuming public on the necessity for cooperation. I entertain no doubt whatsoever that the consuming public can be made to understand. When it does understand, a substantial portion of that public is going to be available to you as missionaries and helpers.

Now to let loose another blast at the birds on the ground. I believe I am correct in saying that there is not more than 1 out of every 25 staff workers in your field who has ever turned a hand at the job of telling the public what you are doing.

It may be true—it probably is true—that you folks are burdened with work. It probably is true that you do not have time to cultivate the public. Appropriations, being what they are, and being handled as they are for this type of work, generally are limited. There is no vote-getting appeal in funds for the inspection of scales in the corner grocery. The demagogue can do little with a subject that appears so dry. The ruling force of politics in any city is inclined to forget about such fundamental functions of government.

But these facts make it all the more necessary that those who are engaged in the promotion of dollar justice should become missionaries themselves. As I see the situation, it is definitely up to you to let the public know what you are doing. Few people are going to start this machinery for you. Fewer people will remain to keep it going. And since there is so much war talk I may be pardoned for the use of military terms. You men must be generals, colonels, captains, and privates on this job. You must wear the shoulder insignia of the officers and at the same time you must wear the dungarees of the private on a dirty job.

And so we come to some of the methods that are available to you—methods available notwithstanding the lack of funds and lack of personnel.

First, I want to remind you of one of the best methods of reaching into the homes that has ever existed or ever can be obtained. I refer to the children. Those of you who have examined advertising technique ever so casually surely cannot fail to recognize the thousands upon thousands of lines—spoken, written, and pictured—that are directed at children. The explanation of this is simple. You have products that the child wants, products about which the child talks, products which the child insists to mother and dad that he or she must have. It is amazing how much influence the child prattle has, and every one of you who is a parent knows this from experience.

Those children grow up. They become adults. The girls among them become mothers and boys become fathers, and the records show that 85 per cent of the consumers' dollar is spent by the mothers. They follow the habits of childhood. To me this means that you folks ought to, and can, go into every school in your community and into

every recreational center where children are available as an audience. You can present to them the story that you have.

Promptly you ask, how shall it be presented to the children in the schools? What can we, as officials, do in that direction? My answer is one that may not meet with favor in these days when so many people speak harshly about businessmen, but I shall make the suggestion anyway. Salesmen for manufacturers visit every community. Representatives of those firms making weighing and measuring devices have contacted your offices. Ask their help. Those fellows and the managements that they represent want to get their products before the public. You know why. It is good business to have the public acquainted with the X Y Z scales.

Those fellows are not held down by a city council or a State legislature. They spend money to make money. If you plan a program, a series of demonstrations, those manufacturing concerns will help you. They will supply the stuff you need. Women's clubs may be called in to help. Other agencies may be enlisted. But in any event, you have started children—and adults also—to talking and thinking.

Some of you may have given up your efforts to gain newspaper publicity. Never do that. I am among those who believe that very few editors can afford to ignore a direct request from your agencies for more consideration in the news columns. But you have to have something to give those editors. You have to have news or, as the professional writers call them, feature stories. Again, you gentlemen must develop that information. It is available to you in your day-to-day operation if you keep your eyes open.

If I were confronted with the job that some of you men have, I would first inquire of the editor of a newspaper whether his columns were open to information which would serve to protect the readers of his newspaper. His answer is going to be "Yes, if it is news." Then I would ask him to have one of his reporters come around. I would get to know the reporter. I would find out what his interests are. I would know about his family. I would ask his advice, time after time. The reporters, however, will not come around long unless you try to help them. I have been in the news field a long time. It is still a fact that I like to have an official seek my advice on the handling of a news story.

There is the radio. It is not available to all and it is a bit difficult to present your story over the air, but it can be done.

There are few communities in this Nation of ours which do not have some sort of a drama club or group. Such a group may exist in high schools or even in the grammar schools. Or it may be found among church organizations or among folks who have an interest in the theater and who regard amateur plays as good training for themselves. Does it not seem possible then that this type of organization could be used as a vehicle to put over the job you are doing—to express it in drama form to the public? I think it can be done that way because it has been done in other fields in aiding these people to get the information. It may mean much longer hours but the results will justify the effort.

The ACTING CHAIRMAN. Thank you very much, Mr. Bruckart. I think you have left us with one of the finest thoughts that will come out of this Conference, because if we will take to heart what you have said this morning and go back to our homes and make the people

of our communities weights and measures conscious, it will help more in our work than anything else we can possibly do.

REPORT OF THE COMMITTEE ON PUBLICITY AND EDUCATION,
PRESENTED BY W. S. BUSSEY, CHAIRMAN

In compliance with a resolution adopted by this organization last year, Dr. Briggs, President of the Conference, appointed a Committee on Weights and Measures Publicity and Education, composed of the following members: W. S. Bussey, of Texas, Chairman; A. J. Jensen, of North Dakota; M. A. Hubbard, of Virginia; A. Edward Snyder, of Terre Haute, Ind.; James E. McHugh, of Lehigh County, Pa.; Robert Williams, of Nassau County, N. Y.; and H. G. Boutell, of the National Bureau of Standards.

Owing to the broadness of the field to be covered by this Committee and the limited amount of time available after the Committee was appointed and organized, we do not have as much to offer the Conference in this report as we would like to have. However, your Committee is extremely anxious to get this important phase of our work definitely under way this year. Therefore, we shall make a few concrete recommendations and suggestions in this report, and we earnestly solicit the wholehearted cooperation and assistance of each and every weights and measures official in this country in an earnest endeavor to forward the cause of weights and measures publicity and education.

In making a brief survey of the field which this Committee is to cover, we find that our efforts must be directed along three different routes: First, the education of weights and measures officials themselves; second, the education of those persons connected with the various industries with which we deal; and third, the education of the consuming public.

Your Committee prepared and mailed a questionnaire containing some 10 questions. This questionnaire went to all weights and measures officials who were present at this Conference last year, and a few who were not. The questions were arranged to secure some definite information about what was already being done along these lines, in the various jurisdictions throughout the Nation. Some 26 of these questionnaires were returned properly filled out; 8 of them came from State jurisdictions, 4 from county jurisdictions, and 14 from city jurisdictions. Three was the largest number of questionnaires returned from any one State; 1 of these came from the State department proper, and 2 from city or county departments. These questionnaires clearly indicate that quite a lot of work is being done in some jurisdictions along educational lines, while in most jurisdictions very little is being done. Practically every questionnaire returned also contained some valuable information and helpful suggestions, and your Committee wishes to take this opportunity to express our sincere appreciation for your cooperation and help in returning these questionnaires to us so promptly and so full of helpful ideas.

From the information coming to your Committee, it is evident that there is a strong need for more educational work to be done among weights and measures officials themselves. We are convinced that in most jurisdictions the officials are eager for more knowledge of the work and are also most capable of learning; therefore, we feel that our first efforts should be along these lines and that we should especially

dedicate our talents and efforts for the coming year toward our own advancement in weights and measures knowledge and toward more efficiency in weights and measures administration.

Your Committee is also convinced that there is a tremendous need for more knowledge of weights and measures administration on the part of high public officials, and the leaders in those industries with which we are in constant contact. Our educational programs should reach these men through various channels, such as civic organizations and clubs, trade magazines, and all other avenues at our disposal. If the legitimate business man is made to understand our purpose, the battle will be almost won, for he can do more to help our weights and measures enforcement organizations than can any other individual.

The consuming public is the next group with which we must deal. There are many ways and means of educating the consuming public, but this is a big task and a never-ending one. We must avail ourselves of every opportunity to distribute weights and measures knowledge among this group.

Your Committee realizes that conditions vary greatly in different jurisdictions and that no set rule for educating any one of these three groups will completely meet the needs of every locality. We do feel, however, that a general outline for a constructive and progressive program can be worked out which will be definitely beneficial to all jurisdictions, and it is with this thought in mind that your Committee will recommend to you such an outline, and we sincerely hope that numerous jurisdictions will adopt it and give it a trial throughout the coming year.

No doubt the most difficult portion of this educational program to work out and recommend is that portion dealing with the weights and measures officials themselves; this is true owing to the wide variety of conditions existent in the several States. In some States we have only one inspector in the entire jurisdiction, and in such case whatever he does he must do alone. In contrast with this condition we have other States where we will find a single city with 75 or more inspectors; other city and county departments, as well as a State department, might also be found in this same State.

Your Committee feels that the matter of educating the weights and measures officials should be a constant endeavor, and in jurisdictions where the personnel justifies it, we strongly recommend that at least one general school of instruction be conducted each year, at which time all weights and measures officials in the jurisdiction should be present, if at all possible, as well as other individuals interested in the subject matter to be studied.

By September 1, 1940, your Committee will have prepared a course of study for the individual weights and measures official, assigning him a definite subject for each month of the year. This schedule will, with the cooperation of the individual official, improve his efficiency and enhance his standing among the citizens of his community.

Your Committee will have available by September 1, 1940, an outline of a course of study for a general school of instruction, as heretofore mentioned. We also recommend and urge that the various States follow the example set by Indiana in appointing a State Committee on Education to work with and assist your national committee. A number of State committees of this character can no doubt be valuable assets to the national committee, and we sincerely hope that

each State whose personnel justifies such a committee will cooperate with us to this extent.

As you know, the name given this Committee is "Committee on Weights and Measures Publicity and Education." Your Committee finds that there is one word in this name which is often misinterpreted, thus giving the wrong impression and causing an adverse psychological effect—that is the word "Publicity." After all, we are not seeking publicity for ourselves, but we are seeking to publicize the importance of our work in such a way as to educate the public. So without a detailed discussion of the impression which a good many people get from the word "publicity," your Committee would like to recommend that its name be changed to the "Committee on Weights and Measures Education." Of course, the Committee can still continue to function in the entire field of publicity and education.

Your Committee will not attempt to sell you upon the importance of publicity and education in weights and measures work, as we are firmly convinced that you are as well aware of its importance as are the members of the Committee. Neither will we take the time to enumerate the multiplied hundreds of avenues available for the dissemination of weights and measures knowledge. However, we are going to recommend a simple educational program to be adopted and followed by the various jurisdictions, and, of course, you will understand that the suggestions in this outline are not maximum suggestions, and if a jurisdiction feels that it can take on a broader assignment, the Committee will be at your command to assist in the preparation of such a program. Likewise, if a jurisdiction feels that a less extensive program would be more appropriate under prevailing conditions, your Committee will also be ready to cooperate.

First, we want to urge that as many jurisdictions as possible adopt the course of study for the individual weights and measures inspector, which your Committee will prepare. Second, we suggest a general weights and measures school of instruction to be held at least once each year; the Committee will also furnish an outline for the course of study for this school, as well as other useful literature and material. The third item on our list for the enlightenment of weights and measures officials is our recommendation that the various jurisdictions keep in constant contact with each other throughout the year by means of correspondence. This correspondence will keep each official advised as to the actions taken by, and decisions made in, the respective jurisdictions. This policy has been followed to some extent by several jurisdictions during the past few years, and no doubt has resulted in a better mutual understanding of the many problems which come up. We also recommend an active weights and measures association in each State having an active department, and that an annual conference be held to be attended by weights and measures officials and all others interested in our activities. Finally, we recommend that each weights and measures official read regularly the Scale Journal Magazine and that each jurisdiction contribute news items and other interesting information to the publishers of the journal from time to time. Remember, your Committee wants also to cooperate with those jurisdictions already conducting educational programs.

Next, we come to our proposals for the education of persons connected with various industries. In our proposal and recommendation for the first year, which will be combined somewhat with the education

of the general public, we are recommending that at least six personal appearances be made by a member of the weights and measures bureau or some other capable speaker whose services they can obtain, to appear before civic clubs, business organizations, ladies' clubs, groups of school children, etc. This would mean that a personal appearance would be made every 60 days, and your Committee will have available proposed talks to be delivered upon these occasions. Our second proposal in this group is, that at least 6 newspaper articles appear in the press of the jurisdiction during the year, which, of course, would mean that only one article would necessarily appear each 2 months; the Committee will be glad to assist in the preparation of, and suggesting material for, such articles. The third and last item, which we are recommending in this group, is at least six radio broadcasts during the year, and by the same token, your Committee will have radio talks available for your use.

We well realize that this is not a very widespread program to undertake, but we thought our first recommendations along this line should be made comparatively easy to carry out; and as mentioned heretofore, in those jurisdictions where they feel that a broader program can be handled, you will find your Committee ready and anxious to cooperate in its preparation.

Your Committee feels that if uniform programs are presented throughout the Nation simultaneously, this unity of action will go a long way toward promoting our cause. We feel sure that every jurisdiction will want to cooperate with the Committee and undertake this program, beginning September 1, 1940, by which time your Committee will have all material available that will be needed and, of course, it will be definitely understood that the officials in each jurisdiction will be perfectly free to make any changes or alterations in the Committee's suggested programs that would better fit their local situation.

This Committee earnestly solicits your complete cooperation, and we sincerely hope that numerous jurisdictions will agree to carry this educational program forward. Of course, if it is impossible in your particular locality to carry out all of the suggestions which the Committee has made, then you can select those phases of the program which are possible for you to carry forward. In other words, the Committee will stand ready at all times to work with and assist the individual sealer or department in working out the proper program for his particular locality.

We must have the help of every sealer in this work, if it is to be a success, and we especially urge that all available copies of talks, radio programs, school programs, etc., be furnished the Committee in order that we may have the benefit of your experiences and in turn pass them on to others. We want to be in a position to assist any weights and measures official who calls upon us for help in any educational undertaking.

In addition to the program outlined for the several jurisdictions and individuals, your Committee recommends that we attempt to get one or more articles published in national magazines, said article or articles to be prepared not only to appeal to the consuming public, but to business executives and high public officials as well. In this manner, we would hope to impress upon more of our people the importance of

our work and the importance of having thoroughly capable and well-trained men in our weights and measures departments.

In closing, let us impress one thing upon your mind, and that is, that what this educational program amounts to depends entirely upon you, for each individual and each department will benefit from this program exactly in proportion to what they put into it. If you give it your sincere support and very best efforts, there is no question but what you will profit personally and your entire jurisdiction will profit with you. There is no doubt that the more you study your work, the more you realize its importance and the more pleasure you get out of performing your duties. Therefore, the harder you work at this interesting and important task, the more pleasure you will get out of life.

Secure one of the mimeographed copies of this report, take it home with you and study its proposals, and then let your Committee know that your jurisdiction is going to cooperate in this important undertaking.

Respectfully submitted.

(Signed) W. S. BUSSEY, *Chairman*,
H. G. BOUTELL, *Secretary*,
A. J. JENSEN,
M. A. HUBBARD,
A. EDWARD SNYDER,
ROBERT WILLIAMS,
JAMES E. McHUGH.

Committee on Publicity and Education.

Mr. BAUCOM. I move that we accept the report of the Committee, and that we give them a rising vote of thanks for the work which they have done. I think it is a fine report, and that their proposals are excellent.

Mr. S. T. GRIFFITH. I will second that motion, and will add that I concur in the recommendation for the change in the name of the Committee.

Mr. BAUCOM. I accept that amendment of my motion.

(The motion was unanimously agreed to by a rising vote.)

REPORT OF COMMITTEE ON SPECIFICATIONS AND TOLERANCES— Continued ⁹

Mr. McBRIDE (reading):

SECTION ON VEHICLE TANKS

Add a new Regulation to be numbered 3, to read as follows:

3. *The value of the smallest unit of indicated delivery on a meter used for the measurement of household deliveries of fuel oil shall not exceed 0.1 gallon.*

Mr. BAUCOM. I believe that the word "retail" is better than the word "household"; I move that this change be made, and that the Regulation be then adopted.

(The motion was seconded.)

Mr. BUSSEY. As you know, tenths of gallons are not legal in all jurisdictions; however, I think binary submultiples are legal everywhere. There are certain jurisdictions which can not adopt the Regulation as written, but it has occurred to me that if "1 pint" were substituted for "0.1 gallon," the same purpose would be accomplished.

⁹ For the earlier portion of this report, see p. 97.

This would not interfere with having tenth-gallon graduations in those jurisdictions where that is permissible, and other jurisdictions would not be forced to change Conference language, which is what we are trying to get away from; we want to get the codes written so that we can adopt them word for word as recommended by this Conference. I do not think that the change which I am suggesting would cause conflict in any jurisdiction, and it would help in some.

Mr. McBRIDE. The thought of the Committee was to follow our previous language. The Committee will agree that the suggestion you offer would make no material difference.

Mr. BUSSEY. Would the Committee be agreeable to accepting my suggested amendment?

Mr. McBRIDE. I think so.

(The Regulation, as amended, was duly adopted.)

[SECRETARY'S NOTE.—The text of the Regulation, as adopted, was as follows:

3. *The value of the smallest unit of indicated delivery on a meter used for the measurement of retail deliveries of fuel oil shall not exceed 1 pint.]*

Mr. McBRIDE (reading):

SECTION ON SCALES

Paragraph A-2a (1) reads as follows:

A-2a (1). NOMINAL CAPACITY OF SCALE.—The largest weight indication which can be obtained by the use of all of the reading elements in combination, including the amount represented by any removable weights furnished or ordinarily furnished with the scale: Provided, however, That when a scale is constructed to give weight indications in both the customary and metric systems, this definition shall be applied to the indications in one system only: And provided further, That in applying this definition the capacity of any fractional bar is to be included only when this exceeds $2\frac{1}{2}$ percent of the sum of the capacities of the remaining reading elements.

Amend this paragraph to read as follows:

A-2a (1). NOMINAL CAPACITY OF SCALE.—The largest weight indication which can be obtained by the use of all of the reading elements in combination, including the amount represented by any removable weights furnished or ordinarily furnished with the scale, but excluding the amount represented by any extra removable weights not ordinarily furnished with the scale and excluding also the capacity of any auxiliary weighing attachment not contemplated by the original design of the scale: Provided, however, That when a scale is constructed to give weight indications in both the customary and metric systems, this definition shall be applied to the indications in one system only: And provided further, That in applying this definition the capacity of any fractional bar is to be included only when this exceeds $2\frac{1}{2}$ percent of the sum of the capacities of the remaining reading elements.

The purpose of this amendment is to make quite definite the meaning of "nominal capacity," and to eliminate the possibility of improperly increasing the nominal capacity of a scale by adding in the capacities of auxiliary attachments which in some instances may be equal to the original nominal capacities of the scales.

(The amendment as proposed by the Committee was duly adopted.)

Mr. McBRIDE (reading):

Add a new paragraph under "B-2j. WEIGHT GRADUATIONS," to be known as B-2j (5), to read as follows:

B-2j (5). WEIGHT VALUES.—For any particular series of weight graduations on a weighbeam or readingface, the values of the subdivisions shall be uniform throughout the graduated interval.

Instances have been found where graduated subdivisions have not

been of equal value, and the amendment is designed to cover such a situation.

(The addition as proposed by the Committee was duly adopted.)

Mr. McBRIDE (reading):

Add a new paragraph to be known as B-2z, to read as follows:

B-2z. WEIGHT REGISTRATION.—When a scale is equipped with weight registering means, whether such means be integral with or attached to the scale, the registering means shall be susceptible of giving accurate, clear, distinct, and definite representations of weight throughout its designed operating range; in the case of a scale equipped with unit weights, the weight representations shall include the values of any unit weights applied. The requirements of sections B-2j, B-2l, B-2m, K-6b, and K-6c shall apply to weight registrations insofar as these requirements are applicable, and these requirements shall be broadly applied to appropriate portions of the said weight registrations so as to require a comparable degree of accuracy, clearness, definiteness, precision of reading, etc., in the case of weight registrations and of weighbeam and reading-face weight indications.

At present there is nothing in our specifications relative to printing devices on scales other than person weighers. This new language is designed to take care of that situation.

(The addition as proposed by the Committee was duly adopted.)

Mr. McBRIDE (reading):

Regulation K-6a reads as follows:

K-6a. FOOD SCALES.—The value of the minimum weight graduations on a scale equipped with a weighbeam or reading face, used in the sale of foodstuffs at retail, shall not exceed 1 ounce: Provided, however, That this shall not apply to a scale used exclusively in the sale of vegetables.

Amend this regulation to read as follows:

K-6a. FOOD SCALES.—The value of the minimum weight graduations on a scale equipped with a weighbeam or reading face, used in the sale of foodstuffs at retail, shall not exceed 1 ounce: Provided, however, That this shall not apply to a scale used exclusively in the sale of fruits and/or vegetables. *A spring scale not equipped with a device intended to compensate for changes in the elasticity of the springs due to temperature effects, or not so designed as to be substantially independent of such changes, shall not be used in the retail sale of foodstuffs other than fruits and vegetables.*

This represents an attempt to remedy an unsatisfactory situation with respect to the use of uncompensated spring scales for certain purposes. You will recall that some time ago this general question came up for consideration, and that at that time the Committee recommended rigid adherence to existing specifications and tolerances. The present recommendation adds fruits to the commodities covered by the proviso, thus making it unnecessary to use in the sale of "fruits and/or vegetables" scales graduated to one ounce or less; this is on the theory that the unit sizes of both fruits and vegetables are relatively large, and that a scale suitable for weighing vegetables will also be suitable for weighing fruits.

The new nonretroactive requirement added at the end of the Regulation provides that a spring scale which is not designed to be substantially independent of temperature changes may not be used in the retail sale of foodstuffs except fruits and vegetables.

(The amendment as proposed by the Committee was duly adopted.)

Mr. McBRIDE (reading):

Regulation K-6b reads as follows:

K-6b. VEHICLE SCALES.—*The value of the minimum weight graduations of a vehicle scale having a capacity of not more than 60,000 pounds shall not exceed 20 pounds.*

Amend this Regulation to read as follows:

K-6b. VEHICLE SCALES.—*The value of the minimum weight graduations on the weighbeam and/or on the reading face of a vehicle scale having a capacity of not more than 60,000 pounds shall not exceed 20 pounds.*

The purpose of this amendment is to require that if a scale be equipped with both weighbeam and reading face, the same minimum shall apply to both.

(The amendment as proposed by the Committee was duly adopted.)

Mr. McBRIDE (reading):

Regulation K-6c reads as follows:

K-6c. LIVESTOCK SCALES.—The value of the minimum weight graduations of a livestock scale shall not exceed 5 pounds.

Amend this REGULATION to read as follows:

K-6c. LIVESTOCK SCALES.—The value of the minimum weight graduations on the weighbeam and/or on the reading face of a livestock scale shall not exceed 5 pounds.

The purpose here is the same as in the amendment you have just adopted to Regulation K-6b, that is, to require that the two reading elements shall be consistent as to the value of the minimum graduations.

(The amendment as proposed by the Committee was duly adopted.)

Mr. McBRIDE (reading):

SECTION ON WEIGHTS

The first paragraph under "Tolerances" reads as follows:

The tolerances to be allowed in excess or deficiency on commercial weights shall be the values shown in the following table: Provided, however, That the manufacturers' tolerances or the tolerances to be allowed on new commercial weights shall be one-half of the values given.

Amend this paragraph to read as follows:

The tolerances to be allowed in excess or deficiency on commercial avoirdupois weights shall be the values shown in the following table: Provided, however, That the manufacturers' tolerances or the tolerances to be allowed on new commercial avoirdupois weights shall be one-half of the values given.

This is essentially an editorial change, to insert the word "avoirdupois" in two places. [Reading:]

Change the heading for the table of tolerances for avoirdupois weights from "Avoirdupois System" to "Tolerances for Commercial Avoirdupois Weights."

The paragraph introducing the tolerance tables for prescription weights reads as follows:

The tolerances to be allowed in excess or deficiency on apothecaries' prescription weights shall be the values shown in the following table: Provided, however, That the manufacturers' tolerances or the tolerances to be allowed on new apothecaries' prescription weights shall be one-half of the values given.

Amend this paragraph to read as follows:

The tolerances to be allowed in excess or deficiency on apothecaries' prescription weights shall be the values shown in the two following tables: Provided, however, That the manufacturers' tolerances or the tolerances to be allowed on new apothecaries' prescription weights shall be one-half of the values given.

There are two tables of tolerances for apothecaries' weights. The reference in the present text is to "the following table"; the recommendation is to change the reference to "the two following tables." [Reading:]

Change the heading for the table of tolerances for prescription weights of the apothecaries' system from "Apothecaries' System" to "Tolerances for Prescription Weights in Apothecaries' System."

Change the heading for the table of tolerances for prescription weights of the metric system from "Metric System" to "Tolerances for Prescription Weights in Metric System."

(The foregoing amendments to the section on weights, as proposed by the Committee, were duly adopted.)

Mr. McBRIDE. At present we have no tolerances for commercial troy weights, and it is proposed that such tolerances be adopted. The tolerances recommended by the Committee are based on the tolerances for prescription weights in the apothecaries' system. [Reading:]

Add tolerances for commercial troy weights, as follows:

The tolerances to be allowed in excess or deficiency on commercial troy weights shall be the values shown in the following table: Provided, however, That the manufacturers, tolerances or the tolerances to be allowed on new commercial troy weights shall be one-half of the values given.

Tolerances for Commercial Troy Weights

Weight	Tolerance	Weight	Tolerance
<i>Ounces troy</i>	<i>Grains</i>	<i>Penny- weights</i>	<i>Grains</i>
12	4.0	10	0.7
10	4.0	5	.5
8	3.0	4	.4
5	3.0		
		3	.3
4	2.0	2	.25
3	2.0	1	.15
2	2.0		
1	1.0		

Mr. KANZER. Why 0.25 and 0.15 grain? Why not 0.2 grain and 0.1 grain?

Mr. McBRIDE. The Committee recommendation follows an existing table of tolerances.

Mr. BAUCOM. Mr. Pienkowsky has had charge of such matters for the Bureau for many years, and I would like him to tell us if he thinks the tolerances are reasonable, and whether or not he recommends them. I do not mean by this to question what our Committee has done, but if Mr. Pienkowsky will express his opinion, I think we shall be ready to vote on it.

Mr. PIENKOWSKY. The members of your Committee are much better qualified than I am to speak from the standpoint of field operation. However, I may say that the values of 0.25 and 0.15 grain correspond to other tolerances, and I think that this fact has been given considerable weight by the Committee. If values are rounded out, proper ratios may be lost, and that would be unfortunate.

Mr. KANZER. I recognize that, but I feel that the necessary weights for applying a tolerance of 0.15 grain may not be available in the field.

(It was moved and seconded that the proposed tolerances for troy weights be adopted, the question was taken, and the motion was agreed to.)

Mr. McBRIDE (reading):

SECTION ON GENERAL REGULATIONS

Establish a new group of regulations to be known as "General Regulations," and add as Regulation 1 under this heading, the following:

1. POSITION OF WEIGHING OR MEASURING DEVICE.—A weighing or measuring device used in retail trade, except such a device as is used in the preparation of packages marked to show their net contents, shall be so positioned that its indications may be accurately read, and the weighing or measuring operation observed, from some reasonable "customer" position. (The permissible distance between the device and a reasonable customer position will depend upon the size and character of the indicating elements of the device.)

Mr. BUSSEY. In certain jurisdictions certain classes of prepacked merchandise are not required by law to be marked. Some jurisdictions require the labeling of food products but not of other products, but these other products might be weighed prior to sale, not in the presence of the customer, and these should not be excluded by the Regulation.

Mr. BAUCOM. To clarify this, how about striking out the word "marked," and inserting "not in the presence of the purchaser" or "preparation of packages not in the presence of the purchaser." Would that cover the situation?

Mr. BUSSEY. Let us not try to decide on definite language now; the Committee will be in a much better position to select the proper phraseology than we are at this moment. I would like to see the Regulation adopted with the understanding that the Committee will modify the language to cover the point I have raised.

(The Regulation was duly adopted with the understanding that the Committee would modify the language to cover the point raised by Mr. Bussey.)

[SECRETARY'S NOTE.—The modified form of the Regulation, as later decided upon by the Committee on Specifications and Tolerances, is as follows:

POSITION OF WEIGHING OR MEASURING DEVICE.—A weighing or measuring device used in retail trade, except as used exclusively in the preparation of packages put up in advance of sale, shall be so positioned that its indications may be accurately read, and the weighing or measuring operation observed, from some reasonable "customer" position. (The permissible distance between the device and a reasonable customer position will depend upon the size and character of the indicating elements of the device.)]

Mr. BUSSEY. I do not know whether it is necessary or not, but I move the adoption of the Committee's report as a whole, as amended.

Mr. S. T. GRIFFITH. I second the motion.

(The motion was duly agreed to.)

Mr. McBRIDE. The Committee had a further duty imposed upon it at the last Conference, upon which it is desired to report as follows. [Reading:]

QUESTIONNAIRE ON VEHICLE-SCALE TOLERANCE

The Committee was instructed, by motion of the last Conference, to prepare a questionnaire on the corner tolerance for vehicle scales as adopted by this Conference, to be sent to every State official and to every member of this organization, the Conference to be governed by the majority opinion expressed. Pursuant to

this instruction a questionnaire was prepared and sent to all weights and measures officials on the Bureau mailing list, which comprised 356 names; in addition, there were 36 officials at the 1939 Conference whose names did not appear on that mailing list, and questionnaires were sent to these persons also. Two officials reported not receiving their questionnaires and additional copies were forwarded to them, thus making a total of 394 questionnaires sent out. The form of the question was as follows:

**IMPORTANT—PLEASE CONSULT ATTACHED MATERIAL
NATIONAL CONFERENCE ON WEIGHTS AND MEASURES**

MAIL BALLOT ON VEHICLE-SCALE TOLERANCES

Are you in favor of continuing in effect the present tolerances on vehicle scales as adopted by the National Conference on Weights and Measures?

{ Yes-----
{ No-----

(Signed) -----

Title -----

February , 1940.

The "attached material" referred to was an explanatory letter, together with a statement of vehicle-scale tolerances and related paragraphs from Definitions, Specifications, and Regulations.

The result of the balloting is as follows: 186 ballots were returned, 45 of which were from State officials, 134 from local officials, and 7 from officials unidentified. Thirty-six State officials voted "Yes," 9 State officials voted "No," 111 local officials voted "Yes," and 22 local officials voted "No." This makes a total of 153 voting "Yes" and 33 voting "No," which would indicate that it is the desire of the great majority of this Conference to continue in effect the present tolerances on vehicle scales as adopted by the National Conference on Weights and Measures.

Mr. LEVITT. I think there was a little misunderstanding on the questionnaire. Our original proposal and the original motion which was put from the floor was that the questionnaire be sent to interested persons, including others than members of the Conference. After this questionnaire came out, the National Scale Men's Association sent out a questionnaire to all members of the National Scale Men's Association, and the reports that we got from that were about seventy-odd favoring the return to the 0.2 percent tolerance, and only about twenty-odd favoring the present 0.4 percent tolerance; so there is a little difference of opinion.

The ACTING CHAIRMAN. Of course, the National Scale Men's Association is not the governing body here, and as long as the Committee is the official Committee of the National Conference, the vote that they have taken must prevail, as I see it. So you are voting on the acceptance or nonacceptance of the Committee's report.

Mr. McBRIDE. This is just a report of our action, so there is no need for a vote.

Mr. LEVITT. While I am not objecting, I wanted to bring this up to show that there are other groups who do not agree.

**DEMONSTRATION OF RECENT DEVELOPMENTS IN WEIGHING AND
MEASURING APPARATUS, BY REPRESENTATIVES OF MANU-
FACTURERS**

SECRETARY'S NOTE.—At this point the representatives of several manufacturers of commercial apparatus briefly addressed the Conference, in some instances referring to exhibits on display adjacent to the meeting room. A. W. Corwin, Sealer of Weights and Measures of Allegany County, N. Y., exhibited and described a carrying case and moistener for seals, which he had developed.

CORRECTIONS TO STANDARDS

By H. W. BEARCE, *National Bureau of Standards*

Before any weights and measures inspection program can be effectively carried out, the responsible officials must be provided with adequate standards.

It is a well-known fact that no weights and measures apparatus or other manufactured product is absolutely correct. This applies to the measures used in trade and commerce, to field standards used to test commercial measures, to office standards used to test the field standards, and to the standards tested and used by the National Bureau of Standards. In all this chain of interrelated standards not a single one is absolutely correct. This fact at once gives rise to the question: How nearly correct must a standard be in order that it may adequately serve its purpose?

Because of the varied requirements and conditions of use of standards, it is impossible to give a single answer that will apply in all cases. It is possible, however, to lay down some general rules that will help to decide, in a given case, whether or not a certain standard is adequate for the purpose intended.

In order that there may be no misunderstanding in our discussion of corrections to standards, it would be well to define certain terms that will be used throughout the discussion—tolerance, error, and correction.

Tolerance, as applied to weights and measures standards and to precision measurements in general, is a value defining the amount of the maximum allowable error or departure from true value or performance; or, in short form, the amount of variation permitted.

There is lack of complete agreement among laboratories and among individuals in the definition and use of the terms "error" and "correction," and particularly there is lack of agreement in the use of plus and minus signs as applied to these terms.

As a starting point suppose we agree that when we consider a weight, a measure, the indication of a scale, the length of a measuring tape, a measured quantity, or a measured distance, the error, in each case, is the amount of departure from true value. Let us agree further that if the indicated or observed value is in excess of the true value, then the error is plus, and if it is less than the true value, then the error is minus. Let us agree further that the "correction" in each of the above examples is the amount that must be added, algebraically, to the weight, the measure, the indication of the scale, the length of the measuring tape, the measured quantity or the measured distance, to make it correct.

At this point, serious complications enter the picture and if we are to avoid confusion in the use of corrections and signs of corrections, we must at all times be sure whether we are considering the weight or the object weighed; the measure or the material measured; the measuring tape itself, a distance laid off with the tape, or a distance measured with the tape.

A few examples may be helpful. A weight that is heavier than its nominal value has, by our definition, a plus error and a minus correc-

tion. That is, since the weight is heavier than its nominal value, it will have to be made lighter to make it correct.

Now let us see what happens to the sign of the correction when a weight is used to compare other weights, to test a scale, or to weigh out a quantity of material. If a correct standard weight is used to test other weights, a weight that is heavier than the standard will have a plus error and a minus correction. Please note that the correction we are now considering is the correction to be applied to the weight under test.

Again, consider the situation when a standard weight is used to test an indicating scale. If the scale under test indicates a greater amount than is actually on the scale platform, then the scale is "fast," it over-registers, and it has a plus error. It has a minus correction, since an amount must be subtracted from the indication of the scale to give the correct amount; or, speaking algebraically, a minus correction must be added to the indication of the scale to obtain the correct weight. If, as is sometimes the case, it is necessary to take into account a correction to the standard weight in determining the correction to be applied to the indication of the scale, the problem becomes further complicated, and it is not uncommon for the correction to the standard to be applied in the wrong direction. For that reason, if for no other, it is advisable to use standard weights that are of such accuracy that in the testing of other weights and scales, corrections to the standards need not be applied.

If the standard used in testing the scale has an error that must be taken into account, then the final error in the indication of the scale is the apparent error minus the known error of the standard, and the final correction to be applied to the indication of the scale is the apparent correction minus the known correction to the standard. For example:

Standard weight		Indication of scale	Error		Correction	
Nominal value	Actual value		In standard	Indicated	To standard	Indicated
10 lb	9 lb 15 oz	10 lb 2 oz	-1 oz	+2 oz	+1 oz	-2 oz

Final error in scale indication = $(+2 \text{ oz}) - (-1 \text{ oz}) = +3 \text{ oz}$.

Final correction to scale indication = $(-2 \text{ oz}) - (1 \text{ oz}) = -3 \text{ oz}$.

That is, the scale indicates 10 pounds 2 ounces when the actual applied load is 9 pounds 15 ounces, or it has an error of plus 3 ounces and a correction of minus 3 ounces. Many other examples of errors and corrections will readily come to mind.

Let us turn now to the application of corrections to length standards, such, for example, as steel measuring tapes. If the tape itself is longer than its nominal value, it will have a plus error and a minus correction. An interval laid off, or "generated" with such a tape will be too long and will also have a plus error and a minus correction. On the other hand, a distance measured with such a tape will appear to be less than its actual length by the amount of this error, and an amount equal to this error will have to be added to the observed length to obtain the true length of the measured interval. The correction to the observed length of the measured interval is therefore plus.

For that reason, a tape or other length standard which is longer than its nominal length is usually said to have a plus correction, since the correction must be added to the apparent length of an interval measured with such a tape. Strictly speaking, the plus correction applies to the length value indicated by the tape rather than to the tape itself. The term "correction to interval" may properly be used in this case.

The same thing is true in regard to weights. If a weight is heavier than its nominal value, then, as already agreed, it will have a plus error and a minus correction, and objects compared with it will, if correct, appear to be light, and will therefore have a *plus* correction; that is, something must be added to the observed weight to give the true weight. Here again, strictly speaking, the correction applies to the observed value of the object weighed, and is opposite in sign from that of the weight with which it is compared.

In many cases the safe thing to do is to report actual values of lengths, masses, capacities, etc., and thus avoid the possibility of confusion.

Turning now to the testing of weights and measures, let us take two typical examples, (1) capacity measures, and (2) weights. In the testing of capacity measures used in trade it is customary practice to use capacity standards supplemented by a glass graduate. Now it is obvious that if we are to test capacity measures by the use of other capacity measures that are accepted as standards, these standards should be so nearly correct that their errors may be neglected, or, if that is not the case, then the errors in the standards must be known and taken into account in deciding whether or not the measures under test are within the specified tolerance. For example, a correct measure, if tested with an oversized standard, will appear to be small; while a measure that is in error by the same amount and in the same direction as the incorrect standard, will appear to be correct.

If we could at all times hold the error in the standard to 10 percent, or less, of the permissible error in the measure to be tested, there would be little occasion to worry about the possibility of passing apparatus that ought to be rejected, or of rejecting apparatus that ought to be passed, as a result of errors in the standards. There would, of course, even then, be a few border-line cases that would be in doubt, but these doubtful cases would be relatively few.

Unfortunately, it is often impracticable to hold the errors in standards to 10 percent, or less, of the tolerance on the measure to be tested. The error in the standard is much more likely to be 20 percent, 25 percent, or even 50 percent of the tolerance. Such errors cannot, of course, safely be neglected. Corrections to the standards must then be known and must be applied.

In passing, it may be noted that in the field of interchangeable manufacture of machined parts such as bolts and nuts, shafts and bearings, where accurate dimensions are highly important, it is customary practice to use very accurate "go" and "not go" limit gages to determine whether or not the parts are within specified dimensional limits. Here, again, it is impossible to make either the parts or the gages exactly to the desired size. It is necessary, therefore, to apply tolerances to the gages as well as to the product; and since it is good gaging practice to keep the gage tolerances inside the product limits, it is desirable to keep the gage tolerances as small as is practicable in order that the tolerance remaining for use on the product may not

be reduced below practical working limits. The situation is closely analogous to that with which you are all familiar, in which you use one class of standards to test other standards of the same type, but of a less precise class. If you are to be sure that you will not reject some that ought to be passed, or pass some that ought to be rejected, then the errors in your standards must be small in comparison with the tolerances on the measures under test.

In our further discussion of capacity measures suppose we confine our attention to two sizes, the 5-gallon and the 1-gallon, and consider these as typical. The Conference tolerances on these sizes, as given in Handbook H22, are as follows:

Capacity of measure	Tolerance	
	In excess	In deficiency
5 gal.-----	6 liq oz (11 cu in.)-----	3 liq oz (5.4 cu in.)-----
1 gal.-----	1 liq oz (1.8 cu in.)-----	0.5 liq oz (0.9 cu in.)-----

These tolerances will perhaps mean more to us if we express them in another way. For example, 6 liquid ounces on 5 gallons is equivalent to 6 parts in 640, or 1 in 107, about. Eleven cubic inches on 5 gallons is equivalent to 1 part in 105. The tolerance on the 1-gallon measure is 1 part in 128. These are the tolerances in excess. Those in deficiency are half these amounts, and the tolerances on new measures are half of these, in each case.

To test these commercial measures we would ordinarily use either conical measures of the glass slicker plate type, accurate to 1 part in 2,000,¹⁰ or the "field standard," having a small diameter, graduated neck, accurate to 1 part in 2,000 for the 5 gallon and to 1 part in 1,000 for the 1 gallon. Thus the tolerance on the standard is about one-twentieth of the tolerance on the measure being tested in the case of the 5-gallon measure, and about one-tenth of it in the case of the 1-gallon measure. These standards, in turn, are tested at the Bureau by determining the weight of water contained or delivered, and the capacity is then calculated from the known weight of water per unit of volume at various temperatures.

The determination of volume from the weight of water contained or delivered by the capacity measure involves, of course, a knowledge of the corrections to the standard weights used in making the weighings, and a knowledge of the density of water at various temperatures. These corrections will be considered further on in our discussion of corrections to standard weights. For the present it is sufficient to state that, in general, the corrections to standard weights are small in comparison with the tolerances on capacity measures. For example, the tolerances on class C commercial test weights of 10, 5, 2, and 1 pounds are, respectively, 4, 3, 1.5, and 1 grains, that is, from 1 part in 17,500 on the 10-pound weight, to 1 part in 7,000 on the 1-pound weight; whereas, the tolerances on capacity measures vary from 1 part in 2,000 for the 5-gallon measure of the most accurate type, up to 1 part in 105 (the tolerance in excess) on the 5-gallon measure of the commercial type.

¹⁰ The NBS certificate gives the correction to 1 part in 10,000.

One other metal capacity measure in which many of you are interested may be mentioned, that is, the 50-gallon measure which is coming into rather wide use in the testing of meters for gasoline and domestic fuel oil. These 50-gallon standards, when tested at the Bureau, are held to an accuracy of 1 part in 2,000, or 0.1 quart on 200 quarts.

Obviously, if these 50-gallon standards were to be tested by the use of a 5-gallon commercial measure, which may be in error by as much as 11 cubic inches per filling, or 110 cubic inches on 50 gallons, the actual error in the 5-gallon measure must be kept far below the permissible maximum, or must be taken into account by the application of a correction.

One other piece of apparatus that you will have occasion to use in the testing of capacity measures is a small glass graduate, often referred to as a tolerance graduate, for use in measuring the excess or deficiency of the measure under test. For this purpose you would probably use either a 4-liquid ounce graduate subdivided to $\frac{1}{2}$ dram, or a 10-cubic inch graduate subdivided to 0.2 cubic inch. These graduates, if tested and stamped with the precision stamp of this Bureau, will be correct within one-half of the smallest subdivision, or, in the cases mentioned, to $\frac{1}{4}$ liquid dram and to 0.1 cubic inch, respectively. Since the tolerance in excess on a 1-gallon commercial measure is 1 liquid ounce or 8 liquid drams, it is seen that an error of $\frac{1}{4}$ dram in the graduate is so small as to be insignificant, since it is only one thirty-second of the tolerance on the measure. If the 10-cubic inch graduate is used, the error of one-half division will amount to one eighteenth of the tolerance on the measure; this also would not be significant in most cases.

On the other hand, if the inspector is using glass graduates to test druggists' prescription glassware, then he must be provided with standards having small corrections, or corrections that are known and used.

In the test of capacity measures by determining the weight of water contained or delivered, some thought should be given to the degree of constancy or uniformity that may be expected in the density of the water that may be available. An investigation carried out at this Bureau several years ago showed that distilled water, spring water, well water, tap water, and even unfiltered Potomac River water reasonably free from suspended particles, when at the same temperature, all have the same density to within 1 part in 10,000. That indicates that any reasonably pure, clear water may be safely used in the testing of capacity measures by the weight method.

Let us turn now to the testing of weights and see if we can formulate some general rules in regard to the use of corrections for these standards.

A study of Handbook H11, Weights and Measures Administration, will indicate the class of standards that should be available and used for various purposes.

A State department should have the following:

- (a) Class A standards.
- (b) Class B office standards.
- (c) Class C standards for office use.
- (d) Class C standards for field use.

If the weights and measures official is to undertake the testing of apothecaries', jewelers', or other weights of the more precise commercial grades, he will need to be provided with adequate standards for these also.

Tolerances for the various classes of standards are contained in Circular C3 of the National Bureau of Standards. For the purpose of comparison, the tolerances for certain classes and denominations are arranged below in tabular form.

Denomina- tion	Tolerance	
	Classes A and B	Class C
<i>Pounds</i>	<i>Grains</i>	<i>Grains</i>
50	2	10 *
25	1.2	6
20	1.2	6
10	0.8	4
8	.6	3
5	.6	3
4	.4	2
3	.4	2
2	.3	1.5
1	.2	1
<i>Ounces</i>		
8	0.1	0.5
5	.1	.5
4	.1	.5
2	.06	.3
1	.04	.2
$\frac{1}{2}$	.04	.2
$\frac{3}{4}$	.02	.1
$\frac{1}{8}$	.01	.05
$\frac{1}{16}$	.01	.05
$\frac{1}{32}$	.01	.05
$\frac{1}{64}$	.004	.02

* For other than cast-iron weights. For cast-iron 50-pound test weights, 10 grains is the tolerance on new and newly adjusted weights only; the maintenance tolerance is 40 grains.

From the above tabulation it will be seen that class C tolerances are 5 times the tolerance on a class A or class B weight of the same denomination. It will also be seen that, in general, the tolerance is not proportional to the mass of the standard. For example, the tolerance on a 2-pound weight is not twice the tolerance on a 1-pound weight, and the tolerance on a 50-pound weight is not 5 times the tolerance on a 10-pound weight.

The reason for this lack of proportionality is obvious in the case of very small weights. For example, an ordinary commercial scale that cannot weigh closer than 1 ounce will weigh 10 pounds (or 160 ounces) to the nearest ounce, or better than 1 percent, but cannot weigh a load of 1 ounce with a possible error of less than 1 ounce or 100 percent. In the case of somewhat larger weights this lack of proportionality results both from the extension of the same principle, and from the fact that we naturally pay less attention to small errors than to large ones regardless of the percentage of the error, e.g., a person pays less attention to an error of 1 cent in \$1 worth of goods than he does to an error of \$10 in \$1,000 worth; and yet the error is 1 percent in each case.

In short, even when we can weigh a moderately large and a small quantity to the same percentage accuracy, there is a well-established custom of weighing the larger amounts to a higher percentage accu-

racy. This has been recognized in the establishment of commercial tolerances.

For very large weights—several hundred pounds to a few thousand pounds each—Mr. Smith presented last year a set of tolerances that are proportional to the mass of the weight. Here again, the tolerances follow the established commercial practice. Although this departs from the scheme used for smaller weights the principle of proportionality was adopted for these larger weights because it is in line with common practice. These very large weights are used only for the test of large scales and on these the tolerances are proportional to the applied load.

There are certain other classes of weights with which most of you are not so directly concerned as you are with those just discussed, but which should receive consideration from the standpoint of tolerance and precision of certification. These are classes M, S, and S2 metric weights used principally for laboratory weighings.

For purposes of comparison, metric weights of classes A, B, and C are also included in the following table. Denominations of 20,000 grams to 1 milligram are included in the table, in order to cover a wide range, but certain denominations have been omitted in order to shorten the table.

Denomina- tion	Tolerances			
	Classes A and B	Class C	Classes M and S	Class S2
<i>Grams</i>	<i>Milligrams</i>	<i>Milligrams</i>	<i>Milligrams</i>	<i>Milligrams</i>
20,000	120	600	100	500
1,000	20	100	5	25
500	14	70	3	15
200	8	40	1	5
100	6	30	0.5	2.5
50	4	20	.3	1.5
20	2	10	.2	1.0
10	1.5	7	.15	0.75
5	1.0	5	.15	.75
2	0.6	3	.10	.50
1	.4	2	.10	.50
<i>Milligrams</i>				
500	0.3	1.5	0.05	0.25
200	.14	0.7	.05	.25
100	.10	.5	.05	.25
50	.07	.35	.03	.15
20	.04	.20	.03	.15
10	.03	.15	.02	.10
5	.02	.10	.02	.10
2	.01	.05	.01	.05
1	.01	.04	.01	.05

The above table, which is intended to show the relations between the tolerances for weights of the various classes, also shows what might at first glance be regarded as inconsistencies. These apparent inconsistencies, however, will on further study be found to arise from differences in the uses to which the various standards are normally put, and to the relative importance of various characteristics of the different classes of standards.

Those of you who have purchased class A standards know that the cost of these standards is very high. You might, therefore, expect them to be of very high accuracy. It is seen from the table, however, that the tolerances on class A weights, except in the very small denominations, are much larger than the tolerances for classes M and S;

in fact, in many cases they are even larger than those for class S2. One of the principal reasons for relatively large tolerances on class A weights is that one of the necessary characteristics of weights of this class is constancy over a long period of time, and this constancy makes necessary the use of material, design, and construction that render accurate adjustment difficult and expensive. Certain manufacturers have at times attempted to furnish class A weights at much lower prices than those generally prevailing, but usually without conspicuous success.

It might also be mentioned that class A weights are ordinarily used only for the test of other weights and for weighings of the highest accuracy involving precautions and corrections such that the inclusion of a correction for the weight itself imposes no great additional inconvenience. On the other hand, test weights for field work must be used rapidly and with the fewest possible complications. Therefore it is essential that they be adjusted so accurately that corrections need not be used. A further consideration is that since class A weights are generally used singly, there is no danger of an accumulation of errors of several weights in a single weighing, whereas weights of classes M, S, and S2 are more likely to be used in weighing out unknown quantities of materials, requiring the use of several weights in a single weighing, thus introducing the possibility of including in a single weighing the additive errors of several weights.

As already pointed out, tolerances for weights of classes A, B, and C are not proportional to the nominal values of the weights. For the smaller weights of classes M, S, and S2 this is also true, and for the same reason. But for the larger weights of classes M, S, and S2, the tolerances are proportional to the masses, or nominal values, as seen from the fact that the tolerance for 1,000 grams is 10 times that for 100 grams, and the tolerance for 20,000 grams is 20 times that for 1,000 grams. This proportionality is appropriate since much of the weighing in scientific work involves the determination of the ratio of one quantity to another, or work on a sample which is a certain percentage or fraction of the total amount involved.

For information on test weights of large denominations you are referred to a paper by Ralph W. Smith given at the Twenty-ninth National Conference on Weights and Measures and printed in Miscellaneous Publication M164, National Bureau of Standards (p. 35, et seq.).

I fully realize that I have covered only a small part of the vast field included within the general boundaries of the terms tolerances, errors, and corrections. If, however, I have said anything that will encourage you to think on these things, I shall feel that neither your time nor mine has been wholly wasted.

TESTING, SERVICING, AND REPAIR OF LIQUID-MEASURING DEVICES

By G. DENNY MOORE, *Managing Director, Gasoline Pump Manufacturers Association*

In dealing out the topics for discussion at this Thirtieth National Conference, the Committee certainly cannot be indicted for "short measure" on my assignment; for territorial scope, this title is second only to that chosen by the valedictorian at a high school graduation. The promising young orator arose and, with becoming modesty,

announced, "Friends, I shall speak to you on The Universe and Contents Thereof."

In all truth, to describe the many processes and functions of any one of the three phases of this extensive subject would fill a 700-page, deckle-edged, leather-covered tome, and if I should attempt any such *opus magnum* here, it would serve my widow right for tying up to such a foolhardy man. But be not alarmed. My sympathies are all with the audience. Moreover, my time limitation automatically solves the problem, as it permits me to eliminate the voluminous detail and to deal only with the important fundamentals of the subject. However, sketchy as my remarks must necessarily be, I trust that I can at least lay the foundation for a helpful and constructive session of questions and answers.

Considering the fact that I am now facing, on the one hand, those who administer the weights and measures laws and regulations, and, on the other hand, those who have to live up to these regulations in the manufacturing and use of the devices involved, I begin to realize that I am standing in a position which a sympathetic friend described as being somewhere between the devil and the deep blue sea. Just where these two extremities are located in the audience, I am not sure.

Consulting National Bureau of Standards Handbook H22 for an official clarification of my subject, I find in the general code of specifications and tolerances that a liquid-measuring device is not classed as a liquid capacity measure. The latter is defined as a container or receptacle, having a fixed volumetric capacity of a quart, gallon, or other unit quantity, from which the liquid contents may be poured by hand. The liquid-measuring device is more in the nature of a mechanism with moving parts, making possible a continuous delivery of measured liquid.

This at once suggests that there must be a difference in the testing methods employed in these two different means of measuring liquids. Testing the liquid capacity measure is simply a matter of comparison of volumetric content, as by a pouring operation, using an appropriate testing standard for comparison. In the case of the mechanically operated liquid-measuring device, designed to meet the requirements of hard usage as well as speed and accuracy, various kinds of tests are used in the manufacturing processes. And all of these tests must be conducted under actual working conditions, using liquid under the various pressures and vacuums that occur in commercial operation.

Since time will not permit me to cover all of the many kinds and types of liquid-measuring devices coming within the range of the program title, I have selected the one of most interest to this assembly, the electric meter gasoline pump. There are more than three-quarters of a million of this type of device in daily use throughout the United States, responsible for measuring over 15 billion gallons of motor fuel annually, or three-fourths of the entire amount served to the motoring public.

In approaching the matter of testing this widely used public-service device, we must bear in mind the fact that gasoline is a commodity very difficult to handle, having physical characteristics quite different from other commodities that are weighed or measured. It is volatile, very sensitive to changes in temperature, and, regardless of temperature, can quite easily be vaporized when exposed to a high degree of vacuum.

The electric meter gasoline pump of today must therefore be so designed that it can meet all these changing conditions as to gasoline properties and withstand the wear and tear of almost continuous use. The modern gasoline pump is made up of a number of independently operating units, each one quite complete in itself as to functioning, and made up of many cooperating working parts. These different operating units, in the order of their sequence of use in the process of delivering gasoline from the underground tank to the automobile tank, are:

1. The foot valve.
2. The motor.
3. The pumping unit.
4. The air eliminator.
5. The measuring unit, or meter.
6. The quantity-indicating mechanism.
7. The visigauge assembly.
8. The discharge nozzle at end of delivery hose.

TESTING EQUIPMENT

In the manufacturing plant, thorough tests are required of these several units individually, not only before they are built into the finished pump but in the completed assembly when it leaves the production line.

Testing Individual Units.—Concerning the tests of these individual working units, let us briefly consider some of the various methods employed by the manufacturers.

1. The foot valve and all other valves in the pump assembly require tests with liquid under actual working degree of pressure or vacuum conditions, as the case may be. In the gasoline pump it is axiomatic that a leaky valve is often worse than no valve at all.

2. The motor must be tested by means of several electrical test instruments for horsepower and other important standards and specifications.

3. The pumping unit must be tested for rated gallons-per-minute delivery, as well as for the proper functioning of its by-pass mechanism.

4. The air eliminator has few working parts, consisting of a float and valves which require very little adjustments or replacements. Its tests are conducted under various liquid pressures occurring in field operations, to determine the ability of this important unit to separate and eliminate air or vapor from the gasoline before it reaches the meter or measuring unit.

5. The measuring unit or meter is the heart of the whole device. In recognition of the vast importance of this vital part of the gasoline pump, it is required that it be given a most rigid test for accuracy of measurement, by the use of standard test measures. Incidentally, these test measures themselves present quite a problem, when it is taken into account that many foreign countries use units of liquid measure quite different from our own, and the gasoline-pump manufacturer must be in a position to furnish a dispensing device that will deliver accurate measurement in any of these countries.

6. The quantity-indicating mechanism, whether clock face, rotary, or any other type, must be as rigidly tested as the meter that motivates it. A faulty indicating mechanism can overcome the good results of the most accurate meter.

7. The visigauge assembly or flow indicator performs the function of showing that the delivery system is full for proper delivery. It is, therefore, necessarily made of transparent material, such as glass. Its further purpose is to indicate the presence of any appreciable amount of air or vapor in the delivery line. It also serves to indicate, before delivery has begun, if the system is properly primed. Any drainage during idle periods should be visible in the flow indicator by recession of the liquid level. The operating feature of this unit is a fanlike spinner back of the glass, giving evidence as to the flow of gasoline when delivery is being made.

8. The discharge nozzle at the end of the delivery hose is in effect another kind of a valve. The severe usage given to this unit through frequent operation requires that it be given special tests for durability, as well as for positive control operation. This test has considerable bearing upon the factor of fire hazard and is, therefore, of special importance.

Testing the Completed Assembly.—So much for the testing operations carried on by the manufacturer, as applied to the various individual units before they are assembled. Now let us consider in more detail the steps taken in the final testing of the completed pump under actual working conditions.

The final act, so far as concerns the weights and measures interests, is at the testing stand or pit, over which each pump must pass as it comes from the assembly line. Here the finished machine is coupled up with the supply tank, as in actual use, and the general tests are applied much the same as they are by the weights and measures official in the field.

The testing operator first turns on the electric power and runs a sufficient quantity of liquid through the system to expel all air, and this automatically fills the whole delivery line under normal working pressure, as shown by the visigauge. Then, using a standard 5-gallon measure, he draws 5 gallons at full flow, as shown by the indicating means, noting at the same time the pump pressure gage as to degree of pressure developed. Also, during this first measuring operation, he takes the time of delivery, that is, the number of delivered gallons per minute.

When 5 gallons are indicated on the dial or reading face, he closes the delivery nozzle and looks at the indicated measure as shown by the standard test measure gage. If it shows correct, he then repeats the test at slow speed, again noting the indication results. If the variation from standard is in excess, plus or minus, and he is assured by examination that there are no line leaks or other faults, this fact indicates the necessity of meter adjustment. Then he makes the adjustment and again applies the test as before, repeating the testing operation as often as may be necessary to obtain the required results as to accuracy of delivery.

This series of testing operations shows the operator several things:

It reveals whether or not a line leak exists, such as a cracked pipe connection, a sand hole in a casting, or other defects.

It shows the rate of gallonage delivery per minute.

It indicates the degree of meter accuracy as to volumetric determination.

It proves the adequacy of the pumping unit as to pressure development, and the working condition of the pump by-pass valve mechanism.

It checks the quantity-indicating mechanism against the metering element that operates it.

It determines whether or not the air eliminator is working properly.

Here at the testing stand the testing operator makes only the required meter changes for accuracy of delivery, based on his findings that all other elements are in good shape.

In case of changes to be made as to faults other than meter adjustment, he pushes the pump off to one side, and the faulty conditions are corrected by other mechanics before it is again put under the test that it failed to meet on the first testing trial.

As the conclusion of the work at the testing stand, the various factory seals are applied as to the meter-adjustment means and the interlock device. Then the pump is sent on its way for exterior finishing. After this, it is given a close physical inspection and tested by air pressure for any leaking conditions that may not have been discovered by liquid-pressure tests. Then crating and packing for shipment. The work is done. A gasoline pump has been built—embodying all the skill of the industry and conforming to the highest standard of regulatory laws known to the science of metrology.

I would like to emphasize here the fact that the gasoline-pump manufacturer fully realizes the responsibility he faces in building a device that, so far as humanly possible, must be in every sense of the word a legally correct device and a practical device—one that will really serve both the legal and the commercial requirements. This means, as previously stated, that a separate test must be made of every individual unit after the assembly has been completed, regardless of all the various individual unit tests that have been made before the assembly. This thoroughness of doing the job right is a fixed principle in the manufacturing of gasoline pumps. There is no such thing as testing on a sampling basis by selective tests here and there, trusting to luck that other parts and functions in the line of construction will be as correct as the selected sample.

SERVICING EQUIPMENT

Now, as to servicing the equipment in the field. A certain pump manufacturer once said: "We are not obligated to continue the manufacture of gasoline pumps, but we are morally obligated to render service on those which, by sale, we have placed into commercial use." This assumption of responsibility, I believe I can safely say, is a part of the moral code of the gasoline pump industry.

Surely, it must follow that a reliable manufacturer should be in a position to render expert service on such a highly important commercial device as the gasoline pump, and not leave the owner or user in a position where he must depend upon the local handy man, jack-of-all-trades, or even worse, the fly-by-night itinerant mechanic, whose reliability is as questionable as his gypsy habits would suggest.

In the field there are four classes of service men:

1. The service man employed by the gasoline-pump manufacturer and trained especially in the work of servicing the equipment manufactured by his company.

2. The service man employed by companies that have a number of service stations using a variety of gasoline pumps of different makes. Some of these men have had factory training or have acquired competency through years of actual gasoline pump work.

3. The local handy man who attempts to service any mechanical device that may get out of order in his community.

4. The wandering, free-lance service man who is here today and gone tomorrow, and who may or may not be competent in gasoline-pump service, but never has a fixed residence and consequently no fixed responsibility.

Little need be said as to this phase of the subject, as the experienced weights and measures official is familiar with the work of these four classes of service men. Much discussion has arisen in the last few years at weights and measures meetings as to the best way of handling the situation to permit only competent and reliable men to do this very important work. In several jurisdictions there are State laws and city ordinances which seek to govern the proposition by licensing, only after proved competency and reliability.

It may be asked what should or does a service man do when called to service a gasoline pump that has failed to pass the weights and measures official's test? As to what mechanical operations he performs, that depends entirely upon the conditions of the individual case, and since it is seldom that there are two cases alike, let us state a case where a meter-equipped gasoline pump has been put out of use and tagged for repair by the local weights and measures official.

In such a case the official is seldom at a given service station when the service man arrives, but the station attendants usually know what the weights and measures official said as to his reason for rejecting the pump. Whether the service man gets any information or not, it is, of course, his business to put the pump in working order without delay.

When he arrives on the job he knows that gasoline-pump troubles can be classed into four general groups:

1. Broken, worn, or disconnected parts.
2. Leaky valves or pipe connections.
3. Wrong meter adjustment.

4. Last, but by far not the least common cause of trouble, is the matter of faulty installation, involving line obstructions or restrictions, too high lift, and poor connections.

Weights and measures officials, of course, are most concerned with the matter of accuracy, so let us get back to our service man as to the case in hand where the pump was rejected on test because it was showing a shortage of 10 cubic inches on 5 gallons. Even with the facts presented to him, the service man does not jump to the conclusion that meter adjustment is the only thing to do. He starts the pump, and by means of his own 5-gallon sealed measure, he makes delivery tests to learn what the meter is actually doing.

He then opens the pump housing and makes an examination for leaks in the line connections, knowing that a line leak could let in air, and result in short measure, if the air were not fully eliminated by the air eliminator. He knows, to start with, that there are only two general causes for short-measure results, namely, air or vapor not completely eliminated from the system, and wrong meter adjustment. He also knows that it is characteristic of a positive piston displacement meter to tend to give overmeasure, rather than short-measure, because any slippage of gasoline past the meter pistons cannot result in short-measure.

Having assured himself that the meter alone is at fault, he makes

the proper piston-stroke adjustment, as verified by delivery tests, closes the pump housing, fills out a report, and hands it to the service station operator, hopefully wishing to get the money due for the service, providing, of course, the service performed is not within the manufacturer's guarantee period.

Service, as properly interpreted in connection with mechanical devices, is a much-abused term and too often used as a means of obtaining something for nothing. I have in mind a definition of service which intrigues me because of its far-reaching truth:

Service is not something for nothing; instead,
it is adequate facilities at a fair price.

An important part of service procedure in the field is for the service man to know how to correct the faulty condition on the spot, and when to remove the defective or impaired part for correction at the factory, where adequate facilities are available. The elements of mechanical ability and thorough training are, therefore, required in the performance of adequate field service.

REPAIRING EQUIPMENT

The third and final step in the treatment of the subject is that of repairing the equipment in the field or when returned to the factory. The usual plan is to completely dismantle the faulty unit and then reassemble it, after which it should be as good as new. The same procedure in testing the unit for efficiency or accuracy is employed as in the original construction of the new pump.

The steps which a practical service man may take in the field, in the case of condemned equipment, depend upon his ability, training, and facilities for the work. Surely, external adjustments of a simple nature may be made in the field. But vital internal adjustments, or repairs on complicated parts, generally warrant returning the part to the factory for a complete overhauling.

PRODUCT DEVELOPMENT

At this point I believe it fitting and proper to make some brief reference to the gasoline-pump development since the departure from the drum-and-measure method of serving motor fuel, a little more than one-third of a century ago.

The first crude gasoline dispenser appeared around 1904—some claim as early as 1900. It was a portable tank-and-pump combination, or a modification of the popular kerosene outfit that adorned the old general store of the gay nineties. As the automobile grew in popularity and the demand for motor fuel increased in those early days of budding automotive travel, the means of placing gasoline in the automobile tank had to keep pace with the changing conditions and the necessity for speed and safety. About 1910 the gasoline pump was moved out to the street curb as a fixed installation with an underground tank. This faster and more efficient unit satisfied the demand for a roadside refueling service that was not possible with the old portable outfit located in the back shed of the general store, or in some other isolated place for safety.

With this new, sturdier, and more convenient refueling unit came many progressive changes and improvements in the art—fireproof

construction, sight-glass or visigauge attachment, bell-ringing device, and a long succession of dial-reading developments.

1918 ushered in the "visible," or glass bowl pump. This step in development was another attempt to meet the demand of the motoring public for some visible means of determining the delivery of gasoline in the automobile tank.

Then came the electric meter pump in 1925, some experimental units having been installed several years earlier. This truly progressive type of pump soon threatened obsolescence of all earlier types. Power operation and metered measurement brought to the field of petroleum marketing features consistent with the modern machine age.

Then came the computing pump in 1933. A new principle in dispensing gasoline had arrived, that of mechanically calculating the amount of the sale while measuring it in fractions of gallons, visibly performing the act in the presence of the gasoline purchaser.

Following quickly the introduction of this modern business machine came the synchronized price-indicating mechanism, permitting the gasoline purchaser to see the price per gallon on the dial, in its true relationship between the number of gallons sold and the amount of the sale. Then came the zero-set-back principle, guarding against the delivery of gasoline before the indicator is set back to the starting point of zero.

To weights and measures men, in the struggle of years of evolving a practical and efficient machine for dispensing motor fuel, Heaven must have been a place where there were no gasoline pumps, and a future Hades held no terrors. But this is not so today. The strictly modern gasoline pump is as nearly a perfect machine for its purpose as the ingenious mind of man can conceive. It is truly a precision instrument, proof against the severest weather conditions and capable of maintaining its operating standards under the hardest usage. This is all reflected in the factor of service, giving to both the user and the supervising sealer a minimum of worry and trouble in that respect.

Here, I would like to take the opportunity to tell you something of the survey that the Gasoline Pump Manufacturers Association has been conducting for nearly a year to find out the true state of obsolescence of the gasoline pumps in use. You have all doubtless received letters from my office seeking information on the number of pumps of the various types in your jurisdictions. Some of you have replied. Others have slightly delayed. The figures are coming in, however, and within the next few months I expect to have a complete survey of the number of gasoline pumps in each of the more than 3,000 counties in the United States, according to the four types—blind, visible, meter noncomputer, and computer.

GREATER UNIFORMITY OF REGULATIONS

As I approach the conclusion of my remarks, it occurs to me to repeat the perennial prayer of the pump industry for a closer approximation of uniformity in the laws and regulations governing the manufacture and operation of gasoline pumps.

To me it has always been a situation of astounding inconsistency that gasoline pumps acceptable in one State may not be approved in another; and again, that certain special equipment or variation in

equipment required in some jurisdictions may not be permitted in others. The variations in specifications range all the way from a difference in the choice of a single word in a warning sign to the variation in important mechanical parts that virtually mean the building of special measuring units.

It is important to remember that the manufacturers build their products for stock and not for individual orders. All pumps according to model or type are built to the same standards, and deliveries are made always from factory stock, the only variations being in painting and customer branding. This is necessary to conduct production on an economical and orderly plan.

The "production line" principle of building gasoline pumps, referred to in my description of the testing operations in the factory, is a vital part of the production plan. Consider one phase of construction requiring an extra part or process in production. Orders for the special part cannot be drawn from stock, but must be "tailor-made" at additional cost of material and labor, and with inevitable confusion in the plant schedule. And yet the price cannot be increased; certainly not when the buyer purchases for other territories where the standard article is acceptable to the weights and measures officials. And so the manufacturer absorbs it. But this throws his cost estimates out of line, and he must make allowance in his new schedule for the increase. Thus the price structure must be increased, and again the burden is passed on to the buyer, down to the ultimate consumer.

The buyer may also find this variation in standards a serious handicap. For example, a purchaser supplying equipment to his stations in several States would be unable to switch equipment from one jurisdiction to another without the inconvenience and expense of changing the varying parts or specifications to conform. Furthermore, the complication would make it impossible for him to buy at the best advantage, because he could not anticipate his requirements safely for stocking purposes, considering the variety of product he has to buy. Either this, or he would have to carry excessive stock in combination and increase his investment in inventory accordingly. This is obviously downright impractical and very definitely uneconomical.

With full respect for the individuality of opinion, it does seem both logical and practical to plead for the leveling out of the many differences in the construction and operating requirements of the gasoline pump, where such a move would result in economy and convenience to both the manufacturers and the vast number of users of this nationally distributed product.

This expression of hope is made in the realization that the spirit of organization among the weights and measures officials is not bound by State, county, or city lines, but permeates the entire fraternity, as so well exemplified in this great national conclave where the minds of all territorial jurisdictions meet in friendly discussion of their problems and ideas.

In conclusion, the gasoline pump industry salutes this impressive and inspiring demonstration, and as in all of the years of cheerfully and sincerely working with you in the interest of a higher degree of public service, the manufacturers give you their unqualified assurance of continuing in that cooperative strain.

METHODS OF SALE FOR CERTAIN COMMODITIES

Mr. Pisciotta. I desire to present the following report on the informal round-table discussion held yesterday afternoon. [Reading:]

Pursuant to a suggestion made by Mr. Pisciotta, of New York City, and Mr. O'Keefe, of Chicago, an informal round-table discussion was held yesterday afternoon in the East Room of the Mayflower Hotel. Several important matters were discussed pertaining to the proper methods of selling and merchandising certain commodities. The following recommendations were made for the consideration of this Conference so that they may be a guide to be followed by weights and measures officials throughout the country.

WRAPPING PAPER

It is recommended that wrapping paper be sold by weight, and all weights and measures officials are urged to enforce their respective laws compelling the sale of wrapping paper by this method only.

COTTON AND WOOL BATTING AND WADDING

It is recommended that this Conference establish a standard method for the sale and merchandising of cotton and wool batting and wadding.

Cotton and wool batting and wadding shall be sold by weight; however, no deficiency in the weight on any one package shall be considered a shortage unless the entire lot as contained in a wholesale carton shall have been weighed and found to be below average weight.

It is further agreed that by reason of the nature of the product plus the effect of climatic conditions, reasonable variations from the weight do occur and shall be allowed.

PROPER DISPLAY OF SCALES FOR RETAIL STORES

In order better to protect the consumer on purchases made in retail stores, it is recommended that weights and measures officials enforce the recommendation made by the Committee on Specifications and Tolerances to the effect that all scales be so displayed that the customer will have an unobstructed and complete view not only of the weight indications but also of the weighing operations of the scale. It is further recommended that weights and measures officials communicate with showcase manufacturers seeking their cooperation so that show-cases may be built providing a suitable place for the scale, to carry out these recommendations.

TOILET TISSUES

It is recommended that the custom established for many years which has complied with rules, regulations, and laws of many jurisdictions for selling toilet tissues by numerical count be continued, and that the new method of selling toilet tissues by net weight be disapproved. However, reasonable opportunity should be given manufacturers to dispose of any stock, wrappers, or other printed material already manufactured and distributed.

CREATION OF A COMMITTEE ON STANDARDS AND SPECIFICATIONS
FOR THE PROPER METHODS OF SALE AND MERCHANDISING OF
COMMODITIES

It is recommended that the President appoint a standing committee of this Conference to be known as the Committee on Standards and Specifications for the Proper Methods of Sale and Merchandising of Commodities. The object of this committee shall be to prepare and recommend to this Conference proper methods of selling commodities to comply with the principles and spirit of proper weights and measures enforcement.

[The foregoing report was signed by the following officials: Alex Pisciotta, of New York City; James O'Keefe, of Chicago, Ill.; Charles C. Read, of New Jersey; W. P. Reed, of Atlanta, Ga.; C. D. Baucom, of North Carolina; John J. Levitt, of Illinois; L. G. Waldman, of St. Louis, Mo.; R. L. Fullen, of Dallas, Texas; W. S. Bussey, of Texas; Charles M. Fuller, of Los Angeles County, Calif.; S. T. Griffith, of Baltimore, Md.; C. E. Tucker, of California; Joseph G. Rogers, of New Jersey; H. N. Davis, of Vermont; C. L. Klocker, of Connecticut; Barnett Kanzer, of New

York; Rollin E. Meek, of Indiana; A. J. Jensen, of North Dakota; John P. McBride, of Massachusetts.]

I move that these recommendations be adopted.

The ACTING CHAIRMAN. These are the recommendations of a group of men who got together, and they think they are practical recommendations. This group was not a committee of the Conference. It has been moved and seconded that these recommendations be accepted by this Conference and made a part of the record.

Mr. ARCHIBALD. I would like to raise a question about that part of the cotton recommendation reading, "as contained in a wholesale carton." Various manufacturers use different sizes of cartons and pack different quantities in the cartons, and there is no standard of packing so far as the individual carton is concerned. There is in the trade a standard unit known as one "lot," which consists of 48 pounds. From the standpoint of the industry, I should prefer to have the wording changed to refer to our standard unit of 48 pounds instead of to the wholesale carton. In some instances there is just one roll in a carton.

Mr. PISCIOTTA. You do not want us to pick one unit, but you do want us to pick a whole carton?

Mr. ARCHIBALD. That is right.

Mr. PISCIOTTA. The suggestion was made by some that we have given you too much leeway in taking the whole carton, and that we should limit it—that if the store has only five or ten units on hand, we should use them—but that is not giving you a fair break. We are willing to take everything that comes in a carton, whatever the standard of that particular manufacturer for that particular class of commodity may be.

Mr. ARCHIBALD. As I have said, there are some manufacturers that put one roll in a carton, and if that could be construed as a wholesale carton it would still contain only one package. If we understand definitely that you mean the unit of shipment that the cotton batting manufacturers use, then there is no objection.

Mr. LEVITT. Would it help you if we added, "in no case less than 10 units," or "in no case less than 20 units."

Mr. ARCHIBALD. I should prefer that you say 48 pounds, which is our standard unit.

The ACTING CHAIRMAN. Some manufacturers use 15 pounds as their standard unit, do they not?

Mr. ARCHIBALD. I know of none.

Mr. PISCIOTTA. Some use 20 pounds.

Mr. ARCHIBALD. No; not 20.

Mr. PISCIOTTA. Well, whatever it may be, you are safe enough. Whatever the carton may hold, that is what you will be tested on, and not on the individual unit.

(The question was taken, and the motion for the adoption of the recommendations was agreed to.)

PARALLAX

By HOWARD E. CRAWFORD, *Inspector of Weights and Measures, City of Jacksonville, Fla.*

There may be a mistake in the title of this paper. Little has been mentioned on the subject in most conferences, and only in a few instances has there been any reference to this subject in our "Handbook of Weights and Measures." Perhaps a proper title should be:

"Fools rush in where angels fear to tread." It was my idea that a member of this Conference from a certain eastern State could most ably present a paper on this subject, and I suggested that it be assigned to him for presentation to you. As he refused, I accepted, unknowing what a task lay before me.

Those of us in this inspection field think of this subject frequently, as it is a necessary observation. Occasionally we see that something has been accomplished, but always we realize that much more can and should be accomplished through the elimination of errors due to this cause, which I am shortly going to name. It is not my intention to ignore what has already been done to improve a condition that exists, which has been undesirable from the standpoint of ideal enforcement. On this point may I mention that I realize you will refer me to the tolerances and specifications as promulgated by our national group. However, we must realize that merchants and consumers alike suffer great losses annually because of parallax. That is one reason why we should consider and give careful thought to this subject. Discrepancies still exist due to errors through this cause which, in the minds of many, might be further eliminated.

It is my opinion, in which I hope that all of you will concur, that our handbook references should forcefully stress the errors caused from this source. In doing so, old, experienced officials would find it a great benefit in presenting the subject to the sealers who have recently been inducted into this field. By this means, manufacturers, too, could possibly be encouraged to a far greater degree in their attempt to overcome errors through this cause.

Let us admit that much more can be done and will be done, and if I seem to trespass in the field of engineering, I herewith beg your pardon, for we who are active in weights and measures enforcement should criticize only in a constructive manner. Then, if this subject can be presented in this light, something will have been brought before this body that may be truly beneficial.

The old order has failed throughout this Universe. Progress is demonstrated only through the elimination of equipment as it becomes inadequate for present and future needs. Are we employing the use of such obsolete devices in our weights and measures field today? Let us acknowledge, therefore, that errors from this cause do occur.

While it is true that there are specifications and tolerances that guide us in guarding against errors through this cause, the word "parallax" is seldom mentioned in any of our handbook publications. At this time there are many weighing devices in use where errors caused from reading at different angles are practically nonexistent. We might mention as a splendid example the automatic scale, with which we are all so familiar. In some of these scales the indicator, instead of passing in front of the graduations, passes up to and directly under them. The same comments may be made from observations of several different package-weighing scales—those commonly known as the over-and-under types. There is also the hanging spring scale of a similar graduation placement, which we are recently finding in use in increasing numbers. These scales, like those just mentioned, employ an indicator which travels directly under the graduations.

I believe that the hanging spring scale commonly in use in the field, especially the smaller ones, could be fitted with the same type of indicator at a very small cost. I am not suggesting that the manu-

facturers should make such changes at once, but I believe that it is possible that this can be accomplished within a reasonable time, without working any hardships on the manufacturers.

In most jurisdictions necessary regulations are promulgated requiring that hanging spring scales be hung at a certain height in order to overcome errors in reading. This regulation was, and is, readily justified, because parallax errors are much reduced through this correct placement of such a scale.

During this discussion, I have not mentioned the computing scale, over which most of our people buy and merchants sell the most expensive meats and produce consumed. It is through the use of this scale that many merchants of honest intention have been accused of deliberately defrauding their customers, and at the same time many dishonest merchants have intentionally used the parallax as an alibi. All sealers and inspectors have been caused a great deal of concern in adjusting complaints due to such an existing condition.

In the past, manufacturers have used several methods in their attempt to help overcome this annoying situation. Through these new devices some improvement was made, but even those mediums were not what we would accept as entirely satisfactory. For instance, one manufacturer has used a ribbon line as an indicator, but we all found that this had its disadvantages unless read properly, because the clerk who did not stand directly in line with the flat surface of the ribbon indicator would, in many instances, be reading over an indicating surface as wide as an entire graduation on the chart of the scale.

Where two indicating lines were installed for accuracy of reading, we found that, when the reading was intelligently done, there was a fair degree of accuracy; however, it has never been a question in my mind but that there were more inaccurate readings than accurate ones. Many clerks have been found to read only the indicator nearest the computing chart, and others have read only the outside line, thus allowing an unbelievable error, as many of you will agree. Where these double indicating lines are employed many merchants have been found using these scales continually after one of these lines has been broken. The variations of reading in these instances have been many times beyond tolerances.

Much can be said of recessed chambers where all persons must stand at a similar height to observe the weight; but all of you are equally familiar with this type of scale.

In a recent weight observation three people of varying heights were used in weighing merchandise selling at 32 cents per pound. Before this test was begun we made certain that the indicating wire was approximately 0.06 of an inch from the computing chart. All three stood at the usual distance from the scale as is done in actual sales work. We found in this test that there was a variance of $\frac{1}{2}$ ounce in the weight readings, and that there was also a 1-cent variation in the reading of the computed values on the chart, which would result in a considerable loss or gain in the multiple weighings done throughout the day.

In purchasing new equipment it is the purpose of a merchant to insure accuracy in weighing and thus prevent loss; nevertheless, parallax in an otherwise accurate scale will even then defeat the very purpose for which this instrument was purchased, and may, on the

other hand, cause the consumer a loss which lays even the most honest merchant open to prosecution.

Because of parallax the exactness of weight tolerances which we wish to bring about certainly does not exist; and when errors through mechanical defect and through wear occur, the percentage of errors, you will agree, is beyond all reason.

Many concerns making weighing instruments are already doing a splendid job in turning out equipment in which errors through parallax are negligible. Some have been able to place indicating wires less than 0.01 inch from the reading chart, and under observation we will find that errors are brought to a minimum, and that this means employed is absolutely dependable.

Before closing, allow me to mention that I have not intentionally laid stress on this subject as it applies to weighing devices. Many of you, as well as I, received a communication from a fellow official in which a liquid-measuring instrument was involved. The information passed on indicated that there were errors due to parallax, which permitted a misunderstanding in the readings of the indications on either side of the pointer, which showed an error spread of 4 cents in money value. In this same instance it was reported that there was a variation of readings on the gallon indication of as much as 23 cubic inches.

What has just been recited is another proof that the existence of parallax definitely defeats the very purpose of weights and measures enforcement—that of ensuring equity in all transactions where the exchange of commodities for money is involved. In conclusion, let us all become more “parallax-minded” so that we may offer a more complete insurance of equity to merchants and consumers alike.

(At this point, at 1:35 p. m., the Conference took a recess until 2:30 p. m.)

SIXTH SESSION—AFTERNOON OF THURSDAY, JUNE 6, 1940

(The Conference reassembled at 2:40 p. m., at the Mayflower Hotel, Lyman J. Briggs, President of the Conference, in the chair.)

FEDERAL FOOD, DRUG, AND COSMETIC ACT

GENERAL REGULATIONS RELATIVE TO NET WEIGHT, A PAPER PRESENTED BY
W. S. FRISBIE, CHIEF, DIVISION OF STATE COOPERATION, FOOD AND DRUG ADMINISTRATION, UNITED STATES DEPARTMENT OF AGRICULTURE

At your Conference last year I undertook to explain the general provisions of the Federal Food, Drug, and Cosmetic Act as they apply to statements of quantity of contents on food, drugs, devices, and cosmetics, and referred also to those sections of the law relating to containers deceptively filled or shaped. It would seem somewhat repetitious to recount here these provisions, since there has been no change within the year either of the law or the regulations thereunder. In this brief paper, therefore, I shall attempt to explain a number of questions which have been received by the Food and Drug Administration relative to the interpretation of the act and regulations in particular instances, and the reconciliation of some of these regulations with those in effect under State laws.

One of the questions which frequently arises was the subject of discussion at a conference of State officials meeting in Washington just 2 weeks ago. This conference met for the purpose of drafting regulations which would be uniform among those States which had adopted the counterpart of the new Federal act and, so far as possible, conform to the regulations established under that act. The particular question relates to the Federal regulation with respect to allowable variations in quantity of contents from the declared weight or measure. The text of the Federal act, as you know, declares that certain variations from the declared quantity of contents shall be permitted, and provides that exemptions as to small packages may be established. The variations permitted are based on two general principles: (1) Such deviations from the stated weight or measure as are caused by ordinary and customary exposure after introduction of the food into interstate commerce; and (2) variations in weight, measure, or count caused by unavoidable deviations in weighing, measuring, or counting, conducted in accord with good commercial practice.

Members of the conference called attention to those State laws which, by their inelastic provisions, grant no authority for the establishment of any variations or deviations from the declared weight or measure. To cite a typical State law: Food is declared to be misbranded, "If in package form if each package does not have a correct statement, clearly printed, on the outside of the package, of the contents and the quantity of the contents in terms of weight, measure, or numerical count." The only exemption provided in this act extends to packages put up by the retailer at the time of sale. A similar provision appeared in the act of 1906 and frequently was the occasion

of considerable concern, if not embarrassment, to those officials whose statutes do not recognize allowable variations. Congress has again declared in the act of 1938 that such variations shall be so recognized for interstate commerce. We find no authority in the Federal act to require a product in package form to contain the exact quantity of contents at the time of entry into the consignee's State, provided it conformed to the act and the regulations at the time it entered interstate commerce.

Another question which has frequently arisen refers to the statement of quantity of contents either in so-called "average" fashion or by means of a stated minimum. The Federal regulation declares that if a statement is not qualified to show definitely that the quantity expressed is the minimum, then that statement shall be considered to express average quantity. This means that if a manufacturer is declaring quantity of contents in minimum terms, he must clearly so state on the label. Under such minimum declaration, the only variations permitted are those of ordinary and customary exposure after the food (or drug, device, or cosmetic) is introduced into interstate commerce, due to conditions normal to good distribution practice, which unavoidably result in decreased weight or measure. When the manufacturer or packer elects to express quantity of contents in "average" terms, then variations due to the ordinary and customary exposure, as well as to unavoidable deviations in weighing, measuring, and counting, are taken into consideration. However, the average of the quantities of the packages in a given shipment must not be below the quantity stated on the individual packages, and no unreasonable shortage of any package is permitted. The exemptions established are specifically set forth in the regulations pertinent to foods, drugs, and cosmetics, and would seem to require no further comment here.

Frequently, the Administration is asked if a declaration of quantity of contents in terms of the metric system is legal. Since the law requires by its text that adequate information shall be conveyed by the label to the consumer, the regulations permit the use of the metric system only as equivalent statements of weight in terms of the avoirdupois pound; or of liquid measure in terms of the United States gallon; or of dry measure in terms of the United States bushel. An exception is made, however, in the case of drugs, where the metric system is recognized without any corresponding equivalent in other systems. The statement of the quantity of contents on devices is by count.

Many irregularities in declaring quantity of contents have been pointed out by State officials, perhaps the most conspicuous being the failure of the manufacturer or packer to indicate, where the expression is in ounces, for example, whether these refer to the avoirdupois system or to liquid measure. Regulations established declare that the quantity of contents of liquid food must be expressed in terms of liquid measure; if the food is solid, semisolid, or viscous, then in terms of pounds and ounces. This means that where the quantity may properly be expressed in ounces, the label shall designate whether it is an avoirdupois ounce or a liquid ounce.

We still receive inquiries as to the use of the term "net weight when packed." In 1920 the Department of Agriculture declared that the term "net weight when packed" is not necessarily a statement of the

net weight when offered for shipment. As under the act of 1906, the act of 1938 confers no immunity whatsoever by the use of such a statement. The weight or measure which appears on a package, regardless of the qualifying statement, must be in compliance at the time it comes within the jurisdiction of the act, and that is usually when it is offered for shipment in interstate commerce.

There seems to be a question in the minds of some weights and measures officials as to the proper method of declaring quantity of contents of food where the packing medium is inedible or at least universally discarded. One of the earliest opinions rendered under the act of 1906 related to this question, and we find that in 1914 the Department declared that olives in brine should be marked with a statement of the net weight of olives exclusive of the brine. This was subsequently reaffirmed and applied to olives in cans as well as in glass bottles. A hearing on the whole subject was held in 1915, and after this hearing—in 1917, to be exact—the Bureau of Chemistry declared that olives in brine should bear a statement of the quantity of contents either in terms of weight of the drained olives or, under certain circumstances dependent upon the shape of the container, in terms of liquid measure of the drained olives. Subsequently, the question arose as to the proper method of declaring quantity of contents on shrimp canned in brine. The decision then was to declare contents in terms of the drained weight of shrimp exclusive of the brine.

Now that the authority, under the act of 1906, to make standards of minimum fill for canned foods has been extended to all foods by the new act, it is possible that the information developed at the hearing on fill standards—and it has been our experience that the records of all hearings on standards contain a wealth of fact and opinion—will be of material assistance in deciding this question on its merits in each individual case.

As you will already have gathered, the Food and Drug Administration has never made any attempt to establish a hard and fast administrative policy applicable to all classes of food. The Food and Drug Administration believes that the method of declaring contents which will give the most adequate information to the consumer should be the determining factor. Certainly, the consumer is interested in and entitled to know the quantity or number, or both, of olives in a given container, and, regardless of the idiosyncrasies of taste, the average consumer will not be interested in the brine. In the case of canned shrimp, declaration of drained weight of shrimp in brine permits a ready appraisal of the contents compared to dry-pack shrimp. Other examples could, of course, be given, but for the present at least the policy of the Administration will be based upon a decision as to the type of labeling which will be most informative to the consumer, thus adhering to the spirit of the law of 1938.

The discussion of the application of the act to the containers deceptively filled, shaped, or formed is the subject of a paper immediately following.

In conclusion, may I express again to the State and city officials here assembled our due appreciation of their continued wholehearted cooperation with us, which we aim to reciprocate as far as may be in our power. We also acknowledge the generous response of the manufacturing industry in undertaking to comply not only with the

letter but with the spirit of the law and in lending their support to a solution of the problems arising under this new act.

DECEPTIVE CONTAINERS, A PAPER PRESENTED BY SUMNER C. ROWE, ASSOCIATE CHEMIST, FOOD AND DRUG ADMINISTRATION, UNITED STATES DEPARTMENT OF AGRICULTURE

Under the Federal Food, Drug, and Cosmetic Act a food, drug, or cosmetic is misbranded if its container is so made, formed, or filled as to be misleading. This so-called deceptive-container provision was included in the new law in order to protect the public from deceptive packaging, which could not be corrected under the old act of 1906. Although attempts were made to amend the old law, they never succeeded in affording the consumer any protection against this type of deceptive package. The requirements of the law were met, in general, provided the quantity of contents was plainly and conspicuously declared on the label. And here is a point which the Food and Drug Administration has found it necessary to explain to many law violators and to reiterate in answers to inquiries, namely, that notwithstanding the mandatory quantity of contents statement upon the label, Congress went one step further and outlawed containers which are deceptively made, formed, or filled.

The deceptive-container provision of the law became effective June 25, 1939. Since that date a large number of deceptively packaged foods, drugs, and cosmetics have been seized. The records up to May 1, 1940, show that 49 lots of food have been seized, involving tea, cookies, macaroni products, pretzels, candy, grated cheese, sardines, flavoring extracts, spices and condiments, nut meats, and dried vegetable-soup mixtures. There were 22 drug products, including quinine sulfate, salicylic acids, dressings, ephedrine jelly, feminine hygiene jellies, ointments, camphorated oil, and nose drops. Thirty-two lots of cosmetics were seized, consisting of face creams and powders, toothpaste and powder, shaving cream, eye drops, deodorant creams, depilatory creams, and preparations for the hair and scalp.

Now, let us consider what a deceptive container is and what measurements can be made upon it. Obviously, it is a question of fact whether or not any particular container is deceptive. The impression which a package creates in the mind of the purchaser cannot be stated in precise terms, and no ironclad rules can be laid down which would cover all cases equitably. In general, deception results when a package appears to contain more than it actually does. It is possible, within certain limits, to work out measuring sticks in the laboratory for use as a guide by industry and enforcement agencies. However, it must be emphasized that the primary basis of such measuring sticks must of necessity be a known and observed deception on the consumer. That is, the numerical limit set by such convenient devices does not in itself spell deception or the lack of it, but rather this limit correlates with their mental concepts.

As an example of one of these measuring sticks, the State of North Dakota has made use of a formula in evaluating the data obtained from bottle measurements. It consists of the ratio between the apparent capacity and the true capacity. An illustration of how this ratio works and of some of the factors which may cause deception are given below. The example at the end of the tabulation (table 11) shows actual measurements on a normal and on a deceptive bottle.

Factors which might cause deception:

- I. Glass bottles:
 (a) Thick glass.
 (b) Panels.
 (c) Excessive height.
 (d) Indented bottoms.
 (e) Irregular shapes.
- II. Opal jars:
 Same as I; also raised covers.
- III. Cardboard, fiber, and metal containers:
 (a) Excessive size (slack-filled).
 (b) False bottom.
 (c) Indented bottom.
 (d) Raised covers.
- IV. Oversized cartons.
- V. Facing.
- VI. Deceptive color of wrappings.
- VII. Excessive wrappings.
- VIII. False packing.
- IX. Deceptive face dimensions.

TABLE 11.—*Illustration of measurement of bottles (20° C.)*[North Dakota Bulletin 40, August 1933]¹

Label	Weight of empty bottle	Weight of bottle plus water		Volume of panels		Capacity of bottle	Displacement volume of bottle	Apparent displacement volume of bottle	Ratio
		Weighed in air	Weighed in water	Measured in cc	Converted to oz av (cc x 0.0352)	c=col. 2 minus col. 1	d=col. 2 minus col. 3	Col. 7 (d) plus col. 5	Col. 8 divided by col. 6 (c)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
4-oz, "Round"-----	oz av 4.86	oz av 9.19	oz av 2.92	cc 3.5	oz av 0.12	oz av 4.33	oz av 6.27	oz av 6.39	1.48
4-oz, "Panel"-----	8.58	12.78	5.09	37.0	1.30	4.20	7.69	8.99	2.14

¹ North Dakota ruling: "Bottles and similar containers of 2-and-4-ounce capacity, where ratio is 1.5 or less, are normal, while those whose ratios exceed 1.8 are deceptive to the purchaser and their use prohibited."

The 4-ounce bottles with North Dakota ratios of 1.48 for the normal bottle and 2.14 for the panel bottle are here for your inspection. You will note that such features as thick glass, paneling, and elongated necks have definitely ruled out the use of the panel bottle. They increase the external volume or apparent displacement volume of the bottle and thus cause a high ratio. To make the necessary measurements, the only apparatus required is a balance, a tank of water to submerge the bottle, and a burette filled with a colored solution of low surface tension for determining the volume of panels and indentations. Instead of a colored solution to measure the volume of panels, we have recently experimented with modeling clay and found it quite satisfactory. By filling the panels with modeling clay and leveling with a knife blade, quick results can be obtained for apparent displacement volume by simply submerging the "depanded" bottle in a graduated cylinder and noting the increased volume.

On the first exhibit card there are mounted glass bottles which have been selected to illustrate different bottle features. The bottles themselves are marked to show their capacity and ratio. Charts have

also been prepared for other types of containers and are marked to correspond to the outline on the mimeographed sheet.

[Exhibits were displayed and circulated among those present.]

In connection with the measurement of containers other than bottles, we have found a ruler graduated in fiftieths of an inch very convenient for measuring dimensions. These rulers can readily be read to one hundredth of an inch, which is the unit best suited for easy calculation of volume. In the case of a cardboard or fiber container which is not a regular geometric figure or which will not hold water, we have found small seeds, such as turnip or mustard seed, very satisfactory for measuring capacity. The container is completely filled with seeds with gentle tapping. The seeds are then poured into a graduated cylinder of the smallest capacity necessary to hold the seeds and after again gently tapping the cylinder, the volume is read directly in cubic centimeters.

Another example of a "measuring stick" is a formula worked out by representatives of the Packaging Institute, Inc., to determine the size of cartons for collapsible tubes. They visited the Administration and offered for comment specimen cartons containing collapsible tubes. The cartons had been made in accordance with a certain formula, and the tubes were inserted in the cartons diagonally. The Administration had no adverse comment to offer on the material submitted. The formula is based on the fact that the clip of the tube, when inserted diagonally, forms a right-angle triangle with the sides of the carton. When the formula is used the dimensions of the cartons for tubes larger than $\frac{5}{8}$ inch in diameter are calculated as follows:

Depth of carton = Diameter of tube plus $\frac{1}{2}$ inch tolerance.

Width of carton = 1.246 times diameter of tube plus $\frac{1}{2}$ -inch tolerance.

Length of carton = Length of tube plus $\frac{1}{2}$ -inch tolerance.

In the case of tubes smaller than $\frac{5}{8}$ inch in diameter, the depth and length of the carton are obtained in the same manner, but the width of the carton is equal to the width of the clip, with no tolerances provided. These tolerances are the maximum limits permissible under present practices. It is our hope that the industry will find it possible to reduce them as commercial filling practices improve.

Recently, representatives of the American Spice Trade Association visited the Food and Drug Administration with numerous experimental packages of ground spices representing different fills. Recognizing the necessity for some headspace in order to shake the spice from the container, a fill of not less than 85 percent for ground spices in shaker-top cans was tentatively accepted by the Administration representatives after a study of data and exhibits presented by the visitors had indicated that such a fill would probably be acceptable from the consumer and commercial standpoint. The figure of 85 percent of the capacity of the container was arrived at by averaging the maximum and minimum volumes occupied by the spice. The decision is not necessarily final, but the Administration at this time does not contemplate actions where this percentage of fill is attained unless later experience shows it to be deceptive to the consumer. From the exhibits submitted it was obvious that a uniform size container could not be used for the same weight of every spice due to the varying apparent densities of the different spices.

The American Spice Trade Association has worked out an apparently reproducible method for obtaining the maximum and minimum

volumes occupied by a given weight of spice. In using the method, the maximum and minimum volumes occupied by 2 avoirdupois ounces are determined as follows:

Maximum volume: Roll 2 ounces of spice back and forth on a sheet of paper 10 times, fill into a 250 cc graduated cylinder, and note the volume.

Minimum volume: Tap cylinder 100 times and read volume; tap 20 times and again read volume; continue until 20 taps reduce the volume less than 1 cc and note the final volume.

The so-called "average volume" occupied by any given weight of spice is obtained by direct proportion, using the average of the maximum and minimum volumes of 2 ounces obtained as indicated above. The consideration which was given to the minimum volume occupied by a given weight of spice came about as a result of a feeling on the part of the Administration that good trade practice demands that a reasonable amount of settling should take place during the packing operation so that excessive headspace will not develop later, giving the package a slack-filled appearance. This settling can be accomplished by shaking or vibrating the package during the filling operation.

In connection with measurements of packages and methods for detecting deception, the Administration would welcome suggestions from members of this Conference. The Administration is always glad to give out any information which it has to assist in your regulatory work.

As a whole, industry has shown a splendid attitude in its efforts to comply with the spirit and letter of the law. I have some samples of exhibits before and after the enactment of the law. Some of these remodeled packages presented difficult engineering problems requiring extensive changes in machinery.

SECRETARY'S NOTE.—At this point numerous exhibits were displayed and circulated among those present. As described by Mr. Rowe, these included:

A candy box which had been filled to only 45 percent of its capacity.

A tin container with the bottom indented approximately $\frac{3}{8}$ inch, considerably more than was necessary.

A container with a cover raised $\frac{7}{16}$ inch above the level of the body of the container, representing approximately 34 percent of the entire height of the container.

An oversized carton for tooth paste, the tube occupying approximately 19 percent of the volume of the carton.

A tomato carton with a pink Cellophane cover, "to make the tomatoes look ripe. This same practice has been extended to noodles, where, by the use of Cellophane wrappers, plain noodles have been made to look like egg noodles."

[Quotation from Mr. Rowe's explanatory remarks.]

A candy box divided into cells, the cells being larger than necessary to accommodate the pieces of candy.

Two candy boxes, the original box and the revised box; the face dimensions of the latter were reduced by more than 50 percent with respect to the former. The revised box "is the box that has been accepted by the National Confectioners' Association as a satisfactory container, and it has been accepted by the Food and Drug Administration. Specifications for this container have been sent to the members of the Association." [Mr. Rowe.]

An original and a revised tooth-paste carton for tubes of the same size; the revised carton represented a 54-percent reduction in size.

An original and a new package of tea; the containers were of the same size, but in the new package the quantity of the contents had been increased by 33½ percent.

An original and a new package of spaghetti, each containing the same amount, the new package being 51 percent smaller than the original package.

An old and a new extract bottle, the new bottle representing a 42-percent reduction.

An original and a revised box, the former with a raised cover; the revision represented a 32-percent reduction.

DISCUSSION OF FOREGOING PAPERS

The CHAIRMAN. The papers of Mr. Frisbie and Mr. Rowe are now before you for discussion.

Mr. KANZER. In the State of New York we have been assigned the enforcement of uniform packaging in addition to our weights and measures work. Our law is a food law only. I would like to ask what we can do under these circumstances: A sample is submitted to us for a ruling. Since we have no hard and fast specifications to guide us, we either transfer the problem to the Federal Government or attempt to solve it ourselves as best we can. In the latter event, the difficulty is, that if we come to a final decision on our part we feel that this may be overruled by the Federal Government, because under our law we may not be in conflict with the Federal authorities. If I call a conference on the matter to get the opinions of the trade, we might work out a solution which would be acceptable to us, but there is always the possibility that it may not be acceptable to the Federal Government. How should I proceed?

Mr. FRISBIE. Well, Mr. Kanzer, that is just another one of our problems of cooperation. You, of course, do not wish to be out of line with what we have ruled or what we may rule, but obviously under this new act we can not give 100 percent of our time to that particular problem; it is just one of many problems. It is asking a great deal of you to be patient, but I would suggest that you bring your concrete problems to us as they come up to you, and we shall solve some of them in cooperation with you, just as we shall do with other States which have passed similar laws.

Mr. KANZER. Should I proceed in the matter at all, aside from submitting it to the Federal Government in the first place?

Mr. FRISBIE. I know of no reason why you should not proceed in line with your law and regulations, even though we may not have taken action and may not feel in a position to do so. We certainly would not discourage you from getting results.

Mr. PISCIOTTA. Do the Federal law and regulations permit the use of such terms as "when packed", "approximate", or, in fact, qualifying terms of any kind?

Mr. FRISBIE. There is nothing in the law to prohibit it, but it does not do the packer any good—it does not confer any immunity whatsoever. It may be that the new act will ultimately be construed to prohibit such qualifying expressions as "net weight when packed"; at present we are simply reiterating the policy announced in 1920, that regardless of any qualifying phrase, the weight, measure, or count stated must be exact as of the time the package enters the jurisdiction of the Federal act. They may state the weight as "when packed", which may have been months before the package moves out of the State, but it is not our concern what the weight was when the package was packed; it is of interest to us what it is when it comes into interstate commerce.

Mr. PISCIOTTA. We have told the packers that they must not mark their packages that way, and then we are asked why we prohibit something which the Federal Government permits.

Mr. FRISBIE. They may truthfully say that we do not prohibit it, but certainly they can not cite any letter in which we encouraged it.

Mr. PISCIOTTA. Another question. Both the Federal law and our State law say that the terms used on a label must be such that they can be understood by the ordinary person, and that ingredients must be designated by their common or usual names. We recently picked up a bottle of prune juice, and the label stated that this was an "aqueous infusion"; I do not believe that an ordinary shopper under ordinary conditions would understand the meaning of "aqueous infusion." Unfortunately, when we brought the packer in, we were confronted with correspondence from the Food and Drug Administration to the effect that the labeling in question was permitted. How is that possible?

Mr. FRISBIE. Well, ordinary prune juice is an aqueous infusion of dried prunes; it sounds plausible that we may have said that that was all right. I admit that "water" instead of "aqueous" would be better. Perhaps that was an old letter; surely we are insisting in all of our correspondence on use of the common or usual name. For example, "sodium bicarbonate" is pretty well understood, but we say it is "baking soda," and we do not recognize "sodium chloride," which is understood by many people—we call it "salt."

Mr. PISCIOTTA. The question is, can we rely on common sense as to what is plain or ordinary language? I think the language should be so plain that it cannot be misconstrued. I doubt that an ordinary person understands "aqueous infusion" to mean "dried prunes soaked in water."

The letter I referred to was received by the manufacturer in June 1939. I do not think we can honestly and sincerely enforce the provisions of the law when we have rulings of that kind, unless we take an attitude which we do not want to take and which we should not take, and say that we shall make our own interpretation and let the Federal authorities do likewise. We should prefer to act in harmony with the Federal interpretations.

Mr. FRISBIE. I do not know how I can clarify it any more. This was evidently an attempt on the part of the manufacturer to embellish his label with some high-sounding words instead of using ordinary words. Unless we can show that there is absolute deception, I am not sure that we would have a case. I think that you are right and that labels will be understood by more people the more ordinary the language used; but we must consider carefully before we say that a manufacturer has stepped over the threshold and is actually violating the act.

Mr. PISCIOTTA. In other words, you feel that perhaps a definite ruling could not be made even though the former ruling was in error?

Mr. FRISBIE. If we could get any evidence that "aqueous infusion" is misleading, the ruling might be changed.

Mr. PISCIOTTA. I cannot conscientiously permit this labeling; in fact, we are going to correct the situation in spite of the ruling, because the manufacturer acknowledges that no ordinary person is going to understand what "aqueous infusion" means.

Mr. FRISBIE. I do not claim that the Federal Government is always right, and least of all do we want to be arbitrary. We are called upon for thousands of opinions, and they change from day to day. I am not dismissing the possibility that the one we are discussing may be changed. The most and best you can do is to bring

your views to us very forcibly in writing, and, best of all, show instances where people have been misled.

Mr. PISCIOTTA. Is it necessary to prove that "aqueous infusion" is not understood by the ordinary person?

Mr. FRISBIE. We should like to hear what the ordinary person has to say.

Mr. PISCIOTTA. I shall agree to do that, and I shall send these letters to you personally.

Mr. FRISBIE. I shall be glad to have the correspondence and shall try to help you.

Mr. ROGERS. We find it very difficult to determine whether certain commodities should be marked on the basis of weight or on the basis of volume. For example, we found one manufacturer marking pickled pigs' feet by weight and another marking this commodity by volume; we feel that any commodity of this nature should be sold on the basis of the net weight of the drained material, but we can not seem to get the matter straightened out. Of course, there are other commodities, such as pepper sauce and chopped vegetables, which we are willing to accept marked either way, but what is proper for large units such as large, whole pickles? Should they be sold by count, by volume, or by weight?

I think it would be very valuable if the Food and Drug Administration would issue a list of various commodities, indicating which should be sold by weight, which by volume, and which by count, because manufacturers do not know, and we find it difficult to advise them.

Mr. H. N. DAVIS. Maple sirup is packed at 180° to 190° F, and the producer must have an oversized can in order that there be full measure at ordinary temperatures. We have a regulation to the effect that a 1-gallon can may be 8 cubic inches oversize, or 239 cubic inches, and still be approved. When that can is shipped into Massachusetts or elsewhere out of our State, I am wondering if it would be called a slack-filled package.

Mr. FRISBIE. The Food and Drug Administration is not going to ask the impossible of any manufacturing industry. Certainly the maple-sirup industry will be permitted to fill their cans with hot sirup, but at least the can should be full when the hot sirup is packed, after which the shrinkage can take care of itself. We have not studied the shrinkage on maple sirup, and I do not know whether or not 8 cubic inches is an excessive allowance; if it should be found that the shrinkage is nothing like 8 cubic inches, then the package would be considered slack-filled.

Mr. KANZER. In trying to solve some problems relative to candy I contacted the confectionery industry and was told that the Federal authorities had ruled that if the top cover of a box is extended $\frac{3}{8}$ inch beyond the body of the box, that is considered satisfactory, and that if 72 pieces of candy were packed where 80 pieces could be packed, representing a 10-percent tolerance, that would not be considered a violation of the Federal requirements. Is that correct?

Mr. ROWE. The National Confectioners' Association has presented some exhibits and data to the Department, proposing standardized packing practices. Certain material on this subject has been distributed to all their members. No official regulation on this subject has yet been made.

Mr. KANZER. How about the North Dakota formula?

Mr. ROWE. The North Dakota ratio has been used simply as a guide in our work, and has not been adopted officially; however, we think that this might well be adopted as a guide by members of the industry.

The CHAIRMAN. Is there further discussion? If not, may I say it seems to be quite clear that a bulletin which would help State officials in making decisions in accordance with the wishes of the Food and Drug Administration would be very helpful. As soon as that can be formulated, I am sure that the members of this organization will appreciate it.

Mr. FRISBIE. In that connection, may I repeat what I said a short time ago, that we are rendering from day-to-day opinions on the application of the act in all of its phases, including net weight, shape of containers, etc. We have not yet contemplated extending our general regulations, which are printed with the text of the act. However, we do give this information to State officials in the form of copies of some of these opinions. I doubt that weights and measures officials are receiving them. If those of you who are interested in our opinions on net weight, labeling requirements, and deceptive containers will write my office, I shall put you on the mailing list.

The CHAIRMAN. Do I understand, Mr. Frisbie, that you have a list of interpretations which have already been made, and which are available to all of these weights and measures officials?

Mr. FRISBIE. Yes, sir. We shall be glad to give them to all cooperating State and local officials who request them.

The CHAIRMAN. That will be very helpful, and the way is clear for you gentlemen to write to Mr. Frisbie for that information.

Am I to understand also, Mr. Frisbie, that you will be happy to consider any particular case when a weights and measures official seeks your advice?

Mr. FRISBIE. Absolutely, yes.

The CHAIRMAN. Thank you very much.

I should now like to call Vice-President Read to the chair.

(At this point Charles C. Read, Vice President of the Conference, assumed the chair.)

REPORT OF COMMITTEE ON STANDARDIZATION OF PACKAGED GOODS, PRESENTED BY ALEX PISCIOTTA, CHAIRMAN

As a result of the report submitted by the National Conference Committee on Standardization of Packaged Goods at the Twenty-ninth National Conference on Weights and Measures last year, this Committee was continued and instructed to make further investigations on the question of the standardization of packaged goods.

During the past year, a great deal of progress has been made by your Committee. As had been requested by the Conference last year, conferences were held with members of the interested industries. The following report is made for your consideration, and together with, and as part of, this report, we are submitting three bills prepared after a great deal of research work and conferences with weights and measures officials other than the members of the Committee and with other persons interested in this problem.

We are very happy to report as a result of our sitting down and discussing this problem with members of the industries that a certain

amount of standardization by voluntary agreement has been accomplished by a number of packers, manufacturers, and distributors without the necessity of enactment of any laws.

During the sessions of the New York State Weights and Measures Conference in New York City, in July 1939, a meeting was held with a committee of the Association of Food Distributors, consisting of Percy R. Iseman, F. C. Wheeler, and Henry Miller. The only members of the National Conference Committee available at that time were Carl Klocker, of Connecticut; C. D. Baucom, of North Carolina; and your Chairman. At this conference also were present John McBride, of Massachusetts; Robert A. Snyder, at that time Acting Superintendent of Weights and Measures of the State of Pennsylvania; and Barnett Kanzer, of the State of New York. As a result of this conference this committee, representing approximately 21 packers of staple commodities within the metropolitan area of New York, who distribute their products throughout the entire country, agreed to pack dry commodities put up by them in standard capacity weights as recommended by our Committee and to discontinue the use of odd-sized containers. This conference was arranged after laboratory tests covering a period of over 2 months were made by your Chairman and by the packers themselves. The purpose of these laboratory tests was to ascertain the possible shrinkage in each respective commodity. The results of these tests and this agreement were mailed to all the members of the National Conference on Weights and Measures on August 17, 1939.

In addition to this conference, other meetings were held with other representatives of the packing industry, and from time to time individual manufacturers and packers were in communication with your Chairman. I will briefly quote from some of the correspondence which we have received from manufacturers showing their willingness to cooperate in our attempt to standardize packages of these commodities.

A letter from A. R. Simpson, manager of the tea department of Standard Brands, dated May 8, 1940, says:

This is to confirm the information given you by our Mr. Fruchterman when he saw you last week, to the effect that it is our intention to adopt 8-oz and 4-oz packages for our Tender Leaf Tea * * * we want you to know that we are definitely planning to do so as soon as our present stock of packing materials is used and the necessary changes in our machinery made.

A letter, dated August 15, 1939, from Percy R. Iseman, of Seeman Bros., advising us that the following firms, who are packers of staple commodities, namely, R. C. Williams & Co., Frances N. Leggett, Seeman Bros. Inc., Graham Co., Albert Ehlers Co., George Dudman Co., Southern Rice Sales Co., and Great Atlantic and Pacific Tea Co., would cooperate, states:

All of these companies are packers of dried beans, peas and rice, and they are discontinuing the odd-size packages just as fast as their present stock of containers is used up. All new containers will be for 16 oz or even fractions of the pound.

* * * * *

As to other commodities, speaking for Seeman Bros., it is our intention as fast as new cartons are issued, to pack the cereal products in even-size packages.

A letter, dated September 26, 1939, from the attorney of Old Dutch Mills, Inc., states:

After said date, Old Dutch Mills, Inc., will market said coffee known as Cafe Reale (Italian roast coffee) in one-pound or sixteen (16)-ounce containers. Until

such time, it is understood that your department will issue no further violations or summonses involving Cafe Reale in the present fifteen (15)-ounce cans.

A letter from B. Filippone & Co., dated October 11, 1939, reads in part as follows:

As per conversation had this day with our Mr. Bartole Filippone with reference to the weight on La Perla Italian Roast Coffee, which at present is packed in tins of 12/14 oz to case, we hereby confirm said conversation in that we are making arrangements to pack the said item in tins of 12/16 oz to case beginning January 1, 1940.

J. Ossola Co. wrote in part, on October 5, 1939, the following:

Incidentally, as already advised you, we have placed an order for new lithographed tins which will be of 1 pound net, and we also agree to have whatever old 15-ounce labels still unused by December 31 corrected to read 1-pound net, either through a sticker or printed correction.

On October 5, 1939, Salvatore A. Laraja wrote in part as follows:

Thus we have no more 15-ounce package coffee to offer, under any label, and have been attempting to supply all our customers with the new package as best we could.

The Long Island Macaroni Co., Inc. wrote on April 18, 1939, in part as follows:

As per our recent conversation which we had at your office, you will find enclosed new labels for our packages of macaroni, which you will note conforms with your requirements.

The attached label reads "Net Weight 1 lb".

Alba Macaroni Mfg. Co., Inc. wrote on April 13, 1939:

As per conversation with Inspector Kennedy in reference to packages marked 15 ounces. We wish to state that we will cooperate with your office, to rid these packages as soon as we can, as we have a small supply on hand.

Caruso Spaghetti & Egg Noodles on April 7, 1939, wrote in part:

With reference to our Caruso Spaghetti package containing 14 oz. net, which has been the subject of our conversations, we beg to advise that we shall be glad to discontinue it and make it either a 12 oz. or 1 lb. package as soon as we have used up all labels that we have on contract. The same applies to two other small packages which we are distributing bearing the label "DIXIE" and "GOLD CROWN."

Ronzoni Macaroni Co., Inc. on April 7, 1939, wrote:

We had been packing for the past 10 years up to the summer of 1938, a carton containing 15 oz. macaroni, spaghetti, and noodles. A change was then made to the one-pound size which we are now packing.

Roman Macaroni Co. Inc. wrote on April 19, 1939, the following:

With reference to our macaroni packages, please be advised that we discontinued using the fifteen-ounce packages January 4, 1938, and thereafter we have used only cellophane wrappers and all small carton boxes marked sixteen ounces.

The B. Manischewitz Co. of New York, Inc., wrote on January 17, 1938, the following:

In order to cooperate with your department and preclude the possibility of our product being sold under misrepresented weights, the B. Manischewitz Co. will pack five pounds net weight in its regular matzoth package for the coming Passover season.

Several conferences were held with representatives of the canning industry and also with Carlos Campbell, Director of the Division of Statistics of the National Cannery Association, and F. F. Fitzgerald, Director of Research of the American Can Co., representing the Can Manufacturers Institute. Both of these gentlemen appeared before

our Conference last year and submitted interesting papers on the subject and participated in the general discussion. Mr. Tourtellot, of the American Can Co., was frequently consulted in the preparation of the proposed legislation. We therefore advise this Conference that the wishes of its members were carried out. We sat down with the industry and discussed this problem. We made very extensive investigations, and a great deal of research work was done. All sorts of problems confronting the manufacturer were considered and carefully studied. At the same time, an endeavor was made to accomplish what we set out to do.

Under date of April 15, 1940, a proposed bill incorporating the standardization of food commodities, namely, dry foods, fruits and vegetables and their juices, edible oils, sirups, honey, and molasses, were incorporated in one bill. This was sent out as a feeler to arouse discussion, criticism, and suggestions. Approximately 200 copies were distributed to members of consumer groups; manufacturers of all sorts of commodities, containers, and packages; weights and measures officials; members of this Committee and the Committee on Legislation of this Conference; the Consumers' Counsel of the Department of Agriculture; and to all persons who we thought would be interested in this subject.

The response was beyond expectation. We never realized the great interest that this subject had aroused, especially among the consumer groups scattered throughout the country. The sending out of the first draft certainly accomplished its purpose.

We will endeavor to explain the provisions of the three separate bills which we have prepared. You must bear in mind that the provisions of these bills are the result of examining very seriously and carefully the suggestions and criticisms, thoughts and ideas, of all interested groups. It is very easy for us to say that we should cut down all cans to a minimum, as was attempted in the present Somers bill, but we must at the same time appreciate and consider the difficulties and problems of the canning and packing industries. This we have endeavored to do, as will be explained to you as each bill is discussed.

PROPOSED STANDARD CAPACITY ACT FOR DRY AND OTHER FOOD PRODUCTS ¹¹

A BILL

To fix standards of capacity for certain food products in containers of any description in order to prevent fraud and deception in the packaging of such food products when sold or distributed in interstate commerce.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

That in order to prevent fraud and deception in the sale, distribution and packaging of certain food products in containers of any description, it is the purpose of this Act to establish fixed and definite capacities for certain food products in containers as standard units of weight and to prohibit the manufacture, sale, or shipment in interstate commerce of certain food products in containers that are not of the capacities prescribed herein.

SEC. 1. All foods sold in dry state, except spices and condiments, but including such foods as peas, beans, and other dry vegetables, crackers, biscuits, cookies, macaroni, spaghetti, noodles, rice, barley, cereals, flour, corn meal, bread meal and cracker meal, puddings and desserts in powdered form, salt, sugar, tea, coffee, cocoa, chocolate powder, matzo's and matzoth products, nuts, candy, dried fruits, and butter, cheese, lard, sliced bacon and sliced ham, when manufactured, sold, offered or exposed for sale or shipped in interstate commerce in containers of any kind shall be packed in one or more of the following standard capacity weights and none other:

One-eighth pound, one-quarter pound, one-half pound, three-quarters of a pound, one pound, one and one-half pounds, and multiples of the pound, provided, however, that these commodities in containers may be sold in quantities of less than one-eighth pound, and provided, further, that candy when packed in units of twelve or less may be sold by numerical count.

SEC. 2. It shall be unlawful to manufacture, pack, sell, offer for sale, ship, or offer for shipment in interstate commerce the commodities herein specified in containers that are not of the standard capacity weights prescribed in this Act. Any individual, partnership, association, or corporation that violates this Act shall be deemed guilty of a misdemeanor and upon conviction thereof shall be punished by a fine not exceeding \$500: Provided, That no person shall be prosecuted under the provisions of this Act when he can establish a guaranty signed by the manufacturer, wholesaler, shipper, or other party residing within the United States from whom the commodities covered by this Act were purchased, to the effect that they comply with the provisions of this Act and the regulations thereunder. Such guaranty, to afford protection, must contain the correct name and address of the party or parties making the sale or shipment to such person, and in such case such party or parties making such sale or shipment shall be amenable to prosecution and subject to fines and other penalties which would attach in due course under the provisions of this Act to the person who made the purchase.

SEC. 3. Any commodity herein specified when packed in a container which is not of the standard capacity weight prescribed in this Act and which shall be manufactured, offered for sale, sold, offered for shipment, or shipped in interstate commerce may be proceeded against in any district court of the United States within the district where same shall be found and may be seized for confiscation by a process of libel for condemnation. Upon condemnation the commodity may be disposed of by destruction, or may be given to charitable institutions for consumption but not for resale, as the court or a judge thereof may direct. The proceedings in such seizure cases shall conform as nearly as may be to the proceedings in admiralty, except that either party may demand trial by jury of any issue of fact joined in such case, and all such proceedings shall be at the suit and in the name of the United States of America.

SEC. 4. This Act shall not prohibit the manufacture, offer for sale, the sale, offer for shipment, or the shipment of commodities in containers covered by this Act, to any foreign country in accordance with the specifications of a foreign consignee or customer not contrary to the law of such foreign country.

¹¹ Copies of this and of the two other proposed bills embodied in the Committee report had been made available to the members of the Conference prior to the presentation of the report, and accordingly their texts were not read to the Conference by Mr. Pisciotta.

SEC. 5. The Secretary of the Treasury shall deliver to the Secretary of Agriculture upon his request from time to time samples of commodities in containers covered by this Act which are not of the prescribed standard capacity weights and which are being imported into the United States or offered for import, giving notice therefor to the owner or consignee, who may appear before the Secretary of Agriculture and have the right to introduce testimony, and if it appears from the examination of such samples that any such commodities in containers are not of the capacities as described in this Act, the said commodities shall be refused admission and the Secretary of the Treasury shall refuse delivery to the owner or consignee and shall cause the destruction of any such commodities refused delivery which shall not be exported by the owner or consignee within three months from the date of notice of such refusal under such regulations as the Secretary of the Treasury may prescribe: Provided, That all charges for storage, cartage, and labor on such commodities which are refused admission or delivery shall be paid by the owner or consignee and any default of such payment shall constitute a lien against any future importation made by such owner or consignee.

SEC. 6. It shall be the duty of each United States district attorney to whom satisfactory evidence of any violation of this Act is presented to cause appropriate proceedings to be commenced and prosecuted in the proper courts of the United States in his district for the enforcement of the provisions of this Act.

SEC. 7. The Secretary of Agriculture shall enforce the provisions of this Act and shall prescribe such regulations as he may deem necessary for carrying into effect the provisions of this Act. He shall also prescribe such tolerances as he may find necessary in order to allow for reasonable variations in standard capacity weights incident to commercial manufacture, and shall cause such examinations and tests to be made as may be necessary in order to determine whether the commodities in containers subject to this Act meet the requirements and may take samples of such commodities in containers.

SEC. 8. For carrying out the purposes of this Act the Secretary of Agriculture is authorized to cooperate with State, county, and municipal authorities, manufacturers, dealers, and shippers; to employ such persons and means, and to pay such expenses including rent, printing publications, and the purchase of supplies and equipment in the District of Columbia and elsewhere, as he shall find to be necessary, and there are hereby authorized to be appropriated, out of any moneys in the Treasury not otherwise appropriated, such sums as may be necessary for such purposes.

SEC. 9. Any duties devolving upon the Secretary of Agriculture by virtue of the provisions of this Act may, with like force and effect, be executed by such officer or officers, agent or agents of the Department of Agriculture as the Secretary may designate for the purpose.

SEC. 10. Funds appropriated for carrying into effect the purposes of this Act shall be available for allotment by the Secretary of Agriculture to the bureaus and officers of the Department of Agriculture and for transfer to other departments and agencies of the Government which the Secretary may call upon to assist or cooperate in carrying out such purposes or for services rendered or to be rendered in connection therewith.

SEC. 11. For the purposes of this Act, the provisions herein are applicable only to dry and other food products herein described in containers sold, offered for sale, shipped or offered for shipment or distributed in interstate commerce.

SEC. 12. If any provision of this Act is declared unconstitutional or the applicability thereof to any person or circumstances is held invalid, the constitutionality of the remainder of the Act and the applicability thereof to other persons and circumstances shall not be affected thereby.

SEC. 13. This Act may be cited as the "Standard Capacity Act 1940".

SEC. 14. This Act shall become effective, at, but not before, the expiration of one year following the 1st day of January next succeeding the enactment of this Act.

The foregoing bill should not meet with much opposition from the industry. We say this advisedly because of our numerous conferences with the most active and largest packers in the industry.

The bill includes almost all the dry, staple, food products now packed in containers of any description, except spices and condiments, namely, peas, beans and other dry vegetables, crackers, biscuits,

cookies, macaroni, spaghetti, noodles, rice, barley, cereals, flour, corn meal, bread meal, and cracker meal, puddings and desserts in powdered form, salt, sugar, tea, coffee, cocoa, chocolate powder, matzoth and matzoth products, nuts, candy, dried fruits, butter, cheese, lard, sliced bacon, sliced meats, sliced ham, and other similar and related products. This means, in effect, that these products, whether packed in the customary cardboard or paper package or in glass or metal containers, must be of the prescribed standard capacity weights of $\frac{1}{8}$ pound, $\frac{1}{4}$ pound, $\frac{1}{2}$ pound, $\frac{3}{4}$ pound, 1 pound, $1\frac{1}{2}$ pounds, and multiples of a pound, with the exception of candy, which we provide may be sold by numerical count when sold in units of 12 or less. Inasmuch as this is Federal legislation, it is applicable only to the sale or shipment of these products in interstate commerce. Enforcement is placed in the United States Department of Agriculture. Unlike the other standardization bills to be submitted, no board of standardization is established to rule on tolerances, but this function is given to the Department of Agriculture, which today prescribes the tolerances, net weight, markings, etc., for these products.

PROPOSED STANDARD CONTAINER ACT FOR EDIBLE OILS, SIRUP, HONEY, MOLASSES

A BILL

To fix standards of dimension and/or capacity for containers for edible oils, sirups, honey, and molasses in order to prevent fraud and deception in containers used in the sale and distribution of these products in interstate commerce; to establish a Board of Standardization for the purpose of prescribing tolerances and approve additional containers of standard capacity for these products when necessary, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

That in order to prevent fraud and deception in containers used in the sale and distribution in interstate Commerce of edible oils, sirups, honey, and molasses, it is the purpose of this Act to establish and fix definite dimensions and/or capacities for containers of these commodities as standard units of measure and to prohibit the use, manufacture, sale or shipment in interstate commerce of containers that are not of the capacities and/or dimensions prescribed herein.

SEC. 1. All edible oils and sirups, except honey and molasses, when packed in original containers of any description shall be sold, distributed, offered or exposed for sale by liquid measure: Provided, That when said containers are of a capacity greater than five (5) gallons these products may be distributed, sold, offered or exposed for sale by net weight.

SEC. 2. All edible oils, sirups, honey, and molasses, in original containers of any description when sold, distributed, offered or exposed for sale by liquid measure shall be packed in the following standard fluid capacities and none other:

Two ounces, four ounces, one-half pint, one pint, one quart, one-half gallon, one gallon, and multiples of the gallon.

SEC. 3. When edible oils, sirups, honey, and molasses are distributed, sold, offered or exposed for sale by liquid measure in metal containers of capacities of one-half pint to one gallon as hereinbefore provided, such containers shall be of the following dimensions:

CYLINDRICAL CONTAINERS

Two and eleven-sixteenths inches in diameter by three and seven-sixteenths inches in height with capacity of one-half pint. (211x307.)

Three and three-sixteenths inches in diameter by four and twelve-sixteenths inches in height with capacity of one pint. (303x412.)

Four and one-sixteenth inches in diameter by five and twelve-sixteenths inches in height with capacity of one quart. (401x512.)

RECTILINEAR CONTAINERS

Two and one-half inches by one and three-quarter inches by four and one-quarter inches in height with capacity of one-half pint. ($2\frac{1}{2} \times 1\frac{3}{4} \times 4\frac{1}{4}$.)

Three inches by two and three-sixteenths inches by five and eleven-sixteenths in height with capacity of one pint. ($3 \times 2\frac{3}{16} \times 5\frac{11}{16}$.)

Three and three-quarter inches by two and five-eighths inches by seven and three-sixteenths inches in height with capacity of one quart. ($3\frac{3}{4} \times 2\frac{5}{8} \times 7\frac{3}{16}$.)

Four and nine-sixteenths inches by three and five-sixteenths inches by eight and eleven sixteenths inches in height with capacity of one-half gallon. ($4\frac{9}{16} \times 3\frac{5}{16} \times 8\frac{11}{16}$.)

Five and three-quarter inches by four and nine-sixteenths inches by nine and eleven-sixteenths inches in height with capacity of one gallon. ($5\frac{3}{4} \times 4\frac{9}{16} \times 9\frac{11}{16}$.)

SEC. 4. Molasses and honey when sold by weight and packed in original containers of any description shall be sold, distributed, offered, or exposed for sale in the following standard capacity weights and none other:

One-eighth pound, one-quarter pound, one-half pound, three-quarters of a pound, one pound, and multiples of a pound.

SEC. 5a. There shall be established a board of standardization consisting of the Secretary of Agriculture or his representative, the Director of the Bureau of Standards of the Department of Commerce, a representative of the National Conference of Weights and Measures selected by such body for that purpose, a representative of consumers and of the canning industry both to be selected by the Secretary of Agriculture.

SEC. 5b. The Board of Standardization may approve from time to time the packing of edible oils, sirups, honey, and molasses in containers of capacities and dimensions other than those prescribed in this Act, Provided, That any additional or new size must contain a binary submultiple or multiple of the gallon or pound, and Provided further, That the Board shall first determine whether such additional sizes are necessary to facilitate the marketing of the products herein described.

SEC. 5c. The Board shall have the authority to prescribe the tolerances which it may find necessary in order to allow for reasonable variations in dimensions and/or capacities incident to the commercial manufacture of the containers and products mentioned in this Act.

SEC. 6. It shall be unlawful to manufacture, pack, sell, offer for sale, ship, or offer for shipment in interstate commerce edible oils, sirups, honey, or molasses in containers that are not of the specified capacities and/or dimensions as prescribed in this Act. Any individual partnership, association, or corporation that violates this Act shall be deemed guilty of a misdemeanor and upon conviction thereof may be punished by a fine not exceeding \$500: Provided, That no person shall be prosecuted under the provisions of this Act when he can establish a guaranty signed by the manufacturer, wholesaler, shipper, or other party residing within the United States from whom the containers and/or commodities covered by this Act, were purchased, to the effect that the containers comply with the provisions of this Act and the regulations thereunder. Such guaranty, to afford protection, must contain the correct name and address of the party or parties making the sale of the containers to such person, and in such case such party or parties making such sale shall be amenable to prosecution, and subject to fines, and other penalties which would attach in due course under the provisions of this Act to the person who made the purchase.

SEC. 7. Any filled or unfilled container for edible oils, sirups, honey, or molasses, which is not of the standard dimensions and/or capacities prescribed in this Act and which shall be manufactured, offered for sale, sold, offered for shipment, or shipped in interstate commerce, may be proceeded against in any district court of the United States within the district where same shall be found and may be seized for confiscation by a process of libel for condemnation. Upon condemnation such containers and their contents may be disposed of by destruction, or may be given to charitable institutions for consumption but not for resale, as the court or a judge thereof may direct. The proceedings in such seizure cases shall conform as nearly as may be to the proceedings in admiralty, except that either party may demand trial by jury of any issue of fact joined in such case, and all such proceedings shall be at the suit and in the name of the United States of America.

SEC. 8. This Act shall not prohibit the manufacture, offer for sale, the sale, offer for shipment, or the shipment of containers or commodities in containers covered by this Act, to any foreign country in accordance with the specifications of a foreign consignee or customer not contrary to the law of such foreign country.

SEC. 9. The Secretary of the Treasury shall deliver to the Secretary of Agriculture upon his request from time to time samples of containers or commodities in

containers covered by this Act, which are not of the prescribed standard capacities and/or dimensions and which are being imported into the United States or offered for import, giving notice therefor to the owner or consignee, who may appear before the Secretary of Agriculture and have the right to introduce testimony, and if it appears from the examination of such samples that such containers, or commodities in containers are not of the capacities and/or dimensions as described in this Act, the said containers or commodities in containers shall be refused admission and the Secretary of the Treasury shall refuse delivery to the consignee and shall cause the destruction of any containers or commodities in containers refused delivery which shall not be exported by the consignee within three months from the date of notice of such refusal under such regulations as the Secretary of the Treasury may prescribe: Provided, That all charges for storage, cartage, and labor on containers which are refused admission or delivery shall be paid by the owner or consignee and any default of such payment shall constitute a lien against any future importation made by such owner or consignee.

SEC. 10. It shall be the duty of each United States district attorney to whom satisfactory evidence of any violation of this Act is presented to cause appropriate proceedings to be commenced and prosecuted in the proper courts of the United States in his district for the enforcement of the provisions of this Act.

SEC. 11. The Secretary of Agriculture shall enforce the provisions of this Act and shall prescribe such regulations as he may deem necessary for carrying into effect the provisions of this Act, and shall cause such examinations and tests to be made as may be necessary in order to determine whether commodities in containers subject to this Act meet the requirements, and may take samples of such containers.

SEC. 12. For carrying out the purposes of this Act the Secretary of Agriculture is authorized to cooperate with State, county, and municipal authorities, manufacturers, dealers, and shippers; to employ such persons and means; and to pay such expenses including rent, printing publications, and the purchase of supplies and equipment in the District of Columbia and elsewhere, as he shall find to be necessary, and there are hereby authorized to be appropriated, out of any moneys in the Treasury not otherwise appropriated, such sums as may be necessary for such purposes.

SEC. 13. Any duties devolving upon the Secretary of Agriculture by virtue of the provisions of this Act may with like force and effect be executed by such officer or officers, agent or agents, of the Department of Agriculture as the Secretary may designate for the purpose.

SEC. 14. Funds appropriated for carrying into effect the purposes of this Act shall be available for allotment by the Secretary of Agriculture to the bureaus and officers of the Department of Agriculture and for transfer to other departments and agencies of the Government which the Secretary may call upon to assist or cooperate in carrying out such purposes or for services rendered or to be rendered in connection therewith.

SEC. 15. For the purposes of this Act, the provisions herein are applicable only to edible oils, sirups, molasses, and honey in containers sold, offered for sale, shipped, or offered for shipment or distributed in interstate commerce.

SEC. 16. If any provision of this Act is declared unconstitutional, or the applicability thereof to any person or circumstances is held invalid, the constitutionality of the remainder of the Act and the applicability thereof to other persons and circumstances shall not be affected thereby.

SEC. 17. This Act may be cited as the Standard Container Act, 1940.

SEC. 18. That this Act shall become effective at, but not before, the expiration of one year following the 1st day of January next succeeding the enactment of this Act.

The foregoing bill provides for the packing of edible oils, sirups, honey, and molasses in containers of standard weight or measure. For edible oils and sirups, this must be on the basis of liquid measure, except when the quantity exceeds 5 gallons, when these products may be sold by net weight.

The first provision of this bill applies to containers of any description. Edible oils, sirups, honey, and molasses, when sold by liquid measure, must be sold in quantities of 2 ounces, 4 ounces, $\frac{1}{2}$ pint, 1 pint, 1 quart, $\frac{1}{2}$ gallon, 1 gallon, and multiples of a gallon. We provide that honey and molasses may also be sold by net weight.

The standard capacity weights for these two commodities, however, must be $\frac{1}{8}$ pound, $\frac{1}{4}$ pound, $\frac{1}{2}$ pound, $\frac{3}{4}$ pound, 1 pound, and multiples of the pound. It is interesting to note that in a survey made of the manner of sale of these products it was found that they were packed for the most part in the capacities prescribed under this bill. However, it was also found that these products when packed in metal containers were often deceptive in that the dimensions for each capacity varied greatly. Thus one canning company alone manufactures for the trade eight rectilinear half-gallon measures of different dimensions. It was deemed advisable, therefore, by your Committee to select and fix the dimensions of cylindrical and rectilinear metal containers for each standard capacity size. Where cylindrical metal containers for certain required capacities are not being used in the trade, no dimensions are given. In the sale of these products only three cylindrical capacity containers are being used in the trade today, namely, $\frac{1}{2}$ pint, 1 pint, and 1 quart.

A board of standardization is created under this bill with the power to approve such other containers as the industry may require in the future because of the introduction of new processes or other methods of packing. However, the capacities must be binary submultiples or multiples of the gallon or pound. The metal rectilinear containers with the dimensions prescribed under this bill are those most commonly used in the packing of these products. They are the $\frac{1}{2}$ pint, 1 pint, 1 quart, $\frac{1}{2}$ gallon, and 1 gallon.

This standardization board is to be composed of the Secretary of the Department of Agriculture, or his representative, the Director of the National Bureau of Standards of the Department of Commerce, a representative of the National Conference on Weights and Measures, a representative of the consumers, and a representative of the industry. This board may approve of new capacity sizes for these commodities, provided they conform to the standard principles of weight or measure embodied in the bill. It may also prescribe the necessary tolerances in dimensions or capacities for the commodity or container involved.

PROPOSED STANDARD CONTAINER ACT FOR FRUITS, VEGETABLES, AND THEIR JUICES

A BILL

To fix standards of capacities and/or dimensions for metal and other containers for fruits and vegetables and their juices in order to prevent fraud and deception in such containers when used in the sale and distribution of these products in interstate commerce; to establish a board of standardization for the purpose of prescribing tolerances and approve additional containers for these products when necessary, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

That in order to prevent fraud and deception in metal or other containers used in the sale and distribution in interstate commerce of fruits and vegetables and their juices, it is the purpose of this Act to establish and fix definite capacities and/or dimensions for containers of these commodities as standard units of measure and to prohibit the use, manufacture, sale, or shipment in interstate commerce of containers that are not of the capacities and/or dimensions prescribed herein.

SEC. 1. All fruit and vegetable juices in containers of any description, except as hereinafter provided, shall be manufactured, packed, sold, or distributed in any one or more of the following standard fluid capacities and none other:

Eight ounces, twelve ounces, one pint, one and one-half pints, one quart, one-half gallon, three quarts, one gallon and multiples of the gallon, Provided, That such

juices may be sold in containers of a capacity of six fluid ounces when intended exclusively for consumption on the premises where sold or distributed.

Sec. 2a. When fruit and vegetable juices are manufactured, packed, sold or distributed in sanitary metal-type containers, such containers shall be of the following dimensions and capacities and none other: Provided, That reasonable tolerances shall be allowed in the height sufficient to permit the attainment of the prescribed volume fill and Provided, further, That the six fluid ounce container herein described shall be used in the sale or distribution of these juices when intended exclusively for consumption on the premises where sold or distributed:

Two and two-sixteenths inches in diameter by three and fifteen-sixteenths inches in height with capacity of six fluid ounces (202x315).

Two and eleven-sixteenths inches in diameter by three and four-sixteenths inches in height with capacity of eight fluid ounces (211x304).

Two and eleven-sixteenths inches in diameter by four and fourteen-sixteenths inches in height with capacity of twelve fluid ounces (211x414).

Three and three-sixteenths inches in diameter by four and twelve-sixteenths inches in height with capacity of one pint (303x412).

Three and seven-sixteenths inches in diameter by six and one-sixteenth inches in height with capacity of one and one-half pints (307x601).

Four and one-sixteenth inches in diameter by five and twelve-sixteenths inches in height with capacity of one quart (401x512).

Four and four-sixteenths inches in diameter by seven and eight-sixteenths inches in height with capacity of one quart and one pint (404x708).

Six and three-sixteenths inches in diameter by seven inches in height with capacity of three quarts (603x700).

Sec. 2b. Sanitary metal-type containers for fruit and vegetable juices of capacities greater than three quarts may be used, Provided, That such capacities shall be one gallon or multiples of a gallon.

Sec. 2c. The sanitary metal-type containers for fruit and vegetable juices with the dimensions herein described may not be used as containers for fruits and vegetables except where specifically allowed under the provisions of this Act.

Sec. 3a. When fruits and vegetables are manufactured, packed, sold, distributed or shipped in sanitary-type metal containers, such containers shall be of the following general dimensions and none other, Provided, That reasonable tolerances shall be allowed in the height sufficient to permit the attainment of the prescribed volume fill, and provided further that corn on cob may be sold in containers whose dimensions are different from those herein provided:

CYLINDRICAL CONTAINERS

Two and eleven-sixteenths inches in diameter by three and four-sixteenths inches in height (211x304).

Two and eleven-sixteenths inches in diameter by four inches in height (211x400).

Three and one-sixteenth inches in diameter by four and eleven-sixteenths inches in height (301x411). This container shall be used exclusively in the manufacture, sale, distribution or shipment of fruits and not vegetables.

Three and three-sixteenths inches in diameter by four and six-sixteenths inches in height (303x406). This container shall be used exclusively in the manufacture, sale, distribution, or shipment of vegetables and not fruits.

Three and seven-sixteenths inches in diameter by four and nine-sixteenths inches in height (307x409).

Four and one-sixteenth inches in diameter by four and eleven-sixteenths inches in height (401x411).

Six and three-sixteenths inches in diameter by seven inches in height (603x700).

Sec. 3b. The following sanitary-type metal containers shall be used exclusively for the fruits and/or vegetables indicated for each such container, Provided, That reasonable tolerances shall be allowed in the height sufficient to permit the attainment of the prescribed volume fill:

CYLINDRICAL CONTAINERS

Peas, tomato sauce, tomato paste, and cranberries may be packed in a container of the following dimensions: Two and two-sixteenths inches in diameter by three and eight-sixteenths inches in height (202x308).

Baby food, baked beans, pimentos, vegetable soup, and olives may be packed in a container of the following dimensions: Two and two-sixteenths inches in diameter by two and fourteen-sixteenths inches in height (202x214).

Baby food and mushrooms may be packed in a container of the following di-

mensions: Two and eleven-sixteenths inches in diameter by two and fourteen-sixteenths inches in height (211x214).

Fruit salad and cocktail, pineapple, and mushrooms may be packed in a container of the following dimensions: Two and eleven-sixteenths inches in diameter by four and fourteen-sixteenths inches in height (211x414).

Pimentos may be packed in containers of the following dimensions: Three inches in diameter by one and eight-sixteenths inches in height (300x108) and three inches in diameter by two and six-sixteenths inches in height (300x206).

Pineapple may be packed in a container of the following dimensions: Three and seven-sixteenths inches in diameter by two and three-sixteenths inches in height (307x203).

Beets, corn, carrots, peas, and peas and carrots may be packed in a container of the following dimensions: Three and seven-sixteenths inches in diameter by three and six-sixteenths inches in height (307x306).

Oven-baked beans, kidney beans, baked beans, vegetable soup, mushrooms and pineapple may be packed in a container of the following dimensions: Three and seven-sixteenths inches in diameter by five and twelve-sixteenths inches in height (307x512).

Asparagus tips and soup cuts may be packed in a container of the following dimensions: Three and seven-sixteenths inches in diameter by six and four-sixteenths inches in height (307x604).

Pineapple may be packed in a container of the following dimensions: Four and one-sixteenth inches in diameter by two and seven and one-half sixteenths inches in height (401x207.5).

Beets and sweet potatoes may be packed in a container of the following dimensions: Four and four-sixteenths inches in diameter by three and seven-sixteenths inches in height (404x307).

Kidney beans, baked beans, vegetable soup, and grapefruit may be packed in a container of the following dimensions: Four and four-sixteenths inches in diameter by seven inches in height (404x700).

Vegetable soup and grapefruit may be packed in a container of the following dimensions: Five and two-sixteenths inches in diameter by five and ten-sixteenths inches in height (502x510).

RECTILINEAR CONTAINERS

Asparagus may be packed in containers of the following dimensions: Three inches by three and eight-sixteenths inches by three and eight-sixteenths inches in height (300x308x308) and three inches by three and eight-sixteenths inches by six and four-sixteenths inches in height (300x308x604).

Sec. 4a. There shall be established a board of standardization consisting of the Secretary of Agriculture or his representative, the Director of the Bureau of Standards of the Department of Commerce, a representative of the National Conference of Weights and Measures selected by such body for that purpose, a representative of consumers and of the canning industry both to be selected by the Secretary of Agriculture.

Sec. 4b. The Board of Standardization may approve, from time to time, containers of sizes and capacities other than those mentioned in this Act for commodities which by reason of inherent characteristics or by reason of new methods of processing, packing, or canning cannot be properly packed in containers of the sizes prescribed herein; Provided, That the Board must first determine whether such additional sizes are necessary to facilitate the marketing of fruits and vegetables and their juices, and Provided further, That such additional sizes shall not be deceptive in appearance to the consumer. No container shall be approved by the Board that is so constructed that the bottoms or tops are raised or lowered more than is necessary to effect proper closure.

Sec. 4c. The Board shall have the authority to prescribe the tolerances which it may find necessary in order to allow for reasonable variations in dimensions and/or capacities incident to the commercial manufacture of the containers and products mentioned in this Act.

Sec. 5. It shall be unlawful to manufacture, to offer for sale, to sell, to offer for shipment or to ship in interstate commerce filled or unfilled metal or other containers for fruits and vegetables or their juices, that are not of the capacities and/or dimensions prescribed in this Act. Any individual, partnership, association, or corporation that violates this Act shall be deemed guilty of a misdemeanor and upon conviction thereof shall be punished by a fine not exceeding \$500: Provided, That no person shall be prosecuted under the provisions of this Act when he can establish a guaranty signed by the manufacturer, wholesaler, shipper,

or other party residing within the United States from whom the containers covered by this Act, filled or unfilled, were purchased, to the effect that the containers comply with the provisions of this Act and the regulations thereunder. Such guaranty, to afford protection, must contain the correct name and address of the party or parties making the sale of the containers to such person, and in such case such party or parties making such sale or shipment shall be amenable to the prosecution and subject to fines and other penalties which would attach in due course under the provisions of this Act to the person who made the purchase.

Sec. 6. Any filled or unfilled container for fruits and vegetables or their juices, which is not of the standard capacities and/or dimensions prescribed in this Act, which shall be manufactured, offered for sale, sold, offered for shipment, or shipped in interstate commerce may be proceeded against in any district court of the United States within the district where same shall be found and may be seized for confiscation by a process of libel for condemnation. Upon condemnation, such containers and their contents may be disposed of by destruction, or may be given to charitable institutions for consumption but not for resale, as the court or a judge thereof may direct. The proceedings in such seizure cases shall conform as nearly as may be to the proceedings in admiralty, except that either party may demand trial by jury of any issue of fact joined in such case, and all such proceedings shall be at the suit and in the name of the United States of America.

Sec. 7. This Act shall not prohibit the manufacture, offer for sale, the sale, offer for shipment, or the shipment of containers or commodities in containers covered by this Act, to any foreign country in accordance with the specifications of a foreign consignee or customer not contrary to the law of such foreign country.

Sec. 8. The Secretary of the Treasury shall deliver to the Secretary of Agriculture upon his request from time to time samples of containers covered by this Act, whether filled or unfilled, which are not of the prescribed standard capacities and/or dimensions and which are being imported into the United States or offered for import, giving notice therefor to the owner or consignee, who may appear before the Secretary of Agriculture and have the right to introduce testimony, and if it appears from the examination of such samples that any such containers whether filled or unfilled, are not of the capacities and/or dimensions as described in this Act, the said containers shall be refused admission and the Secretary of the Treasury shall refuse delivery to the consignee or owner and shall cause the destruction of any containers refused delivery which shall not be exported by the consignee or owner within three months from the date of notice of such refusal under such regulations as the Secretary of the Treasury may prescribe: Provided, That all charges for storage, cartage, and labor on containers which are refused admission or delivery shall be paid by the owner or consignee and any default of such payment shall constitute a lien against any future importation made by such owner or consignee.

Sec. 9. It shall be the duty of each United States district attorney to whom satisfactory evidence of any violation of this Act is presented to cause appropriate proceedings to be commenced and prosecuted in the proper courts of the United States in his district for the enforcement of the provisions of this Act.

Sec. 10. The Secretary of Agriculture shall enforce the provisions of this Act and shall prescribe such regulations as he may deem necessary for carrying into effect the provisions of this Act, and shall cause such examinations and tests to be made as may be necessary in order to determine whether containers or commodities in containers subject to this Act meet the requirements, and may take samples of such containers.

Sec. 11. For carrying out the purposes of this Act the Secretary of Agriculture is authorized to cooperate with State, county and municipal authorities, manufacturers, dealers and shippers; to employ such persons and means, and to pay such expenses including rent, printing publications, and the purchase of supplies and equipment in the District of Columbia and elsewhere, as he shall find to be necessary, and there are hereby authorized to be appropriated, out of any moneys in the Treasury not otherwise appropriated, such sums as may be necessary for such purposes.

Sec. 12. Any duties devolving upon the Secretary of Agriculture by virtue of the provisions of this Act may with like force and effect be executed by such officer or officers, agent or agents, of the Department of Agriculture as the Secretary may designate for the purpose.

Sec. 13. Funds appropriated for carrying into effect the purposes of this Act shall be available for allotment by the Secretary of Agriculture to the bureaus and officers of the Department of Agriculture and for transfer to other departments and agencies of the Government which the Secretary may call upon to assist or

cooperate in carrying out such purposes or for services rendered or to be rendered in connection therewith.

SEC. 14. For the purposes of this Act, the provisions herein are applicable only to fruits, vegetables and their juices in containers sold, offered for sale, shipped or offered for shipment or distributed in interstate commerce.

SEC. 15. If any provision of this Act is declared unconstitutional, or the applicability thereof to any person or circumstances is held invalid, the constitutionality of the remainder of the Act and the applicability thereof to other persons and circumstances shall not be affected thereby.

SEC. 16. This Act may be cited as the "Standard Container Act for Fruits, Vegetables and Their Juices, 1940."

SEC. 17. That this Act shall become effective at, but not before, the expiration of one year following the 1st day of January next succeeding the enactment of this Act.

The foregoing bill concerns itself with the packing of fruit and vegetable juices and fruits and vegetables in containers. This presented problems and obstacles not present in the commodities heretofore considered. We found after studying manufacturing processes in the canning industry, that our original views on the subject must of necessity be modified. In the case of fruit and vegetable juices we were basically right. A liquid quart of tomato juice will have the same cubic capacity or volume as a quart of pineapple juice. Hence standardization of fruit and vegetable juices by standard capacities is provided. The first provision in this bill includes the packing of these juices in containers of any description. The sole exception is made in the case of the 6-ounce container, but this size is limited to the sale of these products for consumption on the premises only.

A study of the metal containers for fruit and vegetable juices now in use disclosed the interesting fact that odd sizes or capacities for these products were in general use. For example, we found containers of 12½ ounces, 14 ounces, 18 ounces, 20 ounces, 46 ounces, 50 ounces, 94 ounces, and many more. The existence of some of these is almost archaic, and the reason given for their use is that the industry is in the process of experimentation with the consumer to determine which sizes are in greatest demand. There is no question but that in this case the experiment has been unduly prolonged, so that almost 30 years have gone by. The packing of these products in standard fluid capacities would ultimately render a great saving to the manufacturer and the consumer.

Under the first provision of our proposed bill, fruit and vegetable juices in containers of any description must be packed only in the following standard fluid capacities: 8 ounces, 12 ounces, 1 pint, 1½ pint, 1 quart, ½ gallon, 3 quarts, 1 gallon, and multiples of the gallon. We make an exception of the 6-fluid-ounce container, with the restriction that it be used exclusively for consumption on the premises. We eliminated from those capacities now in use the 12½ ounce, 14-ounce, 18-ounce, 20-ounce, 28-ounce, 46-ounce, 50-ounce, 94-ounce, and others; this was done because we are convinced that these sizes are very deceptive. No reasonable argument can be given for the existence of a 14-ounce and an 18-ounce container, or an 18-ounce and a 20-ounce container as against a 16-ounce standard container.

When we considered the packing of fruit and vegetable juices in metal containers we decided to adopt, as far as possible, the containers now in use which could also be used to conform with our standardization requirements. Thus, with the exception of three sizes, the eight dimensions given conform to the containers now in use for fruits and vegetables or fruit and vegetable juices.

It must be clearly understood that the dimensions of the diameters of the metal container are prescribed, and that the Board of Standardization established by this bill has no authority to change these diameters. It does have the power to establish tolerances in the height of the given containers whenever the necessity arises. The Committee is fully aware of the fact that new or different methods of processing may demand a slight change in the height of a container. When these occasions arise the board will act to meet the situation.

Inasmuch as no cylindrical metal containers for fruit and vegetable juices are being used in capacities greater than 3 quarts, it is provided that larger quantities of these juices, when packed at some future time, must be in quantities of 1 gallon or multiples of the gallon. Another important provision prohibits containers prescribed for fruit and vegetable juices being used for fruits and vegetables, except where specifically allowed under other provisions of the bill; this, in effect, prevents the three new containers described above being used for the packing of fruits and vegetables.

At the conclusion of the last National Conference your Committee firmly intended to insist upon standardization of fruits and vegetables in metal containers, by specifying the standard capacity weights in which these products could be packed. An intensive study was made to determine the reasons for the great number of sizes now in use and the methods of processing, manufacture, and packing used for the products in the industry. As a result of this study, we found it necessary to modify our original intentions. Standardization in the manner which we desired would be impracticable and would defeat our own purposes. The metal containers used for these products are in reality small boilers in which the product is cooked at extremely high temperatures and pressures. Each fruit and vegetable has its own specific gravity and when prepared with various seasonings or sirups will have still other specific gravities. As the specific gravity changes or varies, so will the dimensions of the can. Hence any attempt to standardize by weight would result in the use of several hundred containers varying by as little as $\frac{1}{16}$ inch in height. This would be true even if the diameters of the cans were fixed. However, there was no question in our minds at any time that the number of cans being used was excessive. The list of recommended sizes submitted by the canners to the industry for their approval, although a step in the right direction, was still too many. Finally, we were able to come to several definite findings and conclusions:

1. More than 80 percent of all fruits and vegetables are packed today in eight general sizes. These are 211x304, 211x400, 300x407, 301x411, 303x406, 307x409, 401x411, and 603x700. (In the industry 211x303 means $2\frac{1}{16}$ inches in diameter by $3\frac{3}{16}$ inches in height.)

2. Thirty-two other sizes are in use for the packing of so-called "special packs." Certain commodities, because of their inherent physical characteristics, are being packed in these special sizes. Examples of these are pimentos, asparagus, pineapple, and baby foods. Some of these special commodities are also packed in one or more of the general sizes described above.

3. The cubic capacities of some of the general and special sizes vary as little as $\frac{3}{16}$ cubic inch and the diameter or height as little as $\frac{1}{16}$ inch.

4. A comparative study of the general and special sizes disclosed that many of the special packs could be readily packed in one of the general sizes. Also, three of the general sizes (300x407, 301x411, and 303x406) vary so little in their cubic capacities and in their dimensions as to encourage deception and misrepresentation.

5. Twenty of the thirty-two special sizes are used for a single fruit or vegetable.

As a result of these findings, this Committee decided to confine the general size 301x411 to fruits and 303x406 to vegetables. The cubic capacity of 301x411 is 25.99 cubic inches; the cubic capacity of 303x406 is 26.31 cubic inches. Most of the commodities packed in the former size are fruits (11 out of 15); the others are vegetables. Most of the commodities packed in the latter size are vegetables (13 out of 16), and the others are fruits. To clarify the existing confusion and deception, 301x411 will be permitted as a fruit container and 303x406 as a vegetable container, and the fruits now packed in both will use the 301x411, while the vegetables now packed in both will use the 303x406. It should be borne in mind that the 301 diameter is one in use on the West Coast, and the 303 is used in the East. Cannerymen have informed us that the elimination of either would cause a complete dislocation of the industry and a tremendous expenditure. Although willing to go along with us in some of the proposed changes, they are adamant in their position of opposing the elimination of eight of these sizes. Various consumer groups suggested this compromise, and we believe that it will serve to eliminate deception.

Another change in the list of general sizes is suggested. The general size 300x407 now in use will be eliminated. Its usefulness is questionable. The cubic capacity is 23.71 cubic inches, and eight vegetables and four fruits are packed in this size. With little change, these vegetables can be packed in the 303x406 size, and the fruits in the 301x411 size.

Guided by our findings, we set to work eliminating some of the special sizes now in use. Our fundamental rule was to place as many of the special sizes as possible into the general size classification since most fruits and vegetables are now packed in these general sizes. We also had in mind the important practical consideration of making the changes without creating a hardship on the packers of these foods. Cubic capacities, dimensions, and physical characteristics of each food were considered. Nine special sizes were eliminated by substituting the general size. Seven more special sizes were eliminated by suggesting their being packed in one of the special sizes that remained. Table 12 will explain these changes more plainly.

TABLE 12.—*Substitution of sizes*

[An asterisk indicates a size eliminated; GS indicates a general size.]

Size number	Cubic capacity	Number of products	Product
SUBSTITUTION OF GENERAL SIZES FOR SOME SPECIAL SIZES			
211x304 (GS).....	<i>Cubic inches</i> 13.48	28	13 vegetables, 15 fruits.
*211x300.....	12.34	1	Tomato sauce.
301x411 (GS).....	25.99	15	4 vegetables, 11 fruits.
*211x600.....	26.47	1	Olives.
*301x400.....	21.93	1	Pineapple.
211x400 (GS).....	17.05	25	22 vegetables, 3 fruits.
*307x214.....	19.17	1	Baked beans.
303x406 (GS).....	26.31	16	13 vegetables, 3 fruits.
*307x400.....	27.63	2	String beans, baked beans.
*300x411.....	24.99	1	Pimentos.
307x409 (GS).....	32.00	40	22 vegetables, 18 fruits.
*300x509.....	30.17	3	Baked beans, spaghetti.
*303x509.....	34.11	3	Vegetable soup.
401x411 (GS).....	46.45	32	16 fruits, 16 vegetables.
*307x704.....	52.62	1	Olives.

TABLE 12.—*Substitution of sizes*—Continued

Size number	Cubic capacity	Number of products	Product
SUBSTITUTION OF SOME SPECIAL SIZES FOR OTHER SPECIAL SIZES			
	<i>Cubic inches</i>		
202x308.....	9.42	3	Peas, tomato sauce, tomato paste.
*211x206.....	9.15	1	Cranberries.
202x214.....	7.63	1	Baby food.
*211x200.....	7.18	4	Baked beans, pimentos, vegetable soup, olives.
202x204.....	5.45	1	Mushrooms.
211x214.....	11.59	1	Baby food.
*211x212.....	11.12	1	Mushrooms.
211x414.....	21.28	2	Fruit salad and cocktail, pineapple.
*300x400.....	21.11	1	Mushrooms.
307x512.....	40.95	3	Oven-baked beans, kidney beans, vegetable soup.
*307x506.....	38.30	1	Pineapple.
*307x510.....	40.28	2	Baked beans, mushrooms.
301x411 (GS).....	25.99	15	4 vegetables, 11 fruits.
303x406 (GS).....	26.31	16	13 vegetables, 3 fruits.
*300x407 (GS).....	23.71	12	8 vegetables, 4 fruits.

Fruits now packed in 300x407 will be packed in 301x411, vegetables in 303x406, eliminating general size 300x407.

When we state in this report that a particular size has been substituted or eliminated, we mean that such substitution or elimination has been made from a list of recommended sizes which the industry submitted to its members for voluntary approval in March 1940. This list does not include all the sizes now in use. Therefore, when eliminations are made from this list, we are in fact also eliminating an unknown number of sizes now in use. The proposed list of sizes for the industry included 32 special sizes and 8 general sizes. We now suggest 16 special sizes and 7 general sizes, or an elimination of 16 special and 1 general size from the list submitted by the industry. More than 90 percent of all fruits and vegetables would then be packed in the 7 general sizes, and of the 16 special sizes, 5 will be used exclusively for 1 product. It should be further noted that corn on cob was excluded from our consideration, because the can sizes for this product are constantly changing. This is due to natural causes, the size of corn varying constantly with geographical and seasonal changes.

It should be especially noted that only the fruits and vegetables indicated for each special size can be packed therein. We are guided by the idea that eventually the industry will eliminate all special sizes and confine the packing of fruits and vegetables to the 7 basic general sizes.

Table 13 is a list indicating the sizes of cans for the packing of fruits and vegetables, recommended to the industry by its Committee for Simplified Practice, March 1940. (Fruit and vegetable juices excluded.)

The creation of a board of standardization under the bill "Proposed Standard Container Act for Fruits, Vegetables, and Their Juices", as in the bill pertaining to edible oils, sirups, molasses, and honey, was suggested by representatives of the industry. They felt that the dimensions of metal containers should not be so rigidly fixed as to prevent necessary changes due, for example, to new methods of manufacture, processing, or packing. This Committee feels that a member of this Conference should be on this board. Consumers and the industry felt that they should each be given representation.

TABLE 13.—*Recommended sizes*

(Asterisks indicate a size eliminated by the Committee's recommendations.)

Size	Cubic capacity	Total number of commodities packed	Commodity
GENERAL SIZES			
	<i>Cubic inches</i>		
211x304.....	13.48	28	
211x400.....	17.05	25	
*300x407.....	23.71	12	
301x411 ^a	25.99	15	
303x406 ^a	26.31	16	
307x409.....	32.00	40	
401x411.....	46.45	32	
603x700.....	170.71	49	
SPECIAL SIZES			
*202x204.....	5.45	1	Mushrooms.
202x308.....	9.42	3	Peas, tomato sauce, tomato paste.
202x214.....	7.63	1	Baby food.
*211x200.....	7.18	4	Baked beans, pimentos, vegetable soup, olives.
*211x206.....	9.15	1	Cranberries.
*211x212.....	11.12	1	Mushrooms.
211x214.....	11.59	1	Baby food.
*211x300.....	12.34	1	Tomato sauce.
211x414.....	21.28	2	Fruit salad and cocktail, pineapple.
*211x600.....	26.47	1	Olives.
300x108.....	5.59	1	Pimentos.
300x206.....	11.37	1	Do.
*300x400.....	21.11	1	Mushrooms.
*300x411.....	24.99	1	Pimentos.
*300x509.....	30.17	3	Baked beans, spaghetti, vegetable soup.
*301x400.....	21.93	1	Pineapple.
*303x509.....	34.11	3	Baked beans, spaghetti, vegetable soup.
307x203.....	13.21	1	Pineapple.
*307x214.....	19.17	1	Baked beans.
307x306.....	22.90	5	Beets, carrots, corn, peas, peas and carrots.
*307x400.....	27.63	2	String beans, baked beans.
*307x506.....	38.30	1	Pineapple.
*307x510.....	40.28	2	Baked beans, mushrooms.
307x512.....	40.95	3	Oven-baked beans, kidney beans, vegetable soup.
307x604.....	44.99	1	Asparagus.
*307x704.....	52.62	1	Olives.
401x207.5.....	22.07	1	Pineapple.
404x307.....	37.19	2	Beets, sweet potatoes.
404x700.....	80.54	4	Kidney beans, baked beans, vegetable soup, grapefruit.
502x510.....	92.09	2	Vegetable soup, grapefruit.
300x308x308.....	26.96	1	Asparagus.
300x308x604.....	50.68	1	Do.

^a 301x411 is the size recommended by the Committee for fruits only, and 303x406 for vegetables.

Other provisions of the bill provide for its enforcement by the Department of Agriculture Commodities in interstate commerce alone are affected. With the passage of this legislation by the Congress, the States could pass enabling acts similar to this in content and provide for their enforcement by the State or local weights and measures officials.

The Committee, after considering the wishes of this Conference as expressed last year, has worked diligently. With the splendid cooperation of representatives of the industry, consumer groups, and other members of this Conference, and after a year's effort, it presents these three proposed bills for approval and recommends that the necessary

steps be taken by the Committee on Legislation of this Conference to have them properly presented to Congress for enactment into law

(Signed) ALEX PISCIOTTA, *Chairman.*

C. D. BAUCOM,
CARLTON L. KLOCKER,
C. E. TUCKER,
R. L. FULLEN,
JAMES O'KEEFE,

Committee on Standardization of Packaged Goods.

Mr. PISCIOTTA. Appropriate changes should be made in the three proposed bills as a result of the transfer of the Food and Drug Administration from the Department of Agriculture to another Federal agency; it is the desire and intention of the Committee that, if and when these bills become law, they be enforced by the Food and Drug Administration.

I understand that with this report the work of our Committee is completed.

Mr. KANZER. I feel that the Chairman and the members of the Committee should be congratulated upon their splendid report. The work was tremendous, I know, and there were so many angles to be covered and so many details to be looked after that there can be nothing but praise for the results. I move that the Conference extend a vote of thanks to the Committee for their work.

(The motion was seconded, the question was taken, and the motion was adopted.)

Mr. HARRINGTON. I move the adoption of the report.

(The motion was seconded, the question was taken, and the motion was adopted.)

REPORT OF COMMITTEE ON LEGISLATION, PRESENTED BY ROLLIN E. MEEK, CHAIRMAN, AND DISCUSSION THEREON

Those of you who attended the closing session of the Twenty-ninth National Conference or who have read the report of that Conference will recall that a resolution offered by Alex Pisciotta, of New York City, and adopted by a unanimous vote of the Conference provided for the appointment of a committee on legislation. The resolution is as follows:

Resolved, That a legislative committee of this Conference be appointed by the President of the Conference, for the purpose of keeping in close touch with all pending legislation as it is introduced in the Congress, which would affect in any manner the work and duties of the weights and measures officials throughout the country, and that this committee procure copies of such bills to make a study of same, and to forward sufficient copies to members of this Conference with comments and recommendations, and to appear on behalf of this Conference at any hearings of the Committee on Coinage, Weights, and Measures of the Congress, and of other boards, departments, or bureaus affecting the work of weights and measures.

The Committee appointed under authority of this Resolution by Lyman J. Briggs, President of the Conference, early in the present calendar year, is composed of the following members of the Conference: Rollin E. Meek, Chief, State Bureau of Weights and Measures, Indianapolis, Ind., Chairman; C. L. Klocker, State Inspector of Weights and Measures, Hartford, Conn.; R. M. Johnson, Chief Inspector of Weights and Measures, Room 401, City Hall, Birmingham,

Ala.; George M. Roberts, Superintendent of Weights, Measures, and Markets, Washington, D. C.; Alex Pisciotta, Director, Bureau of Weights and Measures, New York, N. Y.; L. G. Waldman, Commissioner, Division of Weights and Measures, St. Louis, Mo.; and John J. Levitt, Superintendent, State Division of Standards, Department of Agriculture, Springfield, Ill.

A study of the resolution discloses that the work of your Committee on Legislation is somewhat limited in scope—in fact, limited to the consideration of bills actually introduced to the Congress, the offering of comments and recommendations to the members of the Conference in connection with such bills, and the appearance at any hearings of the Committee on Coinage, Weights, and Measures of the Congress, and of other boards, departments, or bureaus affecting weights and measures.

Since the Committee has received no invitations to appear before the Committee on Coinage, Weights, and Measures or any department, bureau, or commission in the interests of weights and measures, consideration will first be given to H. R. 4402 and H. R. 5530, which are the only two bills affecting weights and measures understood to have been introduced to the Congress. The Committee's recommendations and comments relative to these bills were delayed due to its failure to receive reports of any hearings held in respect to these bills. While the Committee has been handicapped in preparing recommendations for this Conference on H. R. 4402 and H. R. 5530, I wish to advise that the Committee gave these bills careful study upon receipt of printed copies and again at Committee meetings held during this Conference, and is now prepared to submit its report.

First, I wish to express appreciation to H. A. Spilman and L. C. Carey of the Agricultural Marketing Service of the United States Department of Agriculture, and to members of the Standardization Committee of the Conference for their attendance at the first meeting of the Committee, and for the helpful suggestions advanced by them. These men are well informed on the bills considered and attended the meeting on invitation of the Committee.

Recommendations on H. R. 4402.—The Committee favors legislation to standardize and reduce the number of containers for canned fruits, vegetables, and canned milk, but does not recommend the approval of H. R. 4402, which is a bill to fix standards of dimension and capacity for metal containers for canned fruits, vegetables, and canned milk in order to prevent fraud and deception in containers used in the sale and distribution of these products, and for other purposes, as it will not accomplish the purpose for which it was intended.

Recommendations on H. R. 5530.—The Committee approves the purpose and intent of H. R. 5530, which is a bill to fix standards for till baskets and boxes, climax baskets, hampers, round stave baskets, drums, market baskets, barrels, cartons, crates, boxes, sacks, and other containers for fruits and vegetables, to consolidate existing laws on this subject, and for other purposes; however, it raises the following objections:

(1) The provision for the 1-pound climax basket for mushrooms is inconsistent and impossible of being carried out with the provisions defining the dimensions of said basket.

(2) The provision permitting the use of irregular containers, when the intention of the bill is to standardize and diminish the number of containers used, is objected to because it is inconsistent to the general purpose of the bill.

The Committee recommends that this Conference go on record as favoring the reenactment by the States of the essential features of this bill in order that State officials may proceed in State courts, thus obviating the necessity of referring violations to Federal authorities.

It is the conclusion of the Committee that the enactment of H. R. 5530 in substantially the form prepared will materially reduce the number of sizes of containers, fix standards for cartons, crates, boxes, sacks, and other containers for fruits and vegetables, and consolidate existing laws on this subject, all of which are objectives worthy of our support. Therefore, the Committee respectfully recommends the approval of H. R. 5530, after amendments have been made removing the objections herein raised.

Your Committee, taking cognizance of the limited scope of its activities as provided in the resolution calling for the creation of the Committee, has given careful consideration to the suggestion advanced by Ralph W. Smith, Acting Secretary of the Conference, that its activities be enlarged to include proposed legislation as well as legislation actually introduced to the Congress. Such action would concentrate in the hands of one committee closely associated matters related to legislation, with the probability that more constructive results would be realized than were the work to be divided among several committees.

If the Conference is of the opinion that it would be advisable for the Committee on Legislation to give attention to proposed legislation as well as to legislation actually introduced to the Congress, the Committee suggests that it be so instructed by action of this Conference. In the event the Committee's scope is enlarged by such authorization, an additional recommendation will be made at this time. Otherwise this completes the report of the Committee on Legislation.

(At this point the Conference, by formal vote, enlarged the scope of the Committee on Legislation to include proposed legislation. The Committee Chairman then proceeded with his report.)

In view of the fact that the subject of standardization of packaged commodities has been given considerable discussion during former Conferences on Weights and Measures, the Committee, in a joint session Monday night with the Standardization Committee, considered the three proposed bills prepared by the Standardization Committee. Since copies of these proposed bills have been in the hands of the Committee on Legislation for some time, and careful study given to their provisions both before and during the joint session Monday night, your Committee now desires to make the following recommendation regarding these proposed bills:

Recommendation on Proposed Bills.—The Committee approves the purpose and intent of the proposed legislation prepared by the Standardization Committee of this Conference and recommends the introduction to the Congress and ultimate enactment of legislation standardizing the capacities of containers for food products based upon the principles contained in such proposed legislation.

(Signed) ROLLIN E. MEEK, *Chairman*,
CARLTON L. KLOCKER,
JOHN J. LEVITT,
GEORGE M. ROBERTS,
R. M. JOHNSON,
ALEX PISCIOTTA,
L. G. WALDMAN.

Committee on Legislation.

Mr. R. E. MEEK. Mr. Chairman, I move the adoption of the report.

Mr. FULLEN. I second the motion.

Mr. R. W. DAVIS. The American Veneer Package Association is one whose products will be regulated by H. R. 5530, and I am very pleased with the report of the Committee. We have worked on these matters, especially standardization, since 1928; there have been complications, but we feel that the producer, manufacturer, and consumer have benefited. We think that the present bill will eliminate odd sizes which have crept into use, and we feel that the report of your Committee is sound.

Mr. KANZER. I am not clear exactly where we stand. We have just approved the report of the Standardization Committee, which embodies the principle that the bill shall be interstate in character, and that intrastate violations would be prosecuted in the State courts. Is that correct?

Mr. PISCIOTTA. You are confusing two things. The bills which the Standardization Committee reported have nothing to do with H. R. 5530. The Committee on Legislation objects to two provisions of H. R. 5530, the dimensions for mushroom baskets, and authorization for the use of irregular baskets—one part of the bill requires standardization, and the other permits irregular baskets. If those provisions are corrected, the Committee approves passage of the bill.

Mr. KANZER. I do not see how we can possibly endorse the principle of H. R. 5530, in view of the endorsement by this Conference just a short time ago of the principle of confining Federal acts to interstate transactions and leaving the way open for the States to enact legislation to handle intrastate transactions. H. R. 5530 says that the Federal Government shall prosecute for intrastate violations.

I am here by direction of my commissioner who has opposed H. R. 5530, and I must take that stand. Our opposition followed a series of conferences extending over several months, and we had the benefit of answers prepared by Mr. Kitchen to a series of questions which we had addressed to Congressman Somers. Our legal bureau took the position that under this bill, State and municipal officials had no authority to prosecute except in Federal courts.

New York State has made its position definitely known and will strongly oppose the enactment of this bill. It is an expense to take cases to the Federal courts, and there is no need for it. The only effective way is to permit the weights and measures official to act on a violation in his community when he sees fit. I ask that you consider my proposal for amendment of H. R. 5530 to confine it to interstate trade and leave it to State legislation to handle intrastate trade. It is a waste of time to pass enabling legislation in a State covering matters included in an intrastate Federal law, because that is illegal upon advice given me by our legal bureau.

Mr. R. E. MEEK. The Committee considered objections such as those raised by Mr. Kanzer, and it was our opinion that the enactment of H. R. 5530 would not create such conditions as Mr. Kanzer predicts. We recommend that the Conference favor the enactment of the essential features of this bill into State law. If New York would do that, it is my opinion that their officials could take local cases to their local courts; naturally, they could not do that under a Federal law.

I think this bill would be a benefit to New York State whether or not they pass a State law. It is my understanding that all violations of Federal standard-container acts do not result in prosecutions, but that many situations are corrected without prosecution; this could be done in New York State whether or not the State saw fit to enact similar legislation.

Mr. KANZER. I am not an attorney, and can only give you the benefit of the legal bureau of the State of New York, which is, that after H. R. 5530 is enacted we cannot pass similar State legislation. We are in favor of the principles of this bill. We want standardization as much as anybody wants it, but I do not want it at the price of losing State and municipal rights in the matter.

Mr. FULLEN. I rise to a point of order. This subject has already been discussed, and everybody has had a chance to appear before the Committee on Legislation.

(The question was taken, and the report of the Committee on Legislation was duly adopted.)

DISTRIBUTION OF MIMEOGRAPHED MATERIAL

Mr. SNYDER. I move that the Conference request the Bureau to supply mimeographed copies of Mr. Pisciotta's report on methods of sale of commodities.

(The motion was seconded.)

Mr. R. W. SMITH. I would suggest as an amendment to that motion that the Bureau be requested to send to those in attendance at this Conference, as soon as practicable after the conclusion of the meeting, mimeographed copies of such reports, papers, and similar material as have not been available during the meeting.

(The amendment was accepted, the question was taken, and the motion was agreed to.)

INSIGNIA FOR MEMBERS OF NATIONAL CONFERENCE

Mr. CRAWFORD. Last year I made a suggestion which apparently was accepted but not acted upon. We now have a Committee on Publicity and Education to which this matter can appropriately be referred. My suggestion was for an insignia, a lapel button, indicating membership in this Conference. Personally, I should be proud to have and wear such an insignia, and I move that the Committee on Education and Publicity prepare a suitable design, and make the buttons available to the members of the Conference when we meet in 1941.

(The motion was seconded.)

Mr. ROGERS. Is it the intention to supply the buttons to the members?

Mr. CRAWFORD. We cannot afford to do that; they can be made available at cost.

(The question was taken and the motion was agreed to.)

REQUEST FOR APPOINTMENT OF COMMITTEE

Mr. BAUCOM. This morning the Conference adopted the report of Mr. Pisciotta, which contained the recommendation that a com-

mittee be appointed to study methods of sale of commodities. I move that this committee be appointed before the sessions of this Conference are ended.

(The motion was seconded, the question was taken, and the motion was agreed to.)

MARKING AND LETTERING OF MILK BOTTLES

The ACTING CHAIRMAN. Mr. Victor L. Hall, of the Glass Container Association of America, desires to be heard.

Mr. HALL. I want to speak for just a short time on special marking and lettering of milk bottles. This Conference a number of years ago recognized that milk bottles were in reality legal measures, and went on record recommending:

1. Standards of fill.
2. Capacity designation.
3. Permissible tolerances in capacity.

These recommendations, revised as they have been as the necessity arose, have been extremely helpful in bringing about uniformity throughout the 48 States. I do not mean to infer that all of the States have followed the above Conference recommendations, because this, as you know, is not so. For example, on the question of capacity fill-point designation, the States are about evenly divided in specifying the fill point either to the bottom of the cap seat or $\frac{1}{4}$ inch below the cap seat. Nevertheless, the recommendation has had a great influence toward the adoption of one or the other of these two fill points, rather than some other designation. Our glass-container industry is not experiencing any real difficulty so far as these provisions are concerned, although greater economies could be effected and passed on to the dairymen if all States specified the same fill point.

The thing we are interested in pointing out to the Conference today is the lack of uniformity among the different States in the legislation or regulations requiring that certain markings and lettering, in addition to content lettering, appear on milk bottles.

The purpose of such markings and lettering is twofold:

1. To identify the manufacturer of the bottle.
2. To provide notice to consumers that the weights and measures department has authorized the use of the bottle.

The milk bottle being a legal measure, it is, of course, necessary that the individual States exercise control over the purchase and use within the State. Through legislation, most States provide for periodic tests to determine that the capacity is correct, and in order to proceed against a manufacturer supplying bottles of incorrect capacity, the weights and measures inspectors must know the name and location of the manufacturer. These data have been amply provided for in most States by the following requirements:

1. That the name, initials, or trade-mark of the manufacturer be blown in the side or bottom of the bottle; or
2. That a designating number, a different number being provided for each manufacturer, be blown in the side of the bottle. In most instances this number is registered with the State superintendent of weights and measures, and on all bottles the word "registered" is blown on the side near the bottom; or
3. That both the name, initials, or trade-mark, and the designating number be blown in the bottle.

It is the definite view of our milk bottle industry that the above methods for identifying the manufacturer and for controlling the sale of milk bottles by each manufacturer should be sufficient.

During the past several years there has been a tendency on the part of some States to require additional markings to identify the manufacturer and to provide additional proof that such bottles comply with the individual State requirements. Five States now require that the name or abbreviation for the State, with, in some cases, a designating number, and the word "Seal" be blown on the shoulder or on the body of the bottle. Recently, one other State has indicated its desire or intention to adopt this requirement. In addition to the above, some States have required special markings for store or deposit bottles, including the name of the city in which the bottles are to be used.

While there is no particular fabrication problem in manufacturing bottles with the special markings and lettering, at the same time it is a very costly proposition, particularly from the standpoint of mold costs, inventories, and service. In order to appreciate this, it is necessary to know something of the types of milk bottles furnished the different classes of milk dealers.

Bottles for the large dairies, because of their volume, are manufactured from private molds; that is, an individual design and an individual set of molds are made up for each such customer.

For the smaller dairies, the manufacturer cannot afford to make up private molds. In these cases, stock molds are used, and the name and address of the dairy is blown in by inserting a lettered plate. This makes it possible to use the same stock mold for a great number of dairies, except that it is necessary to have two sets because of the two capacity designations previously referred to.

For the very small dairy requiring only a few gross of bottles, the manufacturer carries stocks of bottles with only the capacity markings shown.

The requirement for a State seal or special lettering adds materially to the cost of manufacture of all three of these types furnished the various classes of buyers. In the case of the large dairy, using private molds, the additional cost is not so burdensome as in the case of the small dairies using stock molds. However, when the large dairy uses colored lettering, a separate production run must be made for the additional stocks of bottles required to show the blown lettered seal or other special markings. Likewise, in the case of smaller dairies, separate stock molds must be carried for each State requiring special markings, individual production runs must be made, and separate stocks must be carried.

The magnitude of these increased costs can only be appreciated by considering the number of sizes and shapes of bottles necessary to supply the dairy industry of any one State. The separate molds, etc., must be multiplied by nine to cover the milk-bottle sizes and shapes. Then to this are added 10 or 12 other bottles for cream and cottage cheese.

This extra cost must be borne by someone, and it is only reasonable to believe that it must eventually be passed on to the dairy and ultimately to the milk consumer.

It is the constant aim of our industry to provide milk bottles to the dairy industry at the lowest possible cost. We have a standardization

committee which has functioned effectively in simplifying the sizes and shapes of milk bottles, as well as setting standard specifications. Since 1937 the number of sizes and shapes has been reduced from 31 to 9. Also a design committee has developed more practical and lighter-weight bottles. The weight has been reduced 14 percent, and a further reduction seems imminent. The savings in manufacturing, servicing, and selling resulting from these activities have been passed on in the form of lower prices.

We sincerely hope that the various States will not make it impossible to continue this trend by requiring special markings and lettering. In this connection we solicit the support of this Conference to go on record as opposing State legislation or regulation involving the use of individual State markings, because, as pointed out, such requirements are costly to the manufacturer and must in the end add additional burdens to the consumer of dairy products.

Mr. TURNER. Our requirement for the filling point on milk bottles conforms to that in Handbook H22— $\frac{1}{4}$ inch below the cap seat. In defense of State marking of bottles, I want to say that we want something on the bottles so that we can recognize them as bottles which we have approved.

(At this point, at 5:35 p. m., the Conference adjourned to meet at 9:30 a. m., Friday, June 7, 1940.)

SEVENTH SESSION—MORNING OF FRIDAY, JUNE 7, 1940

(The Conference reassembled at 10 a. m., at the Mayflower Hotel, C. E. Tucker, Vice President of the Conference, in the chair.)

ABSTRACTS OF STATE REPORTS ¹²

ALABAMA

By R. M. JOHNSON, *Inspector of Weights and Measures, City of Birmingham*

In the absence of a representative of the State Division of Weights and Measures, Mr. Johnson reported upon the activities of the Birmingham department. He mentioned particularly the checking of coal deliveries and the licensing and bonding of weighmasters, the hearty cooperation of the city commissioner in the administration of the department, and a revision of weights and measures ordinances which was in progress.

CALIFORNIA

By CHARLES M. FULLER, *Sealer of Weights and Measures, County of Los Angeles*

Reporting for the State, Mr. Fuller noted that 15 gasoline and oil inspectors of the State bureau carried on work in 58 counties of the State. He mentioned the successful efforts to improve the weights and measures statutes, and cited as outstanding, the existing definition of deceptive containers and the checking of the practice of two-draft weighing. The forum, the press, radio, and the schools were named as mediums for the publicity work of the bureau.

CONNECTICUT

By CARLTON L. KLOCKER, *State Inspector of Weights and Measures*

Mr. Klocker reported that a laboratory was being constructed which would be equipped for a variety of testing work, and that a motorized unit was being purchased for the testing of meters.

DISTRICT OF COLUMBIA

By GEORGE M. ROBERTS, *Superintendent of Weights, Measures, and Markets*

Mr. Roberts reported upon the results of an investigation on the quality of motor fuels, upon the beneficial results of a licensing system for coal dealers, and upon certain prosecutions made for short-weight poultry and short-count baskets of tomatoes. He stated that there was under consideration an extension of the licensing system to merchants other than coal dealers, in the expectation that this would prove as helpful as it had in the case of the coal dealers.

¹² For convenience of reference these reports have been arranged in alphabetical order.

GEORGIA

By W. P. REED, *Inspector of Weights and Measures, City of Atlanta*

Reporting for the State, Mr. Reed said that there had been no session of the legislature since the preceding Conference, and that it was hoped that the next legislature would enact a comprehensive weights and measures law. Progress was indicated, however, by the appointment of a weights and measures official for Fulton County. For his own city, Mr. Reed reported a new weights and measures ordinance, drafted after a study of the requirements in effect in numerous other jurisdictions, and the probability of an early increase in his inspectional force.

ILLINOIS

By JOHN J. LEVITT, *State Superintendent of Standards*

Mr. Levitt reported an increase of over forty thousand dollars in his appropriation for the biennium, with which he expected to procure another large-capacity scale-testing unit, duplicating the one which has been giving such satisfactory service for 4 years, and to add six inspectors to his force. These new inspectors will be assigned largely to investigational duties, and will work in pairs, sometimes in cooperation with the inspectors on regular assignment.

INDIANA

By A. EDWARD SNYDER, *Inspector of Weights and Measures, City of Terre Haute*

Reporting for the State, Mr. Snyder noted an increase in the number of inspections made during the past year, the publication of revised specifications, tolerances, and regulations for commercial devices, the conduct of a satisfactory program of education, and the probability of an addition to the testing equipment of the bureau. He also said that another county inspector might soon be appointed.

MARYLAND

By S. T. GRIFFITH, *Chief, Division of Weights and Measures, City of Baltimore*

Reporting for the State, Mr. Griffith said that recently eight counties had appointed inspectors of weights and measures; in most cases these men were without equipment to carry on their official duties, and had had no opportunity for training. Hopes were still entertained for the creation of an active State organization. Speaking for the city of Baltimore, Mr. Griffith reported some new equipment but no changes in personnel.

MASSACHUSETTS

By JOHN P. MCBRIDE, *State Director of Standards and Necessaries of Life*

Mr. McBride reported that the activities of his division remained unchanged with respect to strictly weights and measures duties, but mentioned new duties of a "quality" character under a recent law setting up certain control over the quality of gasoline. He stated that food, shelter, heat, and certain sundries were classified as "necessaries of life," and that his division exercised a degree of price regulation in this field; it was said that this activity was arousing a lively public interest.

MICHIGAN

By GLENN W. DAVIS, *Director, State Bureau of Foods and Standards*

Mr. Davis said that there had been no new weights and measures legislation in his State during the past year. He mentioned that the 42 inspectors of the bureau covered the State on foods and on weights and measures, working in close cooperation with the county and municipal sealers. Continued operation of two State-owned equipments for the testing of large-capacity scales was reported.

MISSOURI

By LOUIS G. WALDMAN, *Commissioner of Weights and Measures, City of St. Louis*

Mr. Waldman reported that in spite of repeated efforts to interest the Governor and members of the legislature in the establishment of a State department of weights and measures, no action had yet been taken; however, it was hoped that something would be done in the 1941 legislative session. Speaking for the city of St. Louis, Mr. Waldman said that his recently established vehicle tank testing station was operating very successfully and to the satisfaction of distributors and the consuming public.

NEW JERSEY

By JOSEPH G. ROGERS, *Assistant Superintendent and Secretary, State Department of Weights and Measures*

Mr. Rogers, reporting on the legislative program of the department, mentioned two poultry bills, one designed to license poultry buyers; a bill along the lines of the Federal Food, Drug, and Cosmetic Act, but embracing all package goods; a bill to license dealers in liquid fuels and to make it compulsory to equip vehicle-tank meters with ticket printers; and a bill providing for pensions for municipal weights and measures officials. Mr. Rogers also spoke of a district court decision adverse to his department's control of the "bootleg" coal situation, which was being appealed to the United States Supreme Court.

NEW YORK

By BARNETT KANZER, *Director, State Bureau of Weights and Measures*

Mr. Kanzer discussed the results of an investigation on weights of packaged flour, involving almost eleven thousand packages. In all, more than 7 percent of the packages were found to be short in weight by more than 3 percent of their nominal weights; in the case of one packer's product, more than 30 percent of the packages weighed were found short weight by 3 percent or more. Overweight and underweight packages were found in the ratio of less than 1 to 3. A conference with the representatives of the industry was expected to result in immediate improvement of conditions.

NORTH CAROLINA

By C. D. BAUCOM, *State Superintendent of Weights and Measures*, and H. L. SHANKLE, *Chief, State Division of Gasoline and Oil Inspection*

Mr. Baucum commented on an investigation which had been made in his State on the weight of flour packages, and stated that the results were similar to those developed in the New York State investigation.

It was said that the only recent Regulation issued was the one relating to sight glasses, discussed in the paper presented earlier.¹³ Mr. Shankle reported an increase from 17 to 19 in the staff of inspectors in his Division.

NORTH DAKOTA¹⁴

By A. J. JENSEN, *Chief State Inspector of Weights and Measures*

Mr. Jensen stated that the five men comprising the weights and measures inspectional force of North Dakota were barely sufficient to care for the testing in the many widely separated business establishments of the State, among which he mentioned 1,700 grain elevators and 1,700 cream stations. It was said that in an intensified campaign against violators of the law, there had been during the year 1939 a large increase in the number of prosecutions.

OHIO

By V. D. CAMPBELL, *Deputy State Sealer*

Mr. Campbell reported that studies were being carried on in connection with the development of a program for expansion of the weights and measures activities of the State, which would be presented to the next legislature and for which approval in the form of increased appropriations was anticipated. Close cooperation was noted between the State office and the city and county officials.

PENNSYLVANIA

By JOSEPH F. BLICKLEY, *Chief, State Bureau of Standard Weights and Measures*

Mr. Blickley, noting his recent appointment to office, commented upon the excellent cooperation being rendered his bureau by the local departments throughout the State. He stated that gratifying progress had been made in controlling the coal situation which had been a major problem for some time.

TEXAS

By C. W. CONDIT, *Inspector, State Division of Weights and Measures*

Mr. Condit reported the acquisition by his division during the past year of a master scale house and testing laboratory; equipment for the calibration of weights of large denomination was already installed, and this would be supplemented by testing apparatus for gasoline pumps and other devices. Mention was made of a very successful prosecution record, particularly in a group of cases against cotton weighers.

VERMONT

By H. N. DAVIS, *Supervisor, State Division of Weights and Measures*

Mr. Davis reported the successful operation of the law under which men selling or repairing weighing and measuring apparatus are licensed; one of the requirements of this law is that reports be made to the State on all apparatus sold or repaired, including details of repairs and

¹³ See p. 15.

¹⁴ In the absence of Mr. Jensen, and at his request, this report was read to the Conference by C. P. Smith.

adjustments made. Effective work by the new testing unit for large-capacity scales was reported; of 156 scales tested, 51 percent were found in satisfactory condition, and on 26 retests suitable repairs were found to have been made in 65 percent of the cases and 14 scales were rejected for the second time.

VIRGINIA

By M. A. HUBBARD, *State Supervisor of Weights and Measures*

Mr. Hubbard reported a substantial increase in the funds available for the inspection of gasoline- and grease-measuring devices. Several weights and measures bills were included in the legislative program of the division, but only one was enacted and this was not in a form satisfactory to the division. The testing of large-capacity scales with the ten 500-pound weights recently acquired had begun but had not progressed as rapidly as desired because of inefficient means for handling the weights; results obtained, however, had demonstrated the urgent need for this character of testing.

WEST VIRGINIA

By EDWARD A. BROOKS, *State Inspector of Weights and Measures*

Mr. Brooks reported that his State was seriously handicapped in its supervision of weights and measures by insufficiency of funds and personnel; in addition to their other duties, the three State inspectors are charged with testing the scales of more than 1,000 coal mines. There were recently procured a truck and a complement of test weights for the testing of livestock scales in the State, and a survey of such scales was immediately undertaken.

(At this point Lyman J. Briggs, President of the Conference, assumed the chair.)

REPORTS OF REPRESENTATIVES OF STATE ASSOCIATIONS OF WEIGHTS AND MEASURES OFFICIALS

At this point, brief reports of State associations were made, as follows:

California Association of Weights and Measures Officials, by Charles M. Fuller.

Illinois Weights and Measures Association, by John J. Levitt.

Indiana Association of Inspectors of Weights and Measures, by Rollin E. Meek.

Massachusetts Association of Sealers of Weights and Measures, by Peter F. Conley.

Michigan Association of Weights and Measures Officials, by Arthur J. Wilhelm.

New Jersey Weights and Measures Association, by Charles C. Read.

New York Association of Sealers of Weights and Measures, by Charles H. Bulson.

Ohio Sealers Association, by William C. Witfoth.

Texas Weights and Measures Association, by R. L. Fullen.

Virginia Weights and Measures Association, by H. G. Twyford.

REPRESENTATION AT MEETINGS OF OTHER ORGANIZATIONS

Mr. W. P. REED. Last year I recommended that this Conference pay the expenses of speakers at meetings of mayors and city managers, hoping that in that way we might arouse their interest in creating better weights and measures conditions. I want to tell you of an instance which supports that idea.

I was sent to Nashville to speak before the Southern Governors' Conference. Although I am not a good speaker, when I had finished, Governor Bailey of Arkansas said to me, "Where in the world have you weights and measures officials been that you have not told the value of weights and measures regulation before?" The Governor of Oklahoma expressed a similar opinion. The president of the Mississippi Farm Bureau Federation, who was in attendance, asked me what he could do to improve the situation in his State; I loaned him Handbook H11, which contains the Model Law and advised him to get in touch with Ralph Smith at the Bureau.

I had been trying to get a hearing before my own Governor, but he did not think that weights and measures meant anything and would not give me a hearing; at this meeting he had to listen to me. Afterward he apologized and said that at the next legislative session he would help us.

Now that is evidence of the good which can come from these contacts. If the same thing is done before associations of mayors and city managers, I believe that much good will come of it.

Mr. R. W. SMITH. I should like to report on a matter relevant to what Mr. Reed has just said; this concerns the appearance before a meeting of an association of city managers of a speaker representing the National Conference on Weights and Measures, as requested by the Twenty-ninth Conference. The executive director of the association in question was written as follows:

At the annual meeting of the National Conference on Weights and Measures held last June a motion was adopted to the effect that if it could be arranged, the organization be represented by a speaker to appear before the meeting of the International City Managers' Association in Detroit on October 9-12, 1939. The purpose of participation in your program would be to interest your members in the problem of proper laws and ordinances in relation to weights and measures, and of the administration of such laws and ordinances.

Before steps were inaugurated toward the end in view, it was realized that the time was too short to approach you on the subject in reference to the meeting in October. Consequently the idea of carrying out the project at that time was abandoned.

The purpose of this letter is to get information for use in the future. Accordingly, I request that you advise me whether, in your opinion, your organization would be interested in the question of proper weights and measures laws and the enforcement thereof. If so, do you think that it would be agreeable to have the subject on the agenda of a future meeting and to extend to our organization an invitation to be represented by a speaker?

I would like very much to have your general reaction in this relation. If this is favorable, I will be glad to go into the matter further. Otherwise, I will be prepared to report back to the National Conference on Weights and Measures that the purpose of its resolution can not be carried out.

The following reply was received from the assistant director of the association.

I am very much interested in the subject of your letter of January 11, but we can not very well promise that we can give the subject of weights and measures a place on our next conference program. It might possibly be that an article in our journal, Public Management, would reach many more municipal officials than would a speaker at our conference. In any case, I should be glad if you would

write us about the more pressing problems in weight and measure administration as well as recent developments in this field which you think should be brought to the attention of city managers and other municipal officials. If you will write us along this line, we will then have some basis for deciding whether we might suggest to the program committee for our conference that consideration be given to placing the subject on the conference program or whether the material would be suitable for an article in our journal.

The reaction of the association office seemed to be rather definitely unsympathetic toward the suggestion of this Conference, and accordingly nothing further has been done in the matter. If the Conference desires further action, additional efforts can be made to interest the program committee. It is suggested, however, that we should avoid the appearance of trying to force our way on the program of any organization, and that it might be better to take no further steps at this time with respect to this particular association.

REPORT OF COMMITTEE ON NOMINATIONS, PRESENTED BY JOSEPH G. ROGERS, CHAIRMAN, AND ELECTION OF OFFICERS

Your Committee submits the following nominations:

For President, Lyman J. Briggs.

For Vice Presidents, H. N. Davis, A. J. Jensen, C. L. Klocker, Joseph G. Rogers, Louis G. Waldman, and Tom Webb.

For Secretary, Ralph W. Smith.

For Treasurer, George F. Austin, Jr.

For members of the Executive Committee, all officers, ex officio, and in addition, the following: Joseph F. Blickley, James A. Boyle, V. D. Campbell, Howard E. Crawford, Manon L. Fowler, Charles M. Fuller, R. L. Fullen, S. T. Griffith, Carl E. Hawkins, M. A. Hubbard, John J. Levitt, John P. McBride, Cleo C. Morgan, Alex Pisciotta, W. P. Reed, Robert Williams.

(Signed) JOSEPH G. ROGERS, *Chairman*,
JOHN J. LEVITT,
JAMES A. BOYLE, *vice* G. K. HEATH,
HOWARD E. CRAWFORD,
R. L. FULLEN,
MATTHIAS A. HARRINGTON,
TOM WEBB.

Committee on Nominations.

Mr. ROGERS. I am in a very embarrassing position, gentlemen, being Chairman of the Committee and reporting my name in nomination for the post of Vice President. Here on the floor I wish to decline that honor, although I appreciate it very much; otherwise I would not have made this report myself. I may say that that part of the Committee meeting was taken out of my hands, and I respectfully submit the report in the name of the Committee.

Mr. BOYLE. The Committee on Nominations nominated Mr. Rogers for Vice President over his objections. I move that the nominations as read be accepted.

(The motion was seconded.)

Mr. S. T. GRIFFITH. I ask that Mr. Rogers accept the nomination.

The CHAIRMAN. May I ask you to accept the nomination?

Mr. ROGERS. I want to make my position clear. I am glad to serve this Conference in every capacity where I can be of help, but I have no personal ambitions. I am perfectly willing not to be mentioned for any office. But if it is the will of the Conference to have

me as a vice president, that is an honor which I deeply appreciate, and I will accept the nomination.

Mr. LEVITT. As a member of the Committee on Nominations let me say that in view of the work which Joe Rogers has done for weights and measures, we drafted him over his very strenuous objections, and we do not want our work spoiled.

(The question was taken and the motion was agreed to. Accordingly the nominees of the Committee on Nominations were duly elected.)

REPORT OF COMMITTEE ON RESOLUTIONS, PRESENTED BY CARLTON L. KLOCKER, CHAIRMAN, AND ADOPTION OF RESOLUTIONS

APPRECIATION TO DIRECTOR AND STAFF OF THE NATIONAL BUREAU OF STANDARDS

Whereas Dr. Lyman J. Briggs, R. W. Smith, and their able and efficient staff have extended valuable assistance and guidance to this Conference, of which the Conference is highly appreciative: Therefore be it

Resolved, That this, the Thirtieth National Conference on Weights and Measures, does hereby record its grateful appreciation to the above-named gentlemen.

APPRECIATION TO MANAGEMENT OF HEADQUARTERS HOTEL

Whereas the management of the Mayflower Hotel has done everything within its power to make our present meeting the success which it has been: Therefore be it

Resolved, That this, the Thirtieth National Conference on Weights and Measures, assembled at the Mayflower Hotel this seventh day of June 1940, does express its warmest appreciation and thanks to the management of the said hotel for the careful provisions made for our meeting; and be it further

Resolved, That the Secretary of the Conference be instructed to transmit a copy of this resolution to the management of the Mayflower Hotel.

APPRECIATION TO OFFICIALS COOPERATING

Whereas the Governors and the county and city officials of the various States, through their manifest interest in weights and measures work, have made it possible for their respective jurisdictions to be represented at this, the Thirtieth National Conference on Weights and Measures; and

Whereas such cooperation and attendance have in a most practical way furthered uniformity in regulations for the various jurisdictions and have otherwise assisted the general good of the work: Therefore be it

Resolved, That this, the Thirtieth National Conference on Weights and Measures, does appreciate such practical cooperation and does make this resolution a part of the record of its meeting.

IN MEMORY OF DECEASED MEMBERS

Whereas during the past year we have lost through the plan of Divine Providence several members of this Conference; and

Whereas our association with these departed members has been an inspiration to us to continue with greater determination toward the ideals set by them: Therefore be it

Resolved, That we, of the Thirtieth National Conference on Weights and Measures, do hereby record this expression of sincere sorrow at the loss of these members.

APPRECIATION TO THE PRESS AND TO THE SCALE JOURNAL

Whereas the press of the city of Washington has been generous in reporting the activities of our present meeting; and

Whereas the Scale Journal has likewise been generous in giving advance notices of our present meeting: Therefore be it

Resolved, That this, the Thirtieth National Conference on Weights and Measures, does hereby record its appreciation to the press of Washington and to the Scale Journal.

REPORT ON THE MEASUREMENT OF LIQUEFIED PETROLEUM GASES

Whereas our attention has been called to the fact that in a short while it may be necessary for members of the Conference to calibrate instruments used in measuring liquefied petroleum gases; and

Whereas Charles M. Fuller, of Los Angeles, California, has had considerable experience in this phase of weights and measures work; and

Whereas the results of the experimental work he has made arrangements to do during the ensuing year will be of great value to the members of the Conference: Therefore be it

Resolved, That this, the Thirtieth National Conference on Weights and Measures, does herewith request that Mr. Fuller make a complete report to the Thirty-first National Conference on Weights and Measures as to the progress made and the conclusions reached, if any, on this subject.

(Signed) C. L. KLOCKER, *Chairman*,
C. D. BAUCOM,
V. D. CAMPBELL,
C. M. FULLER,
S. T. GRIFFITH,
Committee on Resolutions.

(It was moved and seconded that the report of the Committee on Resolutions be adopted, the question was taken, and the motion was agreed to.)

REPORT OF THE TREASURER, GEORGE F. AUSTIN, JR.

	June 1, 1940.	
Balance on hand June 1, 1939.....		\$584. 90
Receipts:		
June 8, 1939. Dues, 1939 Conference.....	\$192. 00	
June 8, 1939. Accrued interest.....	8. 14	
		<u>200. 14</u>
Total receipts.....		785. 04
Disbursements:		
June 7, 1939. Social evening, Mayflower Hotel—		
Music.....	\$57. 00	
Entertainment.....	25. 00	
Refreshments.....	170. 00	
Services, motion-picture projectionist..	5. 00	
Stenographic, mimeographing, and messenger services.....	30. 00	
Telephone charges.....	1. 10	
		<u>288. 10</u>
Total disbursements.....		288. 10
Balance on hand June 1, 1940.....		496. 94
Respectfully submitted.		

(Signed) GEORGE F. AUSTIN, Jr., *Treasurer.*

(It was moved and seconded that the report of the Treasurer be accepted as read, the question was taken, and the motion was agreed to.)

ANNOUNCEMENT OF COMMITTEE APPOINTMENTS

The CHAIRMAN. The Chair wishes to announce the personnel of the committee which the Conference authorized yesterday afternoon, to be known as the Committee on Standards and Specifications for the Proper Methods of Sale and Merchandising of Commodities, as follows: Alex Pisciotta, of New York City, Chairman; V. D. Campbell, of Ohio; M. A. Hubbard, of Virginia; Joseph G. Rogers, of New Jersey; C. E. Tucker, of California; James O'Keefe, of Chicago, Ill.; Louis G. Waldman, of St. Louis, Mo.

NEW BUSINESS

AMENDMENTS TO THE MODEL STATE LAW ON WEIGHTS AND MEASURES

Mr. R. W. SMITH. There is a possibility that the Bureau may be able to issue during the coming year a revision of Handbook H11, which is now entirely out of print. With that possibility in mind, I wish to suggest some amendments to our Model State Law on Weights and Measures which comprises one of the Appendixes of the Handbook.

That section of the Model Law which contains the general requirement that commodities not liquid be sold by weight or by count, that liquid commodities be sold by liquid measure, and so on, includes in one of its provisions the words, "unless otherwise agreed in writing by the mutual consent of the buyer and seller." We understand that at least one court has held that if it is proper to depart from the specified methods of sale under a mutual-consent agreement, there is no logical reason for the original requirements. To remove the basis for such an interpretation, it is proposed that the words, "unless otherwise agreed in writing by the mutual consent of the buyer and seller" be deleted from section 13a of form 1, section 21a of form 2, and section 19a of form 3 of the Model Law.

(The proposed amendment was duly adopted.)

Mr. R. W. SMITH. At present the Model Law defines the ton and the cord, in section 21a of form 1, section 29a of form 2, and section 27a of form 3. It is proposed that these sections be amplified by adding at the beginning of each, the following:

The term "gallon" shall be understood to mean a unit of 231 cubic inches, of which the liquid quart, liquid pint, and gill are, respectively, the one-quarter, the one-eighth, and the one-thirty-second parts. The term "bushel," when used in connection with dry measures and standard containers, shall be understood to mean a unit of 2150.42 cubic inches, of which the dry quart and dry pint, respectively, are the one-thirty-second and the one-sixty-fourth parts. The term "barrel," when used in connection with flour, shall be understood to mean a unit of 196 pounds, avoirdupois weight, and fractional parts of a barrel shall be understood to mean like fractional parts of 196 pounds.

(It was moved that the proposed amendment be adopted.)

Mr. BAUCOM. What are you going to do with the 48-pound sack of flour?

Mr. R. W. SMITH. It is the purpose of the amendment to require strict adherence to fractional-barrel equivalents, and to eliminate the 96-pound so-called "half barrel," the 48-pound "quarter barrel," and the 24-pound "eighth barrel." The same principle is involved in a penalty section which I shall propose, provided the amendment now under consideration is adopted.

Mr. BAUCOM. The principle is fine, but it is a longstanding custom to have 48-pound sacks of flour throughout the United States.

Mr. R. W. SMITH. On the contrary, I believe you will find that the 49-pound sack is the standard in many sections, and I think that the States recognizing the 48-pound sack are definitely in the minority.

(The motion to adopt the amendment was seconded, the question was taken, and the motion was agreed to.)

Mr. R. W. SMITH. I now propose a penalty section, to be section 21b of form 1, section 29b of form 2, and section 27b of form 3, reading as follows:

It shall be unlawful to keep for the purpose of sale, offer or expose for sale, or sell wheat flour in packages which do not conform to one of the following weights: 196 pounds, 98 pounds, 49 pounds, $24\frac{1}{2}$ pounds, $12\frac{1}{4}$ pounds, 6 pounds, 5 pounds, 4 pounds, 3 pounds, 2 pounds, 1 pound, avoirdupois weight.

You will note that the binary submultiple division is carried down to the sixteenth-barrel, or $12\frac{1}{4}$ pounds; below that point the packages may be in multiples of 1 pound up to and including 6 pounds, which seems to be a reasonable provision in view of the very definite trade custom with respect to these smaller packages. When enacted in a particular jurisdiction, some of these small sizes might, perhaps, be eliminated, to conform to the trade practice prevailing in that community; for the Model Law, however, the plurality of sizes proposed is believed to be advisable.

(The proposed amendment was duly adopted.)

MR. R. W. SMITH. Misrepresentation of price is not strictly a weights and measures matter, but I think it is of sufficient general importance to merit attention in our Model Law. An example of this is the filling station which advertises the price of gasoline on a sign on which the whole-cent figures may be 2 or 3 feet high and the fractional-cent figures so small that from the street the prospective customer cannot even distinguish them as figures. That certainly constitutes a lure and tends to deceive, and I think it is calculated to deceive. I propose the addition to the Model Law of a briefly worded section which I believe will be adequate to cover many situations such as this. [Reading:]

It shall be unlawful to misrepresent the price of a commodity, thing, or service sold or offered or exposed for sale, or to represent the price or the quantity of any commodity, thing, or service in a manner calculated or tending to mislead or deceive an actual or prospective customer.

This is proposed as section 21c of form 1, section 29c of form 2, and section 27c of form 3.

(The proposed amendment was duly adopted.)

MR. R. W. SMITH. The Model Law provides that the word "person" shall be construed to include corporations, companies, societies, and associations. I propose that section 24 of form 1, section 32 of form 2, and section 30 of form 3 be amended by adding the words "individuals, partnerships," before the word "corporations."

(The proposed amendment was duly adopted.)

MR. R. W. SMITH. It is proposed that the "separability clause," which is now included in many statutes, be added to the Model Law as section 25 of form 1, section 33 of form 2, and section 31 of form 3, reading as follows:

If any provision of this act is declared unconstitutional, or the applicability thereof to any person or circumstance is held invalid, the constitutionality of the remainder of the act and the applicability thereof to other persons and circumstances shall not be affected thereby.

(The proposed amendment was duly adopted.)

MR. R. W. SMITH. The final suggestion is that when we find it possible to reprint Handbook H11, we be authorized to number the sections consecutively, eliminating the use of letters in combination with section numbers.

(The authority requested was duly granted.)

Mr. PISCIOTTA. I have three suggestions which I think are important. One is to require that meat products be sold by net weight; then we will not be compelled to permit sale by gross weight.

Mr. R. W. SMITH. That is already covered by the provision that whenever weight is mentioned, it shall mean net weight.

Mr. PISCIOTTA. But does it say that meat products shall not be sold except by net weight? If we say definitely, without any ambiguity, that meat and meat products must be sold by net weight, then there are no two ways about it; if there is meat in a container, it cannot be sold on any basis other than net weight.

My second suggestion is that there be included a requirement that barrels used for any malt beverages shall be 31-gallon barrels.

Another suggestion is to include in the Model Law the recommendation of the Committee on Specifications and Tolerances relative to the positioning of scales.

I move that Mr. Smith, in revising the Model Law, embody these three thoughts in whatever language he considers best.

Mr. BUSSEY. I should like to ask Mr. Smith if there is any objection to referring this matter to the new committee appointed this morning, for study and report to him.

Mr. R. W. SMITH. It seems to me that a more appropriate committee would be the Committee on Legislation; however, I shall be glad to have anyone help on it. But I think that the positioning of scales is a matter to be handled by regulation and not by statutory requirement.

Mr. PISCIOTTA. Some States and municipalities have the right to make such regulations but others do not; if it is in the law, the question is settled.

Mr. ROBERTS. I feel that reference to a committee is unnecessary and may delay reprinting of the Handbook on Weights and Measures Administration. I hope that the National Bureau of Standards will find it convenient to have this Handbook reprinted at the earliest possible time, because in my judgment it is the most valuable publication for weights and measures administrative officials which I have ever seen. It is very unfortunate that it is now out of print, and I think that as speedily as possible revised copies should be made available to all weights and measures officials.

Mr. BUSSEY. I would suggest that in drafting Mr. Pisciotta's suggestions for inclusion in the Model Law, poultry be included with meat and meat products. With that suggested addition, I second Mr. Pisciotta's motion.

Mr. ROGERS. I think all of Mr. Pisciotta's suggestions are good, and I want to support them.

(The question was taken and the motion was agreed to.)

SECRETARY'S NOTE.—In carrying out the instructions of the Conference, the following amendments to the Model Law were drafted by the Secretary:

Add after section 17a of form 1, section 25a of form 2, and section 23a of form 3, the following:

It shall be unlawful to sell, or offer to sell, except for immediate consumption on the premises, any meat, meat products, or poultry in any other manner than by weight.

Add at the end of the definition of the barrel of flour¹⁵ in section 21a of form 1, section 29a of form 2, and section 27a of form 3, the following:

The term "barrel", when used in connection with beer, ale, porter, and other similar fermented liquor, shall be understood to mean a unit of 31 gallons, and

¹⁵ See p. 180.

fractional parts of a barrel shall be understood to mean like fractional parts of 31 gallons.

Add in section 23 of form 1, section 31 of form 2, and section 29 of form 3, after the words, "or sell any commodity in a manner contrary to law," the following:

or who shall use in retail trade, except in the preparation of packages put up in advance of sale, a weighing or measuring device which is not so positioned that its indications may be accurately read and the weighing or measuring operation observed from some position which may reasonably be assumed by a customer;

WEIGHTS AND MEASURES NEWS LETTER

The CHAIRMAN. Gentlemen, in closing the Conference, I have one suggestion to make for your consideration. I have been impressed by what has been said at this meeting, and other times, to the effect that we have full discussions here but that following these Conferences we go back home and often do not see one another until another year, and that consequently we are more or less out of touch with what is going on in the various States and in Washington. You heard this morning statements from our members from California and Michigan about their efforts to keep their own people advised as to what is taking place through the medium of periodical reports or other types of bulletins. I have this suggestion to make: If it seems desirable to you to have the office of the Secretary of this Conference act as a clearing house for information which is of interest and value to State officials, the Bureau will endeavor to set up an informal News Letter which will be made available to all of you. This would appear at first at irregular intervals, but would carry consecutive numbers, so that a file could be maintained. Such a News Letter would supplement the information which is now appearing in State publications and in the Scale Journal, and would help to offset the lack of contact which we experience during these long intervals between our annual meetings.

I should like to know whether you feel that such an attempt on our part would be of interest.

MR. FULLER. Dr. Briggs, I think that would be one of the most valuable things that could be done. I certainly appreciate your interest and think the idea is a splendid one.

MR. LEVITT. I wish to join in commending that plan, and I move that the Bureau adopt such a policy and that these News Letters be mailed to all of the members of this Conference for their guidance and information.

MR. BUSSEY. I wish to add my endorsement to what has been said and also to express my appreciation and the appreciation of the Educational Committee for the splendid work that the Bureau has done in connection with this Conference in making the different talks and papers available to us during the session instead of making us wait until the Conference report is issued several months later. I think the News Letter is a step in the right direction, and, in adding the endorsement of the State of Texas, I should like to second Mr. Levitt's motion.

MR. SAYBOLT. I think the procedure which has just been suggested would be invaluable to those of us who are in business and whose business intimately connects them with the administration of weights and

measures. I think that if business representatives may be included on the mailing list, the News Letter will be most valuable to them.

(The question was taken and the motion was agreed to.)

Mr. R. W. SMITH. Mr. President, I feel a considerable sense of responsibility in carrying out the instructions of the Conference to draft sections of a Model Law which bears the endorsement of this Conference. I believe that one of my contributions to this News Letter will be the proposed language which I shall do my best to work out in conformance with the desires of the Conference. I would earnestly request an expression from you gentlemen when this material reaches you, so that I may have the confidence of your support if you do not criticize adversely and the assistance of your suggestions if you find my original drafts unsatisfactory. Such comments will serve, in a way, as the action of the Conference; I should like to have that much action on the part of the membership of this group before we publish the new material in Handbook H11 as something which the Conference had adopted.

Mr. BAUCOM. We certainly appreciate that suggestion of Mr. Smith's. That is better than the action of any committee which we could possibly appoint. We shall certainly reply as soon as the material reaches us.

PATTERN APPROVAL

Mr. PISCIOTTA. I have a suggestion to offer relative to approving the types of scales or other devices. Suppose that a particular scale is submitted to me by the manufacturer. I may find some fault, or I may not. If I do not, I will approve it immediately and the manufacturer will then submit it to another official. The second official may find faults, and then he will feel that I have been lax in approving it. In the future I propose to do this, and I hope that others will cooperate with me, because in the long run I think the manufacturers are going to benefit by it: When devices are submitted to us we will withhold approval for a time, and will write the Bureau stating that we have found nothing wrong, or outlining our criticisms. That information can be incorporated in the News Letter, and then we can learn the reactions of everybody else, and all officials can take uniform action in approving or disapproving. That is what I intend to do, and I hope that other officials will cooperate, so that when we approve, it will represent the approval not alone of the city of New York but of weights and measures officials throughout the country.

Mr. ALLEN. I think Mr. Pisciotta's suggestion is excellent, but I have this in mind: When a manufacturer submits a device for pattern approval, he does not know what the reaction is going to be. One of the things which keeps the industry progressive is the possibility of profit on experimental work. If our company should bring out a scale and our competitors should learn the details of that scale, through the News Letter, several months before the scale could be offered on the market, then we lose many of the benefits of our experimental work, and we also lose the incentive to develop something new.

You may ask why we have to wait so long before bringing out a new scale. When a new model is developed we have to anticipate possible

changes. The average cost for tools on a new model is \$30,000 or \$40,000 and it takes about 3 months to make the tools. If we get the tools all ready to go into production, and then some weights and measures official requires a change in design, this is very expensive and may possibly result in scrapping some of the tools already made. For that reason we bring out hand-made models first and try to incorporate in these all necessary changes before tooling up for production. Necessarily, we must submit samples to weights and measures officials 3 or 4 months before a model can be put on the market. Secrecy in our development work is essential, and if type approval is made so involved as to cause a delay of several months, or if the developments are made public through the News Letter, I think you are going to stifle progress in business.

Mr. PISCIOTTA. I think there is a great deal in what Mr. Allen says, and we appreciate his position. A few of us have followed the practice of exchanging correspondence, but it seems that everyone should benefit by the exchange of views. However, not every State requires type approval, and I believe that the National Bureau of Standards has a list of the ones which do. Would there be any objection if, instead of publishing this information in a circular letter, we leave it to the National Bureau of Standards to be the clearing house and send it out directly to those people who have type approval, depending upon these few people to maintain the secrecy desired? Then, for example, instead of writing a circular letter, I would write one letter to the Bureau, and the Bureau would write directly to the others.

Mr. LEVITT. I can appreciate the position of the manufacturers. Our State does not require approval, but we do give certificates on equipment submitted, and I know that we have approved equipment and later on have had to ask for its withdrawal.

We want to be fair in this thing. Would it be possible to have new equipment submitted to the Committee on Specifications and Tolerances instead of to each State individually, and then if the Committee approves a device, we can accept it; and if there is something wrong, the Committee can handle the recommendations or the disapproval? I know that Illinois may tell a manufacturer to do certain things, and he may go right across the line into Indiana, and they may have different ideas, and he may go into Pennsylvania, and they may have still other ideas. A manufacturer may have on hand 100 pumps and get an order from Illinois and not one of the pumps may meet the Illinois requirements. That is not fair to the manufacturer.

It looks to me as if we would be taking a big step forward by placing approval and disapproval in the hands of the Committee. We might have to accept something which we think is not as good as it might be, but for my part I should like to shift the burden of responsibility to the Committee.

Mr. NEALE. Representing the Gasoline Pump Manufacturers Association, I am wholly in sympathy with what Mr. Allen has said as to the inadvisability of having information regarding new types of equipment given to the world at large. Everyone knows that the Bureau can keep matters properly confidential, but as to type approval I do not see how physical equipment could be sent to the Bureau,

which is not authorized to give type approval. All the Bureau could do would be to see whether or not equipment complied with the specifications issued by this Conference, and they could not do that by written description—they could do it only after seeing the device itself in operation.

Mr. PISCIOTTA. Mr. Levitt's idea may be all right. There is no question of our confidence in the Committee on Specifications and Tolerances, but I operate under a mandate that I personally approve or disapprove after examining the weighing or measuring device. I cannot issue a certificate of approval because someone from another jurisdiction tells me that a device is all right. I am willing to submit our findings to the Bureau, and I shall appreciate having the Bureau submit to me their findings and those of others. That is the only way it can possibly be done.

Mr. ROGERS. I think the plan of having information given to the Bureau and the Bureau using its discretion as to what should then be held more or less in confidence is the better plan. It is more or less public information anyhow; of course, we do not talk to competitors about another manufacturer's product, but as we meet from time to time we talk these things over. We can confine type approval discussions to the weights and measures group, and have a general news letter to cover matters of a general character. Would not that be acceptable to the manufacturers?

Mr. ALLEN. The only thing I want to stress is the confidential nature of certain information. There has been misunderstanding on the part of some sealers of the trust placed in them, and certain officials have violated our confidence. That is the thing we want to avoid. The fact that that may happen in one instance does not, of course, indict everyone.

Mr. ROESER. I would just as soon that one institution be organized to take care of these problems, or I would just as soon leave things as they are. It is not a question of lack of confidence; it is a question of keeping one's business under control. From the standpoint of myself and my company, I should like very much for you officials to attend to your business as you are attending to it now. We shall get along all right.

Mr. PISCIOTTA. I am willing to submit information to the Bureau, and as a matter of fact I think I shall do that as far as I am concerned.

Mr. BUSSEY. There is no doubt that there is room for improvement in the field of type approval, and I think the subject is too large for us to work out the details at this late hour. In order that we may not have to wait until another Conference to put something into effect, I move that the Committee on Specifications and Tolerances be requested to study the subject and try to work out with the manufacturers some plan which will be mutually satisfactory, after which we can be informed through the News Letter of the results. That should be beneficial to everyone concerned.

Mr. LEVITT. I second that motion.

Mr. BAUCOM. There are only about nine jurisdictions which have type approval. Why not let them get together and work this out? Most of the members of the Committee on Specifications and Tolerances have type approval, so it would amount to the same thing, but

there is no necessity for putting that obligation on the Committee when it is really a responsibility which the type approval officials already have by statute. They could work it out among themselves and then advise the Bureau and get the Bureau's advice.

Mr. LEVITT. There is nothing objectionable in being guided by the advice of the Committee.

Mr. PISCIOTTA. If I have not seen a device, I am taking someone else's word that it is all right; I have to see it, and I have to test it.

Mr. BUSSEY. I am not suggesting taking type approval authority away from any jurisdiction. It is my thought that the Committee would confer with the manufacturers and with every jurisdiction which requires type approval. As I understand the laws, each jurisdiction would still have to approve each device before it would be legal for use in that jurisdiction. But if we can develop a plan which will promote uniformity and reduce confusion, without betraying the confidence of any manufacturer, I think this would be definitely a step in the right direction. It was not my idea that the Committee would approve any equipment—each jurisdiction will have to do that; the Committee would just work out a plan under which we might operate, along the lines of Mr. Pisciotta's suggestion.

Mr. S. T. GRIFFITH. This is a perennial problem which we have never been able to solve. It is worthy of solution. If it could be solved, it would make our work much easier and would eliminate the confusion which exists in the manufacturing field in trying to make devices to meet the requirements of the several jurisdictions.

As I understand Mr. Bussey's motion, it is to refer the matter to the Committee on Specifications and Tolerances for study. I wish to leave it in their hands and call for the question.

Mr. PISCIOTTA. I do not see any necessity for investigating and figuring out new ideas. As I have done in the past and as I have a right to do in the future, I shall have a device tested by my inspectors, and if they approve it, I shall approve it, and if they find any fault with it I shall disapprove it. I am willing to go further than that, and give to the National Bureau of Standards, which we all recognize, the benefit of my examinations; I am going to withhold my final decision until I hear from the Bureau as to their opinion, and I expect that when I hear from the Bureau I shall also receive information which they have procured from other sources.

Why wait until a committee devises a new way to do it? I am willing to leave it to the Bureau to say, "Mr. Pisciotta, we think you are right," or "We think you are wrong," and I assure you that 999 times out of 1,000 I am going to take their advice regardless of what my particular ideas may be. If I am willing to do that, why should not other men be willing to do the same thing?

Mr. NEALE. While it would be most desirable to have weighing and measuring devices submitted to the Bureau, I hold simply that the question presents a physical impossibility. All that could be sent to the Bureau would be drawings, pictures, etc.—certainly not the physical apparatus itself, outside of a limited line of small devices. I will not say what the Bureau's authority is; yet all the Bureau can say is that the device complies with the specifications adopted by the National Conference. I am sure that, not seeing them, the Bureau cannot tell about the operation of them.

The CHAIRMAN. The motion before you, which has been seconded, is to refer this subject to the Committee on Specifications and Tolerances for a recommendation as to a manner of procedure which will bring about the uniformity which we are all anxious to secure. That procedure, of course, must involve prompt consideration in the case of any particular device, and it must secure to the manufacturer the security and protection of his new developments.

Are you ready for the question?

(The question was taken and the motion was agreed to.)

The CHAIRMAN. Is there any further business to come before the Conference?

(There being no further business, it was moved and seconded that the Conference adjourn, the question was taken, and the motion was agreed to. Thereupon, at 12.55 p. m., the Thirtieth National Conference on Weights and Measures adjourned sine die.)





