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- County----- W. H. BARR, Deputy County Sealer of Weights and Measures, Lisbon.

Pennsylvania:

- Allegheny County--- GEORGE B. MOORE, Chief County Inspector of Weights and Measures, Court House, Pittsburgh.
 Allentown----- B. FRANK RINN, Inspector of Weights and Measures, City Hall.
 Altoona----- J. O. DEBRAY, Sealer of Weights and Measures.
 Dauphin County--- JOHN E. BOWERS, County Inspector of Weights and Measures, 13 South Third Street, Harrisburg.
 Harrisburg----- G. B. NEEBINGER, Inspector of Weights and Measures.
 Philadelphia----- CONYERS B. GRAHAM, Chief Clerk, Bureau of Weights and Measures, 2017 Arch Street.
 THEO. A. SERAPHIN, District Supervisor of Weights and Measures, 2017 Arch Street.
 Venango County--- R. A. PRINGLE, County Inspector of Weights and Measures, 546 Grant Street, Franklin.

Tennessee:

- Chattanooga----- TOM F. MAHONEY, Sealer of Weights and Measures, City Hall.
 Memphis----- A. W. BACEGALUPO, Inspector of Weights and Measures.

Virginia:

- Accomac County--- S. J. STEVENSON, County Sealer of Weights and Measures, Accomac.
 Fredericksburg--- R. E. BECKHAM, Sealer of Weights and Measures, City Hall.
 Norfolk----- JAMES L. SKINNER, Sealer of Weights and Measures, 211 Brewer Street.

Virginia—Continued

- Richmond----- B. W. RAGLAND, Chief Bureau of Weights and Measures.
 E. H. HERBIN, Deputy Inspector of Weights and Measures.
 Roanoke----- C. R. VAUGHAN, Sealer of Weights and Measures, care of Health Department.
 Wisconsin: Milwaukee--- WILLIAM F. STEINEL, Sealer of Weights and Measures, 421 Fifth Street.

DELEGATES FROM STATE ASSOCIATIONS OF WEIGHTS AND MEASURES OFFICIALS

- Massachusetts----- Association of Sealers of Weights and Measures:
 JULIUS J. MUTTER, Sealer of Weights and Measures, Town Hall, Easthampton.
 New York----- Association of Sealers of Weights and Measures:
 WILLIAM D. REED, Secretary, 211 Water Street, Penn Yan.

OTHER DELEGATES, AND GUESTS APPEARING ON PROGRAM

- BEAN, H. S., Bureau of Standards, Washington, D. C.
 BEARCE, H. W., Bureau of Standards, Washington, D. C.
 BOUSFIELD, A., Chief Engineer, E. & T. Fairbanks & Co., St. Johnsbury, Vt.
 BRIGGS, C. A., Livestock Weight Supervisor, Department of Agriculture, Washington, D. C.
 BURGESS, Dr. GEORGE K., Director, Bureau of Standards, Washington, D. C.
 CHEYNEY, A. R., Mechanical Engineer, United States Post Office Department, Washington, D. C.
 GAST, FRED W., Engineer of Scales, Treasury Department, Washington, D. C.
 GOULD, R. E., Bureau of Standards, Washington, D. C.
 HOLBROOK, F. S., Bureau of Standards, Washington, D. C.
 HOOVER, Hon. HERBERT, Secretary of Commerce, Washington, D. C.
 HOVEY, V. F., President, National Association of Ice Cream Manufacturers, Schenectady, N. Y.
 INTEMANN, E. A. G., Jr., New Jersey Retail Ice Cream and Candy Manufacturers' Association, New York, N. Y.
 JUDSON, L. V., Bureau of Standards, Washington, D. C.
 LINDSAY, C. A., District Manager, Howe Scale Co., 123 Lafayette Street, New York, N. Y.
 MILLER, D. R., Bureau of Standards, Washington, D. C.
 PARRY, WILLIAM, Bureau of Standards, Washington, D. C.
 PEPPER, E. L., Bureau of Standards, Washington, D. C.
 PIENKOWSKY, A. T., Bureau of Standards, Washington, D. C.
 RASMUSSEN, FRED, Executive Secretary, National Association of Ice Cream Manufacturers, Telegraph Building, Harrisburg, Pa.
 RICHARD, C. L., Bureau of Standards, Washington, D. C.
 ROESER, H. M., Bureau of Standards, Washington, D. C.
 SKINNER, W. W., Chairman, Joint Committee on Food Definitions and Standards, Department of Agriculture, Washington, D. C.
 SMITH, RALPH W., Bureau of Standards, Washington, D. C.
 SOUDER, WILMER, Bureau of Standards, Washington, D. C.
 WINSLOW, M. H., President, Winslow Government Standard Scale Works, Terre Haute, Ind.

GUESTS REPRESENTING MANUFACTURERS

- Allsteel Scale Co. (Inc.): HAROLD C. MITCHELL, 25 West Broadway, New York, N. Y.
 Becker, Christian (Inc.): C. A. BECKER, 147 Eighth Street, Jersey City, N. J.
 Bowser, S. F. & Co. (Inc.): D. A. COREY, Fort Wayne, Ind.
 Buffalo Scale Co.: E. D. GORDON, Engineer, Buffalo, N. Y.
 Chatillon, John, & Sons:
 EDWIN C. SMITH, Sales Manager, 87 Cliff Street, New York, N. Y.
 F. REICHMANN, 108 Grand Avenue, Ridgfield Park, N. J.
 J. G. HUGEL, 87 Cliff Street, New York, N. Y.

Clear Vision Pump Co.:

HAL M. BLACK, General Counsel, Fourth National Bank Building, Wichita, Kans.

J. E. WALTON, Salesman, 800 East Harry Street, Wichita, Knas.

Dayton Scale Co.:

D. J. MOYNIHAN, Vice President, 50 Broad Street, New York, N. Y.

ROBERT CRAIG, Consulting Engineer, Dayton, Ohio.

WILLIAM BOWEN, District Manager, 816 Fourteenth Street, NW., Washington, D. C.

G. G. RICHMOND, Sales Agent, Jacksonville, Fla.

Davis Welding & Mfg. Co.: ARTHUR L. BETTS, Secretary-Treasurer, 1110-1120 Richmond Street, Cincinnati, Ohio.

Engineer Searching Co.: S. J. MACFARREN, Builders Exchange, Washington, D. C.

Fairbanks, E. & T., & Co.: A. BOUSFIELD, Chief Engineer, St. Johnsbury, Vt.

Fairbanks Co., The: E. P. VROOME, Manager, Baltimore Office, 724 East Pratt Street, Baltimore, Md.

Fairbanks, Morse & Co.: L. R. BOYER, Sales Engineer, 900 South Wabash Avenue, Chicago, Ill.

Gilbert & Barker Mfg. Co.: RALPH M. LULL, Sales Engineer, Springfield, Mass.

Guarantee Liquid Measure Co.: W. S. TOWNSEND, President, Rochester, Pa.

Gurley, W. & L. E.: W. L. EGY, Engineer, Troy, N. Y.

Howe Scale Co.: C. A. LINDSAY, District Manager, 123 Lafayette Street, New York, N. Y.

International Business Machines Corp. of New York: HARRY S. EVANS, Manager, 816 Fourteenth Street NW., Washington, D. C.

Measuregraph Co.: E. A. POWELL, Service Manager, 3905 Belle Avenue, Baltimore, Md.

Milwaukee Tank Works: NORMAN R. BEMM, Eastern Manager, 270 Madison Avenue, New York, N. Y.

National Meter Co.: GEORGE D. MACVEAGH, Sales Engineer, 299 Broadway, New York, N. Y.

National Store Specialty Co.: H. A. SHOWALTER, Sales Manager, Bareville, Pa. Ohmer Fare Register Co.:

J. B. MILLS, Works Manager, Dayton, Ohio.

ASHLEY BROWN, Efficiency Engineer, Dayton, Ohio.

GEORGE A. CRIST, Superintendent of Taximeter Production, 16 West Sixty-first Street, New York, N. Y.

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Peerless Weighing Machine Co.: EDMUND M. SCHIEMER, District Manager, 3811 Copley Road, Baltimore, Md.

Pittsburgh Meter Co.:

T. C. CLIFFORD, Sales Manager, Pittsburgh, Pa.

HORACE CHRISMAN, Engineer, Pittsburgh, Pa.

Pittsburgh Taximeter Co.: JOHN W. WEIBLEY, Secretary-Treasurer, Pittsburgh, Pa.

Seraphin Manufacturing Co.: IDA U. SERAPHIN, Secretary, Philadelphia, Pa.

Société Genevoise d'Instruments de Physique: R. Y. FERNER, United States Representative, Investment Building, Washington, D. C.

Spotz Manufacturing Co.: C. A. SPOTZ, Consulting Engineer, Glenbrook, Conn.

Standard Computing Scale Co.: M. D. RIBBLE, Special Representative, Detroit, Mich.

Standard Oil Co. (N. J.):

HARRY L. SHOEMAKER, Engineering Department, 26 Broadway, New York, N. Y.

J. F. WINCHESTER, Superintendent of Motor Vehicles, Baltimore, Md.

OTTO W. ROSENBAUER, Pump and Tank Department, Baltimore, Md.

Standard Scale & Supply Corp.: W. N. HAINES, President, Beaver Falls, Pa.

Stimpson Computing Scale Co.: A. J. BARTLEY, Louisville, Ky.

Tokheim Oil Tank & Pump Co.: FRANK E. MILLS, Fort Wayne, Ind.

Toledo Scale Co.:

H. O. HEM, Consulting Engineer, Toledo, Ohio.

CHARLES C. NEALE, Manager of Service, Toledo, Ohio.

A. M. RAYMOND, Sales Agent, 931 New York Avenue, Washington, D. C.

Torsion Balance Co.: A. T. MILLROY, 92 Reade Street, New York, N. Y.

Triner Scale & Mfg. Co.: J. A. EDGERTON, Washington Representative, Ouray Building, Washington, D. C.

Wayne Tank & Pump Co.:

R. A. DEMPSEY, District Manager, 4030 North Broad Street, Philadelphia, Pa.

W. J. POWERS, Salesman, 3101 Tyndale Avenue, Baltimore, Md.

Winslow Government Standard Scale Works: M. H. WINSLOW, President, P. O. Box 501, Terre Haute, Ind.

GUESTS REPRESENTING RAILROADS AND WEIGHING DEPARTMENTS

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BYLSMA, J. M., Chief, Weighing Department, Western Weighing and Inspection Bureau, 1822 Transportation Building, Chicago, Ill.

HARRISON, M. J. J., General Scale Inspector, Pennsylvania Railroad, 575 Union Station, Chicago, Ill.

HOSFORD, C. C., General Scale Inspector, Pennsylvania Railroad, Room 1022 P. R. R. Station, Pittsburgh, Pa.

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

MANN, C. H., Superintendent of Scales, Southern Railway, Washington, D. C.

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

McATEER, JOHN, Scale Inspector, Consolidation Coal Co., Watson Building, Fairmont, W. Va.

SHARPLEY, H. F., Principal Assistant Engineer, Central of Georgia Railway Co., Savannah, Ga.

STOODY, C. G., Chief Scale Inspector, Chicago, Rock Island & Pacific Railroad, Room 501 Royal Union Life Building, Des Moines, Iowa.

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FELL, F. B., Livestock Weight Supervisor, Department of Agriculture, South Saint Paul, Minn.

HARTLEY, ALBERT A., Federal Trade Commission, 2000 D Street NW., Washington, D. C.

ELY, EDWIN W., Simplification Specialist, Division of Simplified Practice, Department of Commerce, Washington, D. C.

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BROWN, MRS. GEORGE R., Stony Creek, N. Y.

BYLSMA, MRS. J. M., Chicago, Ill.

DALE, SAMUEL S., representing American Institute of Weights and Measures, 115 Broadway, New York, N. Y.

DEAN, MRS. L. J., Glens Falls, N. Y.

FARRELL, DOROTHEA E., Raleigh Hotel, Washington, D. C.

GAYLORD, MRS. N. ORAL F., North Collins, N. Y.

GORDON, MRS. B. B., Logansport, Ind.

GRAHAM, MRS. HERBERT, North Collins, N. Y.

GRAHAM, HERBERT, North Collins, N. Y.

HEISLER, MRS. G. E., Bridgeport, Conn.

KELLY, MRS. D., Bridgeport, Conn.

KANZER, SANFORD, Albany, N. Y.

MUELLER, AUGUST J., President New Jersey Retail Ice Cream and Candy Manufacturers' Association, 425 Jackson Avenue, Jersey City, N. J.

PATRICK, MRS. N. E., 808 Elizabeth Street, Mechanicsville, N. Y.

ROBERTS, FREDERIC L., Treasurer Metric Association, 156 Fifth Avenue, New York, N. Y.

ROBERTS, HELEN, Raleigh Hotel, Washington, D. C.

SEBRING, MRS. WILLIAM C., Rock Stream, N. Y.

SMITH, JAMES, 113 Market Street, Paterson, N. J.

SUMNER, EDYTHE L., 163 Jay Street, Freeport, N. Y.

WILLIAMS, MRS. ROBERT, Washington Avenue, Roosevelt, N. Y.

WOOD, F. AUSTIN, 28 Nassau Road, Roosevelt, N. Y.

WORMAN, MRS. H. S., Boonton, N. J.

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REPORT OF THE EIGHTEENTH NATIONAL CONFERENCE ON WEIGHTS AND MEASURES OF THE UNITED STATES¹

HELD AT THE BUREAU OF STANDARDS, WASHINGTON, D. C., MAY 25-28, 1925

FIRST SESSION (MORNING OF MONDAY, MAY 25, 1925)

The conference was called to order at 10.55 o'clock a. m. by Dr. George K. Burgess, president of the conference and Director of the Bureau of Standards.

OPENING ADDRESS BY THE PRESIDENT, DR. GEORGE K. BURGESS

It is with very great pleasure, indeed, that I call to order this Eighteenth Annual Conference on Weights and Measures of the United States and extend to all of you a cordial welcome to Washington and to the Bureau of Standards. This is the third conference over which I have had the honor of presiding, and I am happy to say that I now feel thoroughly at home in occupying the chair during your deliberations. This experience has given me an excellent insight into your work, and I must say that I have been very much impressed with the excellent way in which you buckle down to business and cooperate in producing things very much to be desired—uniformity, improved methods, increased knowledge, and greater efficiency.

The Bureau of Standards feels itself fortunate to be of assistance to you along these lines, and feels that in its participation it is fulfilling one of its most important functions and is being of very real service to all the people of the United States. We maintain here the fundamental standards of weights and measures of the country. We depend upon you to take those standards and carry them into the commercial dealings, so that they become a very real part of the life of the people in safeguarding them in their various daily transactions. This is a very important function with which you are intrusted, and in doing your part you may well have a very great feeling of satisfaction.

During my tenure of office as president of this organization I have been very much impressed, further, with the attendance at the meetings and the fact that they are so thoroughly representative, not only from a geographical standpoint but also from the standpoint of the various interests concerned. Certainly success in weights and measures regulation is virtually guaranteed when the representatives of our States, our local jurisdictions, our manufacturers of weights and measures, our industries especially concerned

¹The name of these conferences, formerly known as "Annual Conferences on Weights and Measures," has been changed to "National Conferences on Weights and Measures." (See p. 73.)

with weights and measures, and our Federal departments and bureaus meet together amicably to discuss common problems and decide upon proper solutions of them.

From the standpoints both of attendance and accomplishments, then, the conferences with which I have been officially connected have left but little to be desired. In view of this, it seems venturesome for me to predict that this conference now opening bids fair to be the most successful one with which I have been connected. Yet I feel that I can say this with a very excellent chance of being correct in my prediction. The response to our invitations has been especially enthusiastic, and it seems that there will be a very excellent attendance from all sections of the United States. We have high hopes that more than half of the States will be represented, and in view of the present conditions this will be a splendid accomplishment.

If we are not mistaken, our program also will be a very interesting one. Every effort has been made to include nothing but interesting, helpful, and timely subjects of interest, and we advise you not to miss any session, because in every session there is included material which is very much worth while. Among the subjects which are expected to be of special interest and importance I might mention that of heavy-capacity platform scales. The matter of the test of these scales has long been a thorn in the flesh of many of our officials. Everyone grants the fundamental importance of this class of scales, and yet, perhaps, they fail to receive an adequate test more often than any one class of apparatus; but this is not through any fault of the official. The reasons for this condition are not hard to find. In the first place, the procurement of the necessary apparatus represents a high initial expense, and its weight is such that the moving of it from scale to scale constitutes a difficult and expensive problem of transportation. In the second place, the advent of the autotruck and its very intensive development have resulted in a very rapid increase in the capacity of such scales, with the result that the equipments and methods of test have in many cases been unable to keep pace with the progress being made along these lines. Everyone recognizes that equipment which was reasonably satisfactory a few years ago is wholly inadequate to-day, and yet if the official has been unable to obtain anything better he has been obliged, perforce, to do the best he could with the means provided. In connection with this state of affairs the bureau has had many inquiries as to proper equipment for this work, and its advice has been solicited as to the best manner of procedure to correct the present unfortunate conditions existing. The bureau is also advised of many jurisdictions where the needs are fully realized, but where carefully worked-out programs for improvement, though strongly urged and adequately presented, were wholly unsuccessful.

This subject on the program has been designed with the idea that it will lay the groundwork for the eventual solution of these difficulties. First, it will be a taking of stock—an inventory. What is the present situation? This number should do much to advise all of you concerning this, and when this is understood you will be in a better position to proceed. Second, it will help to crystallize your various ideas as to the best equipment and methods available for

the work contemplated and enable you to lay your plans to procure the equipment which will be best for your particular needs and to draw up your budgets accordingly. Third, you will learn from the résumé of what is being accomplished in various jurisdictions, what can reasonably be expected when such equipment is procured, and such methods put into force and effect. This knowledge will be extremely useful as ammunition for inaugurating or continuing the offensive in your various jurisdictions. Finally, it will encourage and spur every one of you on to continued efforts properly to outfit your departments in this important respect, for it will convince you that eventually results may be secured if you keep plugging away at it.

Another subject which we expect will prove to be of great interest is that concerning the manner of sale of ice cream, and I desire especially to mention this for several reasons. First, on account of the interest attaching to the subject itself. It has been attracting the attention of officials from various parts of the country on account of the complaints being made by retailers that they are unable to properly check out on this commodity by the present method employed in purchases and sales by liquid measure. As a result many of the retailers are desirous of finding out if some other method of handling this commodity can not be devised that will enable them to deal in it on a sounder basis. This is not due to the fact that it is suspected that short measure is being delivered by the wholesalers, but is due to the inherent nature of the commodity, in that whenever it is repacked it shrinks in volume, and thus a greater amount per unit of volume than is received must always be delivered in the case of a sale of bulk ice cream.

Second, I am particularly interested in the manner in which this subject is being presented on the program, since it strikes me that it is an excellent illustration of the fairness of this conference and of its desire to obtain all possible information in relation to a subject before taking action in relation to it. Thus, papers will be presented detailing the various viewpoints of the interested parties—the weights and measures official, the manufacturer, and the retailer. Each will have a full opportunity of presenting his side of the case and his recommendations for its solution. Then, the chairman of the joint committee on definitions and standards will tell of the work which his committee has done which is of interest in this relation. Finally, a State official from a State which has been regulating this matter for some years will explain the basis of the method adopted there and how it works out in practice. Certainly the delegates will be in an excellent position to arrive at reasonable conclusions after all this testimony has been placed at their disposal.

Finally the mention of this paper gives me an excellent opportunity to broach an idea which has been proposed, which strikes me as being a very good one. This subject is the coordination of programs of the national conference and of State conferences on weights and measures.

This national conference has proved itself to be a very well worthwhile organization in the obtaining of uniformity in weights and measures matters throughout the country. Your State conferences

are also very important and useful organizations in unifying the work in those States in which they are held. Now, the idea I have in mind will, I think, enable the State organizations to assist the national body and, conversely, enable the latter to assist the former in the manner I am about to point out.

Every year in the weights and measures field there are usually two or three problems which are recognized as outstanding ones at that particular time. For instance, the subject of the sale of ice cream and also that of heavy-capacity scales which I have taken occasion to mention may be considered to be in this category this year. Would it not be a wise plan for a representative group, such as the executive committee of this conference, or, perhaps this conference as a body, to select these outstanding subjects for each year, announce this selection, and recommend that they be included in the programs of each State conference and of the national conference? If the latter body happens to inaugurate such a subject it can be discussed here, and, perhaps, a tentative decision can be reached with the understanding that a final conclusion will be postponed until the next succeeding conference. The subject can then be referred to and discussed at the State conferences held during the following 12 months. This will result in the enlistment in the consideration of an even broader and more representative group of officials than can ever be gotten together here. Returning to the next national conference the delegates from the various States will then be entirely advised as to the consensus of opinion of the officials in their States and will be better enabled to speak with confidence and authority in this relation. If the subject is suggested at such a time that it can better be inaugurated at the various State conferences the discussions held will develop the consensus of opinion in the same way, and the delegates will be similarly assisted in their discussion of the subject when the matter is reached on the program of this conference.

Of the two subjects mentioned heretofore it may be said that at the present time in its present scope the subject of heavy-capacity scales is being inaugurated at this conference, although, of course, it has frequently been discussed heretofore. The subject of the sale of ice cream has been borrowed from the program of the last conference of the weights and measures officials of New Jersey where this subject was very competently handled. The various codes of specifications and tolerances will be excellent material to be handled in this way.

I consider this a most constructive suggestion and commend it to you for your consideration. It has been placed on the program as a subject for discussion in connection with item No. 17.

In addition to the coordination of programs another advantage of leaving a subject open for a year will be that in the meantime industries and the public in your jurisdictions can be consulted as to their attitude in relation to it, and their reaction will be of the greatest value.

It is with very great sorrow that I am obliged to announce that an old and prominent member of this organization passed away since our last meeting—W. B. McGrady, of Pennsylvania. We all knew him and we all admired him as an able and conscientious official, a valued ally, and a sincere friend. He was a past vice president of

this body, a member of our executive committee, and a member of our committee on specifications and tolerances. We will miss him very greatly.

I have filled the place left vacant on the committee on specifications and tolerances by the appointment of A. W. Schwartz, of New Jersey. I am sure you will agree with me as to the wisdom of this choice, and that we are fortunate in enlisting his services. Mr. Schwartz is already functioning as a member of this committee and will participate in the reports made to the conference this year by it.

Before closing I would refer to the report of the seventeenth annual conference, a document of 147 pages, which I trust you have all received. With the cooperation of all parties concerned, special effort was made to have that report published promptly, with the result that it was issued several months in advance of the usual time of publication, and I trust that this prompt publication has served a useful purpose in making our deliberations available to the interested parties at such an early date.

You will note from the program of the eighteenth conference that we have listed an address by the Secretary of Commerce, Mr. Hoover, for Wednesday morning. Mr. Hoover has addressed each of our conferences during his term of office, and I can assure you he takes the keenest interest in our activities, especially in view of the fact that the results of our deliberations are so closely wrapped up with a subject most close to his heart—that of the elimination of waste in production and distribution—and he appreciates our activities as forming a basis of fair dealing and legitimate regulation of the interchange of commodities.

You will also notice that a place has been made on the program on Thursday for a reception by the President of the United States, who has kindly consented to receive the delegates and other attendants at this conference at the White House at 12.30 p. m. Thursday.

Another subject that I would like to bring to your attention is the question of exhibit. You will remember that for many years it was the custom to hold an exhibit of weights and measures apparatus at the time of the annual conference. The question of the scope and frequency of such an exhibit was discussed on the last day of the seventeenth conference last year. It is realized, of course, that the preparation of these exhibits entails a considerable burden upon the exhibitors, who for the most part are manufacturers. I gather from correspondence and conversations that many of them would be glad to hold such exhibits periodically, perhaps once every two or three years, and I think it would be wise for the conference to decide at this time on a definite policy in this matter. There is one great advantage not to be overlooked—when an exhibit is held it brings automatically to our meetings a critical personnel who may oftentimes take an active and constructive part in our deliberations.

I would also remind you that the Bureau of Standards has a small permanent exhibit of certain types of weights and measures apparatus which I trust you will take the opportunity to examine, and you will notice that on Tuesday morning a special place is made on the program for inspection of the primary standards of

length and mass and of the laboratories of the Bureau of Standards. I trust, also, that as opportunity offers during the four-day sessions of this conference you will not hesitate to avail yourselves of the opportunity to acquaint yourselves with any portions of the work going on at the Bureau of Standards in which you may be interested.

Before receiving the reports of State delegates I want to thank the members of the executive committee and others who have assisted in preparing our program for this eighteenth conference, and I can assure you also that the work of your committees, and in particular the committee on specifications and tolerances, has been most conscientious, and they will be able to put before you constructive programs for your consideration.

ABSTRACTS OF REPORTS OF STATE DELEGATES²

ARIZONA

(The report of R. H. Theilmann, State inspector of weights and measures, was incorporated in his paper, which will be found on p. 71.)

CONNECTICUT

By THOMAS F. EGAN, *Deputy State Superintendent of Weights and Measures*

Mr. Egan reported that the weights and measures laws of his State were not in such form as to serve the best interests of all concerned, and that the greatest difficulty now being experienced in his department was in securing the passage of needed legislation. He stated that, notwithstanding the department's best efforts, the proposed standard-weight amendment to the present bread law was defeated in the last legislature. The same was true in the case of a bill concerning the sale of wood for fuel purposes. Two new laws were enacted, however, one in relation to the appointment and salaries of town inspectors and the other providing a penalty for taking more than the quantity represented when buying commodities.

DISTRICT OF COLUMBIA

By GEORGE M. ROBERTS, *Superintendent of Weights, Measures, and Markets*

Mr. Roberts reported continued activity of his department without any changes in law or in personnel, but stressed the handicap of an insufficient force of inspectors and of inadequate equipment for the testing of heavy-capacity scales. He stated that during the last fiscal year 94 prosecutions had been instituted, of which only two resulted in acquittals. Mr. Roberts gave as the reason for this high percentage of convictions, the care with which cases were prepared and the policy of his department not to start action upon insufficient evidence of the guilt of the offender.

² For convenience of reference these reports have been arranged in alphabetical order throughout.

ILLINOIS

By FRED BENJAMIN, *State Superintendent of Standards*

Mr. Benjamin reported that a standard-weight bread bill was pending in the present legislature. This bill would require that bread be sold only in standard-weight loaves and provides a tolerance of 1 ounce per pound in excess or deficiency. At present the State law merely provides that bread shall be sold by weight, and permits cities having a population of 25,000 or more to regulate the matter by local ordinance. Mr. Benjamin said that conditions with respect to gasoline pumps and scales were rapidly improving, although considerable work remained to be done in the case of the former.

INDIANA

By I. L. MILLER, *State Commissioner of Weights and Measures*

Mr. Miller reported that the last legislature enacted a general weights and measures law designed to strengthen the weights and measures administration of the State. He outlined the provisions of the new code which, among other things, gives the State department greater powers, requires the appointment of additional city and county sealers, authorizes the appointment of local weighmasters, amplifies the package-marking requirements, and requires fruits and vegetables not in original containers to be sold by weight. Mr. Miller also reported the continued satisfactory administration of the Indian standard-weight bread law.

MARYLAND

By S. T. GRIFFITH, *Chief Inspector of Weights and Measures, Baltimore*

Mr. Griffith reported that at the present time the State, as a whole, was not active along the lines of weights and measures supervision. There is no State department of weights and measures. In Baltimore, the largest city of the State, a department has been in operation for years, and under recently revised ordinances and regulations is doing very efficient work. Mr. Griffith expressed the hope that in the near future state-wide regulation might be realized in this important phase of governmental activity.

MASSACHUSETTS³

By WILLIAM FOSTER, *Scaler of Weights and Measures, Springfield*, and JAMES SWEENEY, *Scaler of Weights and Measures, Boston*

Mr. Foster briefly summarized the satisfactory progress being made in weights and measures work in Springfield, noting an increase in force and equipment, and a broadening of duties, including the testing of taximeters. Mr. Sweeney gave a résumé of the provisions of some very early weights and measures laws in Massachusetts and showed how the laws of to-day were a natural outgrowth of these

³ These reports were presented by Mr. Foster and Mr. Sweeney in the absence of an official State delegate.

earlier enactments. He noted that the first sealer was appointed in Boston in 1650, and the weights and measures inspection work had continued in the city ever since.

MICHIGAN ⁴

By GEORGE F. AUSTIN, *Sealer of Weights and Measures, Detroit*

Mr. Austin stated that no success had been attained in an endeavor to procure new legislation in the State, and that the State did not have a sufficient number of inspectors engaged in weights and measures work. He then referred to a new ordinance in Detroit which requires the licensing of all stations retailing or wholesaling petroleum products and of operators of such stations and of tank wagons, and briefly described some phases of the work being done in the city, touching especially upon the testing and supervision connected with the sale of gasoline from tank wagons and pumps.

MINNESOTA

By P. P. QUIST, *State Weighmaster*

Mr. Quist conveyed to the conference the greetings of R. F. Barron, State commissioner of weights and measures, who was unable to be present. Mr. Quist stated that it was following his attendance at the conference 17 years ago that the necessity for proper weights and measures supervision was brought to the attention of the authorities of his State, and that since its establishment in 1911 the State department of weights and measures had established an enviable record of accomplishment. He also spoke briefly of the work of the Minnesota grain inspection and weighing service with which he is directly connected.

NEW HAMPSHIRE ⁵

By H. A. WEBSTER, *State Commissioner of Weights and Measures*

Mr. Webster reported increasing interest in and approval of the work of his department on the part of the public, as an evidence of which he cited the increase in appropriation granted by the last legislature. A new law applying to the sale of farm produce in standard boxes has been enacted and the weight per bushel for apples repealed. Mr. Webster mentioned the cooperation of the school authorities in his weights and measures educational program; weights and measures is being continued as a special subject in the school curricula. The large increase in the numbers of wayside stores and gasoline-pump installations was noted as the most perplexing problem of the department.

NEW JERSEY ⁶

By J. HARRY FOLEY, *State Superintendent of Weights and Measures*

Mr. Foley reported that three recently enacted statutes—the sale-by-weight act, the thread act, and the climax basket act—were now

⁴ This report was presented by Mr. Austin in the absence of an official State delegate.

⁵ This report was read to the conference by Edwin H. Thomas.

⁶ This report was read to the conference by A. W. Schwartz.

in successful operation. At the last legislature a bill placing all weights and measures officers under civil service was enacted. The department had also caused to be introduced a standard-weight bread bill, a bill requiring the sale of ice cream by weight, and a bill providing for the licensing of coal dealers, but all of these failed of passage. Mr. Foley also mentioned a special survey of drug stores made during the past year and a system of instruction carried on by the State department for the purpose of training local officials in methods of testing drug-store equipment.

NEW YORK

By BARNETT KANZER, *Assistant Director, State Bureau of Weights and Measures*

Mr. Kanzer reported that the mechanical condition of the weighing and measuring devices in his State was very good, and that he considered the inaccuracies found to be merely the result of normal wear and deterioration in use. He stated that the use of measures was on the wane, weighing being rapidly substituted for measuring by the merchants of the State. Only minor changes have been made during the year in the statutes under which the bureau operates, but it is hoped eventually to secure the passage of a mandatory standard-weight bread law to replace the present law which permits non-standard sizes to be sold when these are marked with their weight.

OREGON

(The report of William A. Dalziel, deputy State sealer of weights and measures, was incorporated in his paper which will be found on p. 69.)

PENNSYLVANIA

By JAMES H. CRAIG, *Deputy Secretary of Internal Affairs*

Mr. Craig reported that for some time the Pennsylvania Bureau of Standards has been severely handicapped by lack of sufficient funds properly to carry on its activities. The statutory force of 12 field inspectors has been reduced to 2, with the obvious result that the bureau could do but little in the way of field work. He stated, however, that it appeared probable that several additional inspectors could be put on during the coming year. Mr. Craig also discussed briefly some of the weighing and measuring devices which had recently been submitted for approval under the Pennsylvania serialization law.

RHODE ISLAND

By WILLIAM F. GOODWIN, *State Sealer of Weights, Measures, and Balances*

Mr. Goodwin briefly reviewed the experience of his department in its contacts with the manufacturers and users of weighing and measuring devices, stating that, while this was not true at first, the fullest cooperation now existed. In his remarks he stressed the successful efforts of his department to harmonize the interests of all

parties concerned in any weights and measures matter. While mentioning the occasional scarcity of funds, Mr. Goodwin said that his department was rendering efficient service to the people of his State.

TENNESSEE

By T. F. MAHONEY, *City Sealer of Weights and Measures, Chattanooga*

Mr. Mahoney reported that, in general, the weights and measures work of his State was not well organized at the present time. Lack of appropriations contributed largely to this condition, but plans were being made for a vigorous campaign in the immediate future to provide adequate weights and measures supervision for all parts of the State such as is now in force in a few of the larger cities.

VERMONT

By H. N. DAVIS, *Deputy State Commissioner of Weights and Measures*

Mr. Davis reported that during the past two years but little could be accomplished in his department except purely routine matters on account of a 50 per cent cut in appropriations which took place in 1923. The last legislature, however, increased the amount available for weights and measures supervision, as a result of which two additional field inspectors are to be placed in service. This will greatly increase the efficiency of the department, and with additional funds which are hoped for from the next legislature fairly satisfactory conditions of administration are anticipated.

VIRGINIA

By L. R. TRAVERS, *Director, State Bureau of Weights and Measures*

Mr. Travers outlined some of the provisions of the new weights and measures law of his State, under which all cities and counties are to appoint sealers and provide suitable testing equipment. He stated that so far practically all of the cities and about 30 of the counties had complied with the provisions of the law in this respect. Mr. Travers said that already it was apparent that the State law could be improved in many of its details, and that the State legislative bureau was drafting amendments which it was hoped would be adopted by the next legislature. In this connection he mentioned particularly a section on baskets and similar containers.

WEST VIRGINIA

By P. R. EDLER, *State Inspector of Weights and Measures*, and HOWARD S. JARBETT, *Chief Clerk, State Department of Weights and Measures*

Mr. Edler reported that dry measures have practically disappeared from his State, having been replaced by weighing scales. He also reported that the rapid building of State highways was causing a very great increase in the number of gasoline-dispensing units being installed. He stated that efforts to have some necessary amendments to the present law made met with failure, but that another effort

would be made to have this legislation enacted. Mr. Jarrett described the situation in respect to the manufacture of a nonstandard-size milk bottle in the State.

WISCONSIN

By GEORGE WARNER, *Chief State Inspector of Weights and Measures*

Mr. Warner reported that no new weights and measures legislation had been enacted during the past year. He mentioned the results of an investigation on packages of cup grease, cans of lubricating oil, etc., in the course of which shortages of as much as 14 per cent on cup grease and 10 per cent on oil were found. He also stated that an important case, involving the right to use a 9-gram sample in testing cream when the State law specifies that an 18-gram sample is to be used, was before the Wisconsin courts for adjudication.

(Following these reports representatives from a number of cities and counties presented brief reports upon various phases of the work in their jurisdictions.)

(At this point, at 12.45 o'clock p. m., the conference took a recess until 2.10 o'clock p. m.)

SECOND SESSION (AFTERNOON OF MONDAY, MAY 25, 1925)

The conference reassembled at 2.10 o'clock, p. m., Dr. George K. Burgess, president, in the chair.

ABSTRACTS OF REPORTS OF REPRESENTATIVES OF STATE ASSOCIATIONS OF WEIGHTS AND MEASURES OFFICIALS

MASSACHUSETTS ASSOCIATION OF SEALERS OF WEIGHTS AND MEASURES

By J. J. MUTTER, *Sealer of Weights and Measures, Easthampton*

Mr. Mutter spoke briefly of the organization of his association and of its recent activities. He mentioned particularly its legislative program. Of three bills sponsored by the association the one giving the State director of standards authority to approve or disapprove of the type of weighing and measuring devices submitted for examination by a manufacturer or the examination of which is requested by a sealer was enacted into law and becomes effective June 2, 1925. The other two bills—one to include certain sealers within the classified civil service and the other defining the term "food in package form" in the law relative to the inspection and sale of food—were held over by the legislature for consideration at its next session. Mr. Mutter also spoke of the close cooperation existing between his association and the State division of standards.

NEW YORK ASSOCIATION OF SEALERS OF WEIGHTS AND MEASURES

By H. W. SHERMAN, *Sealer of Weights and Measures, Rochester*

Mr. Sherman spoke of the necessity for adequate compensation for sealers of weights and measures and of the efforts of his association to this end. He also stated that the association had made strenuous but unsuccessful efforts to have a wood law enacted by the last legislature. Mr. Sherman discussed the bread situation and voiced his conviction that any bread legislation which does not prohibit the sale of nonstandard-weight loaves is practically without value, and expressed the hope that suitable bread legislation would soon be in force throughout the United States.

THE SUPERVISION OF WEIGHMASTERS

By WILLIAM F. CLUETT, *Chief Deputy Inspector of Weights and Measures, City of Chicago, Ill.*

Weights and measures officials charged under the law with enforcing the keeping and use of correct weighing and measuring apparatus by dealers and the delivery of honest quantities are generally trying to improve conditions to the end that the purchaser shall receive what he pays for and the dealer shall benefit through the fair competition that his activities insure. It was with this thought in mind

that we had a public weighmaster ordinance passed by the city council some two years ago. Now this ordinance, which was upheld by our State supreme court, was made not only ineffective and worthless, but positively vicious by an opinion rendered by the same court in passing on the validity of a different ordinance. I can, perhaps, make this more understandable by discussing it in the light of the two decisions handed down by the Illinois Supreme Court in 1924, one of them upholding the validity of our public weighmaster ordinance, the other declaring invalid that part of the Chicago coal ordinance giving the city the right to stop loads of coal in transit and require a reweighing if the said loads had been weighed over approved scales by bonded licensed weighmasters.

The purpose of weights and measures inspections is to insure as far as possible correct determination of quantity. Correct apparatus, laws providing for the keeping and use by dealers only of legal standards, and requirements that only true weight or measure shall be delivered will not alone accomplish this purpose. In addition to this there must be inspection, supervision, and control, with power vested in an authorized official to make rules and regulations and devise methods to make the laws effective and to see that the penalties provided are properly enforced. In Chicago we have a code of city ordinances that we believe are good and comprehensive. These ordinances are backed up by State statutes and by powers granted the city under the cities and villages act, which is the charter under which the city functions. In our opinion, the weak spot in prosecutions for violations of the city ordinances lies in the fact that they are quasi criminal in nature, and a defendant convicted under them can be imprisoned only in order to enforce the payment of a cash penalty imposed by the court. This does not serve as a deterrent from further violations nearly as well as would a sentence of imprisonment or the revocation of a license where flagrant or repeated violations are proved.

Short-weighting in Chicago has been increasing steadily for years, due to a number of causes. First, the department has not a sufficient number of inspectors to try out and check up deliveries of dealers as often as they should be checked, which in itself would go a long way to stop the practice. Second, the courts, in our opinion, deal too leniently with violators. And, last, there is the ever-present cause covered by the word "politics."

Because of short-weighting, the use of padded weight tickets, the mixing of an inferior grade of coal with coal of a superior grade or quality, together with its attendant price-cutting and unfair-competition features, conditions finally reached the stage where the dealers themselves protested and demanded that the city give them protection in order that they might be able to continue in business without the necessity of resorting to the same dishonest practices they complained of. It was because of this protest that the public-weighmaster ordinance was drafted and passed. We already had ordinances governing the sale and delivery of commodities in wagonload lots and for quantities less than wagonload lots, with penalties provided in the way of fines for selling and delivering a less quantity than that represented, but these provisions did not accomplish the purpose intended. The State supreme court had decided that the city

lacked the power to license certain lines of business when this was apparently for the purpose of bringing in revenue, one of these being coal dealers. It did have the power under section 91 of the cities and villages act to tax, license, and regulate public scales among other businesses, so this gave the city the opportunity to draw up an ordinance covering the sale and delivery of commodities with a penalty provision for short weight with a kick to it, and the revocation of license in addition to any cash penalty that might be imposed for short-weighting or issuing false or fraudulent weight certificates. The ordinance provides that any person, firm, or corporation owning scales suitable for weighing may become a public weighmaster upon furnishing a bond of \$2,000 and paying a license fee of \$20 per annum. Public weighmasters are authorized to appoint all necessary deputy weighmasters who are required to furnish a bond of \$2,000 and pay an annual license fee of \$10. Each public weighmaster appointing any deputy weighmaster shall be answerable for any and all acts of such deputy weighmaster in connection with the weighing of any commodity over the scale of such weighmaster, provided that such responsibility on the part of the public weighmaster shall not relieve the deputy weighmaster of liability for his own acts. The ordinance provides that every load lot of commodity, produce, article, or articles of merchandise sold in load lot, by weight, delivered by wagon, truck, or other vehicle within the city, shall be weighed by a public weighmaster, and a certificate of weight for each such load, issued by such public weighmaster, shall be delivered to the purchaser or consignee of such load, or to his or their agent, at the time of delivery and before any of the load is removed from the vehicle. If no person is present to receive the weight certificate it shall be posted conspicuously at the place of delivery before any of the commodity is removed from the vehicle. There are a number of other requirements set forth in different sections of the ordinance, including a section authorizing a weighmaster to weigh his own commodities, which reads as follows:

Nothing contained in this article shall be construed to prevent any person, firm, or corporation engaged in the business of selling any commodity, produce, or article of merchandise which is ordinarily delivered by wagon, truck, or other vehicle, from becoming public weighmasters and appointing deputy weighmasters to weigh the commodity, produce, or article of merchandise being sold and delivered by such person, firm, or corporation; and any weight certificate issued by such person, firm, or corporation, or the deputies appointed by same, covering commodities sold by such person, firm, or corporation, shall be of the same effect as the weight certificate issued by any other public weighmaster.

This privilege is admittedly very liberal, but it was necessary. The ideal way would have been for the city to own the scales and appoint weighmasters as city employees to do the weighing, but when you consider that the area of Chicago is approximately 200 square miles, with thousands of dealers and tens of thousands of loads weighed and delivered daily, it can be seen that the cost of locations, scales, and equipment that would be necessary would be prohibitive. There also are comparatively few persons owning scales suitable for weighing load lots of commodities who are engaged in no other business than that of doing weighing for the public, and they are, in the majority of instances, so far removed

from the yard or business place of the sellers that it would be held to be unreasonable to require a dealer to send his empty vehicle to their scale to have the tare weight ascertained and then have it go back to the dealer's yard for the load to be put on and return it to the public weighmaster's scale to obtain the gross weight in order that the net weight could be ascertained before the load could be delivered. These various angles were all considered before drafting the ordinance. It was believed that with the city having the right to reweigh and revoke licenses for cause a method had been devised that would reduce short weighing to a minimum. The ordinance was passed, and the department withheld its enforcement for four months in order to give the dealers ample time in which to comply with the requirements. We no sooner started to enforce the ordinance than a bill of injunction was asked for by about 120 dealers, consisting mostly of building material and ice dealers, with a few coal dealers mixed in claiming the ordinance was invalid, unreasonable, and unenforceable. The circuit court granted a temporary restraining order, with the understanding that a test case would be tried out in the municipal court, and that a final decision would be given based upon the ultimate outcome of that case. This test case was brought, and the city was loyally supported in its endeavor to uphold the validity of the ordinance by a large majority of the dealers, while the small number who had obtained the temporary injunction in the circuit court as strenuously opposed it. The city lost the decision in the municipal court and appealed direct to the supreme court of the State. That tribunal handed down its decision in the April, 1924, term of court. It reversed the finding of the municipal court and assessed a penalty of \$25 and all of the costs against the company, saying that as this was an agreed case in which all of the contentions of the parties involved were tried out in the lower court there was no necessity of remanding it back for a new trial. The decision, in our opinion, was clear-cut and the matter was handled in a comprehensive manner by the court.

The court said, in part, that—

* * * The ordinance was designed to protect the public against what has been universally regarded as a widespread evil in the selling of commodities in load lot by weight, and it contained effective means for the prevention of the evil * * *. The purpose of the ordinance was most commendable and essential to secure to the purchaser the weight of the commodity purchased and paid for, but a defense was interposed at the trial on the ground that the city had no power either expressed, necessarily implied, or essential to the purpose of the corporation, to pass the ordinance.

The powers of the city council are enumerated in article 5 of the cities and villages act, and among them are the following:

Fifty-fourth.—To regulate the inspection, weighing and measuring of brick, lumber, firewood, coal, hay, and any article of merchandise.

Fifty-fifth.—To provide for the inspection and sealing of weights and measures.

Fifty-sixth.—To enforce the keeping and use of proper weights and measures by vendors.

Sixty-sixth.—To regulate the police of the city or village and pass or enforce all necessary police ordinances.

Ninety-first.—To tax, license, and regulate, * * * public scales, etc.

One hundredth.—To pass all ordinances, rules, and make all regulations, proper or necessary, to carry into effect the powers granted to cities or villages, with such fines or penalties as the city council or

board of trustees shall deem proper, provided no fine or penalty shall exceed \$200, and no imprisonment shall exceed six months for one offense.

The appellee would limit the meaning of these sections by confining the word "regulate" to governing by rule and directing or managing according to certain standards or laws, and contends that the word does not include authority to provide that commodities shall be weighed by a public weighmaster appointed by the city.

The power conferred, as applied to commodities sold in load lots by weight, can not be so restricted. The commodity sold and paid for by weight is necessarily weighed, and the authority is not merely to create a mental state in the seller or rule or regulation that he shall give honest weight, but it includes supervision, oversight, control, and prescribing methods to secure the intended result. It is admitted that the city could legislate by making rules and prescribing methods for weighing commodities sold by weight, but if there were no power to provide for the weighing of the commodity, making rules without superintendence or control would be ineffective and worthless. The ordinance is limited to purchases in load lots, not as loads but by weight. The power to regulate necessarily includes the power to make the regulation effective and to provide for methods of weighing which will secure truthful weights. The method provided for such regulation is the appointment of a weighmaster required to give a bond and pay a small fee instead of the weighing being done by the seller, without the knowledge or supervision of anyone or any method of ascertaining whether the scales are correct or the weighing honest. There is no legal objection to the ordinance.

The department felt greatly elated and believed that effective means had been placed in its hands to reduce short-weighting to a minimum, when, like a bolt from a clear sky, the supreme court handed down a decision in the June term wherein it declared a part of sections 986 and 987 of the Chicago code, the coal ordinance, giving the inspector of weights and measures the right to stop loads of coal in transit and demand a reweighing in order that the weight shown on the delivery ticket might be verified, to be invalid if the original weighing had been done over approved scales by bonded, licensed weighmasters. This right was assumed to be so necessary and logical on the part of the city to insure the delivery of honest weight, the legal right to do so being backed up not only by the cities and villages act but by the State statutes as well, that the city did not consider it necessary to be represented in court when the oral argument came up, especially in view of the opinion rendered by the same court in the public weighmaster case. The arguments advanced by defendant's counsel against the reasonableness and validity of the reweighing clause of the ordinance apparently gave the court a most peculiar viewpoint.

Briefly, section 986 provides that any person, firm, or corporation engaged in the business of selling coal in the city of Chicago shall provide the driver of the wagon or conveyance with a delivery ticket, showing the name and address of the seller and buyer, the name or kind of commodity, and the gross, tare, and net weights, this ticket to be delivered by the driver or person in charge of the conveyance to the purchaser or his agent at the time of the delivery of the fuel and before any of it is removed from the wagon, or to the inspector of weights and measures or any of his deputies upon demand. It provides that upon the demand of the purchaser or his representative, or of the inspector of weights and measures or any of his deputies, that the weights shown on the delivery ticket be verified, it shall be the duty of the driver, or the person, firm, or corporation

delivering such fuel, to proceed to some scale selected by them in the particular locality where the delivery is to be made and there weigh the load, etc. It further provides that if the party making the delivery is not satisfied with the weight shown on this scale it shall be the duty of the purchaser or his representative, or of the inspector of weights and measures or any of his deputies, to go with them to some other scale in the particular locality where the delivery is to be made and permit the weighing to be done.

The court said, in part:

Appellant contends that the State has not delegated to the city of Chicago the power to pass the ordinance in question; that the ordinance is unconstitutional in that it authorizes the inspector of weights and measures to seize the employees and equipment of coal dealers without a warrant and without reason to suspect that an offense has been committed; and that the ordinance is vague and uncertain in its terms and unreasonable and burdensome in its provisions. Appellee meets these contentions with the claim that the act of 1921 in relation to weights and measures has expressly conferred upon cities the power to pass this ordinance; and, furthermore, that it has the general power to regulate the inspection and weighing of commodities under items 54, 56, and 66 of section 1, article 5, of the cities and villages act. The purpose of the act in relation to weights and measures is to secure uniform and accurate standards and protect the public from false weights and measurements by compelling the use of approved standards. In order to carry out the purpose of the act, it provides for inspection of the instrumentalities used in weighing and measuring commodities.

The court then quotes section 7 of the weights and measures act, which gives power to and prescribes the duty of the officers who are to enforce the act, and says:

It is upon this section that appellee relies for its authority to require the dealer to comply with the demand of the inspector to reweigh his load, so that the weight shown by the delivery ticket may be verified. The section is poorly drafted, and the intent of the legislature is awkwardly expressed; but when the whole act is read it is clear that no such authority is expressly given. Stripped of unnecessary verbiage, section 7 simply gives the inspector the authority to test the instrumentalities of weighing and measuring, and if these instrumentalities are being used by a dealer selling from a wagon he may require the dealer to go to a convenient place for the purpose of making the proper tests. If the goods are being sold by the package, bottle, basket, spool, or other measure designating a specific amount, and it is represented that such package, bottle, basket, or spool contains a certain number of pounds, pints, pecks, or yards, as the case may be, then the inspector is given authority to take one of said packages, bottles, baskets, or spools and test the same to determine whether it contains the amount represented. At no place in the statute is the authority given to direct the reweighing of a load of coal which has been weighed by a person authorized to do the weighing on an approved scale.

* * * While a city has under its general charter power to enact ordinances of a regulatory nature, authority to pass all necessary police ordinances to carry into effect these regulations, such regulatory ordinances must be reasonable and must not unnecessarily contravene the natural rights of individuals affected by them. Under the guise of police regulations the personal rights or liberties of citizens can not be arbitrarily invaded. In order to hold valid an ordinance of a regulatory nature, enacted under the general charter powers, the court must be able to see that the ordinance tends in some degree toward the prevention of an offense or the preservation of public health, morals, safety, or welfare. If, under the guise of protecting the public interests, the ordinance arbitrarily interferes with private business and imposes unusual and unnecessarily restrictive regulations upon lawful occupations it is void.

The court then winds up its opinion in the following amazing conclusions:

The ordinances of the city of Chicago provide for the testing of all scales used for weighing coal and provide for the weighing of the coal by licensed

weighmasters and require that the true weights be shown upon a delivery slip. All of these regulations have been held to be reasonable and a proper exercise of the police power. Under these ordinances the only way for the coal dealer to cheat his customers is to steal coal from the wagon after it has been weighed. This he could not do unless he entered into a conspiracy with his drivers. The regulation in question is inquisitorial in its nature and is designed to secure evidence of crime. The likelihood of a dealer entering into a conspiracy with his drivers to steal his customers' coal is so remote that the regulation can not be sustained on that ground, nor can it be sustained on the ground that it furnishes a means of testing the honesty of the public weighmasters. The regulation is entirely foreign to the subject of providing and maintaining accurate standards of weights and measures. It authorizes interference with the orderly conduct of a lawful business where there is no reasonable ground for suspecting that the law is being violated or the public welfare threatened. It is an abridgment of the privileges and immunities of the citizen without any legal justification and is therefore void.

The court by its decision has taken from the cities and villages of Illinois power to employ the only conceivable means of detecting shortweights in the retail coal business and has rendered the city of Chicago helpless to obtain the benefits of its weighmaster's ordinance.

The means of detecting short-weighing provided by the ordinance—that is, reweighing near the point of delivery—is the only means yet devised for detecting short-weighing in the sale of commodities sold, like coal, in load lots by weight. A deficiency of weight in a load of coal, unless so great that no cheater in his right senses would hazard it, is not visible to the naked eye, even if the pretended weight be known by inspection of the delivery ticket. The only way to detect a deficiency is to reweigh the coal. The customer can not reweigh the coal either before or after it has been dumped into his bins; he has no scales suitable for the purpose.

A city, with millions of customers and thousands of dealers and countless loads of commodities being sold and delivered, can not own its own scales and employ and pay for weighmasters out of its own pocket and require all weighing to be done by them. The cost would be prohibitive. Trucks used for the delivery of coal are of standard capacities. A 5-ton or a 10-ton truck is frequently and legitimately used to deliver a 1-ton or a 2-ton order. There is, therefore, never anything unusual or suspicious about the load or the driver.

The inspector is never notified by the dealer that he will send out a short-weight load. The truck is never marked that it contains a short-weight load nor does the driver advertise it.

The delivery ticket or certificate means nothing unless verified, since a deficiency is not visible. The notorious practice of short-weighers of providing their drivers with duplicate tickets, one showing the true and the other the "padded weight," can not be circumvented except by reweighing when the driver is about to hand the "padded weight" to the customer. Short-weighing is nearly always accomplished by a deficient weight accompanied by a "padded weight" ticket or certificate; none of the coal is taken off after weighing through any conspiracy between employer and driver or otherwise. The shortage was never put on the vehicle.

Forcing the dealer to employ the most accurate scales and subjecting them to frequent inspection and testing are of no avail. The accuracy of the scale does not guarantee the honesty of the weight record. Short-weighters do not rely on inaccurate scales, but, instead, use the most accurate and approved ones. They rely on false tickets and certificates.

The weighmaster ordinance does not create public officials in any strict sense of the word. Under its provisions any coal dealer may obtain, and the majority of them already have obtained, licenses and may and do certify deliveries from their own yards to their own customers. In other words, the same people are weighing and certifying to their own deliveries on the same scales as before the ordinance was enacted. The main purpose and chief benefit of the weighmaster ordinance lies in the power of the city to revoke licenses to persons detected in habitual short-weighting and to refuse to issue licenses to such persons, so that they will have to have their deliveries certified by honest weighmasters. Before the city can revoke or refuse a weighmaster's license, however, it must detect the short-weighter. This it can not do without an ordinance such as the one involved in the instant case. The instant ordinance and the weighmaster ordinance do not overlap. They are supplemental. The one is to enable the city, by a reasonable method of inspection, to detect short-weighters; the other is to prevent short-weighters who have been detected and convicted from continuing their insidious frauds upon the public.

A coal dealer, even though he has a weighmaster's license, may cheat his customers in the same way as before; instead of a "padded" delivery ticket he now furnishes a "padded" weighmaster's certificate and sends it out with a deficient load, together with the customary "duplicate" to be used if approached by an inspector. There has never been any trouble from "a dealer entering into a conspiracy with his drivers to steal his customer's coal"; that is not only not the only way for a coal dealer to cheat his customers but it is not even a way which short-weighters, either before or after the enactment of any of the ordinances, ever availed themselves of to any extent. Under the decision of the court it will never be necessary for the dealer to enter into any conspiracy with his drivers to cheat his customers. All the dealer need do is to become a public weighmaster, and his weights can not be questioned. It would be futile to "require that the true weights be shown upon a delivery slip" if the city is prevented from making the only investigation it conceivably can make to determine whether the weights are truly shown.

If my interpretation of the meaning of the law is correct, the court misapprehended the proper construction of the act in relation to weights and measures in holding that "at no place in the statute [the act in relation to weights and measures] is the authority given to direct the reweighing of a load of coal which has been weighed by a person authorized to do the weighing on an approved scale." The following certainly seems to authorize the city inspector to reweigh a load of coal: "He [the inspector or other official] shall have the power and shall from time to time weigh or measure and

inspect * * * amounts of commodities of whatsoever kind for the purpose of sale, offered or exposed for sale, or sold or in the process of delivery in order to determine whether the same contain the amounts represented. * * * He may, for the purpose above mentioned, and in the general performance of his official duties * * * stop any vendor, peddler, junk dealer, coal wagon, ice wagon, delivery wagon, or any person whatsoever and require him, if necessary, to proceed to some place which the Director of Trade and Commerce [or the inspector of weights and measures] may specify, for the purpose of making the proper tests." What could the legislature have said?

All of the foregoing reasons, with many others, pointing out the power of the city to enact the ordinance, backed up by many citations of court decisions, were presented to the court by the city in its petition for a rehearing. I regret to say the petition was denied. The consequences to the regulation of the weighing of commodities sold in load lots, by weight, is nothing short of calamitous. The court by its decision has legalized cheating in load-lot deliveries. Honesty can not be legislated into a person. Bonding and licensing a person authorizing him to do certain things, with penalties prescribed for not doing them, and then prohibiting the ones accepting the bond and issuing the license from using the only conceivable method of checking up in order to see whether or not the licensee is complying with the terms for which the license was granted and enforcing the penalty if not doing so, is not farcical but tragical in matters of this kind. The department temporarily stopped reweighing load lots of coal where the load was accompanied by a public weighmaster's certificate. However, complaints of price cutting and short weighting became so numerous that we started out again the first of the year to stop and reweigh whether the load was accompanied by a public weighmaster's certificate or not. We found but two companies who refused to permit us to reweigh, and we did not insist with them. We simply started a suit in court charging them with interfering with the inspector of weights and measures in the performance of his duty by refusing to weigh in order that he might ascertain the correct net weight. Out of 20 cases of short-weight coal deliveries, reweighed by deputy inspectors during the first three weeks in January, 12 of the loads were accompanied by public weighmaster's certificates. Shortages on these loads ran from 200 to 1,200 pounds each. One of these cases has been selected to be tried out and a record made to be taken up to the State supreme court, and we trust that on a new record of facts we will be able to convince the court that the city not only has the power to pass ordinances authorizing the reweighing of commodities sold in load lots, by weight, whether weighed by a public or private weighmaster, but that it is the duty of the city to do so in order to protect the purchaser.

In the meantime the department has had two forms of amendments to the present public-weighmaster ordinance drafted by the corporation counsel. One of the amendments provides that before the city shall issue a license for a public or deputy weighmaster he shall sign an agreement, which shall be plainly printed on the license application, to the effect that the weights and measures official and the

purchaser are given the specific right to reweigh or cause to be reweighed any load lot of commodity in which the licensee is directly or indirectly interested and which has been weighed by him as a public weighmaster. The other form prohibits any dealer from issuing a public weighmaster's certificate for any load lot of commodity of which he is the seller or in the sale of which he is interested directly or indirectly. The department intends to employ every means possible to get the authority to reweigh load lots of commodities sold by weight and will be guided along the course by conditions as they come up.

DISCUSSION OF ABOVE PAPER

The CHAIRMAN. The paper is before the conference for discussion or consideration. It certainly is a very interesting case.

Mr. SWEENEY. I would like to ask Mr. Cluett whether the court did not rule that the Legislature of the State of Illinois could pass such an act but that it could not be accomplished by ordinance.

Mr. CLUETT. The matter of regulation of weighmasters is in an ordinance passed under authority of the State legislature; the power to reweigh is contained in the State statute on weights and measures. The supreme court did not deny the power of the city of Chicago to pass such an ordinance, but they decided there was no right to reweigh if the load had been weighed originally by a bonded weighmaster.

Mr. EGAN. I would like to ask Mr. Cluett whether the two forms of amendments that have been drafted will correct the evil.

Mr. CLUETT. We think so.

MEETING THE PROBLEM OF PEDDLERS AND TRANSIENT VENDORS

By JAMES A. SWEENEY, *Sealer of Weights and Measures, City of Boston, Mass.*

Mr. Chairman and fellow delegates, it is a great pleasure for me, as the sealer of the largest city in Massachusetts, to be here to-day as a delegate to this the Eighteenth Annual Conference on Weights and Measures. I deem it a distinctive honor to have been assigned a place on your program, yet I can not fail to realize that the subject upon which I shall speak is one that could have been treated far more ably by a representative from the division of standards of Massachusetts, considering the fact that it is principally through that department that all licenses issued to transient vendors and hawkers and peddlers are granted.

In Massachusetts to-day we have placed safeguards around the purchasing public and honest merchant alike by vesting control of hawkers and peddlers and transient vendors in the director of standards of our State, through whom, aided in places by local sealers of weights and measures, splendid results have been obtained and abuses and transgressions have been minimized.

In early colonial days the people of the Massachusetts Bay Colony viewed with suspicion the hawker, the peddler, and petty chapman, and legislation in that early period of our State was enacted more or less drastically concerning them. A statute enacted in 1846 repealed earlier statutes that had been in operation and required every

hawker, peddler, or petty chapman, with certain exceptions, to obtain a license.

Under the provisions of law now in operation in Massachusetts a hawker and peddler is defined by statute in the following manner:

Except as hereinafter expressly provided, the terms "hawker" and "peddler" as used in this chapter shall mean and include any person, either principal or agent, who goes from town to town, or from place to place in the same town, selling or bartering or carrying for sale or barter, or exposing for sale any goods, wares, or merchandise either on foot, on or from any animal or vehicle.

Five classes of hawkers' and peddlers' licenses are issued by the director of standards. They are known as "special town," "special city," "special State," "special county," and "disabled veteran's." A special State license costs the licensee \$50 and entitles him to sell or barter, in any city or town, any fish, fruit, vegetables, or other goods, with a few exceptions. A special county license entitles the licensee to peddle in the county named only such articles as are manufactured by himself or his employer, and the fee paid depends upon the population of the county in question. A special town or special city license carries with it the same privileges as a State license, but the holder is limited to operate only in the city or town for which the license is issued. The fee charged is based on the population of the town. A disabled veteran's license requires the payment of no fee and is granted to any resident of the Commonwealth who served in the Army or Navy of the United States in the World War, who received an honorable discharge therefrom, and who is disabled by reason of such service. The law also permits the sale without a license of certain specified articles, such as books, newspapers, provisions, etc.

The aldermen or selectmen of cities or towns may make regulations, not inconsistent with existing statute laws, governing hawkers and peddlers without the payment of any fee; they are also permitted to require hawkers and peddlers of fish, fruit, and vegetables to be licensed, provided they are not licensed by the State director. In other words, a person licensed by local authority as a hawker or peddler need not be licensed by the director of standards.

A special State, special city, or special town license is transferable through the director upon evidence furnished by the applicant like that required for granting a license. A licensee is required to produce his license for inspection whenever demanded by proper authority, and failure on his part to do so subjects him to the same penalty as if he had no license. Each foot peddler is required to wear a badge, and each pack or parcel or vehicle used in hawking or peddling shall have upon it a plate or tag bearing the number of the license, the word "peddler," and such other information as the director may deem necessary. The director of standards may revoke any license granted by him to a hawker or peddler upon the conviction of the licensee for any crime which, in the judgment of the director, warrants such revocation.

The law also requires the court authorities to notify the director of any conviction of a licensee. Under the general provisions of the law a penalty of not more than \$1,000 is provided for counterfeiting a license, and the same penalty applies for attempting to sell under a license which has expired, or which has been revoked or canceled.

That the legislative act of 1915 was a move in the right direction is clearly demonstrated by the following comparison of revenues derived. The average yearly income derived by the State from hawkers' and peddlers' licenses during the last five years it was under the control of the secretary of state amounted to \$12,947. In 1924 a total of \$88,652 was received, representing the issuance of 3,005 licenses by the director of standards.

The statutory definition of a transient vendor in Massachusetts is as follows:

"Transient vendor" for the purposes of this chapter shall mean and include any person, either principal or agent, who engages in a temporary or transient business in the Commonwealth, either in one locality or in traveling from place to place, selling goods, wares, or merchandise.

"Temporary or transient business" for the purposes of this chapter shall mean and include any exhibition and sale of goods, wares, or merchandise which is carried on in any tent, booth, building, or other structure, unless such place is open for business during usual business hours for a period of at least nine months in each year.

The problem of transient vendors is one of long standing. Legislation affecting itinerant vendors, as they were then termed, was first enacted in 1890, the power to license them being vested in the secretary of state. Unfortunately, however, no means were provided for the enforcement of the act, with the result that permanent dealers in nearly all of the populous communities of the State were compelled to meet competition from large numbers of this class of traders, who received all benefits of protection from the fire, police, and other public departments without bearing any share of the expense of maintenance.

It became apparent that conditions existing were not due to lack of law but to lack of enforcement. The matter finally began to receive the attention of the various chambers of commerce, with the result that, acting in conjunction with the State department of weights and measures, the law was amended in 1916, transferring the duties formerly devolving upon the secretary of state to the director of standards. Provisions were made for enforcement by the director and inspectors of standards, local sealers of weights and measures, constables, and police officers. The wisdom of this legislative act finds full expression in the fact that while only three itinerant vendors' licenses were issued in 1915, 348 licenses were issued to transient vendors in the fiscal year 1924.

In enacting the statute relative to transient vendors due consideration was given to all persons engaged in a permanent business, and every precaution was taken to encourage rather than to discourage all legitimate business enterprises. Consequently, the law does not affect sales made by commercial travelers nor bona fide sales at wholesale by sample for future delivery, nor sales of merchandise by any person, even though he is engaged in a temporary or transient business in any town, provided taxes have been assessed on his stock of trade.

Before commencing business every transient vendor must secure a license from the director of standards and must deposit \$500 or give a bond in like sum payable to the director and his successors. The license authorizes but one person to sell goods under it, but allows the licensee to have assistants who may aid him in the conduct of

business. Adequate provision is also made to insure the payment to the city or town of the proper local taxes on the stock of the vendor. Detailed requirements also exist in relation to bankrupt sales, fire sales, etc., in order to insure the genuineness of such sales. Heavy penalties are provided for making false statements in respect to license applications and for other violations of the law.

The deposit of \$500 or the bond is subject to attachment and execution in behalf of a creditor of the licensee, whose claim arises in connection with business done under the State license and is also subject to the payment of all fines or penalties incurred by the licensee through the violation of any provisions of the law relating to transient vendors.

The director holds the special deposit for 60 days after the expiration or surrender of the license or after an affidavit of its loss has been filed. After satisfying all claims made upon the same under the provisions of the law he returns the balance to the licensee.

Finally, I might say that any person who applies for a license must declare that he is a citizen of the United States or else that he has declared his intention to become one.

Under the law as it is now operated in Massachusetts we have several splendid results. It is almost impossible in the whole State of Massachusetts to find anyone selling any goods, such as I have described, without a license. The State receives \$88,652 from State licenses, and that does not include the revenue from local licenses. We have about 2,000 peddlers in the city of Boston that sell ice and coal and wood.

If in your States you do not have statutes regulating hawkers and peddlers and transient vendors, it might be a good idea for you to get a copy of that law. This line of work broadens your general field of endeavor, and as a general rule is looked upon as very beneficial for the general public. It prevents a transient vendor from obtaining a vacant store for a few weeks at a nominal rental, doing a tremendous business with a very inferior quality of goods, and then leaving, having paid absolutely nothing for the protection from fire and the other things that the permanent merchant must pay for. Also such vendors often resort to very questionable methods of doing business which are harmful to the established merchants.

DISCUSSION OF ABOVE PAPER

Mr. SCHWARTZ. I appreciate that under these laws you have collected a total of \$88,652 a year for the treasury, but what I fail to understand is this: What relation has that to the work of a weights and measures official? In our State, and I presume in other States, the counties and cities handle these matters under a license bureau.

Mr. EGAN. We have something of the same condition in Connecticut that they had in Massachusetts. The secretary of state issues licenses to itinerant vendors, but I dare say there might be thousands who would pay if the licensing was placed in a proper bureau like that of the director of standards in Massachusetts.

Mr. SWEENEY. I want to say, Mr. Chairman, in reply to the gentleman from New Jersey, that the importance of the weights and measures department is just what you make it. If you take

within its scope certain branches or factors that are intimately connected with it, the result is always good.

Mr. GRIFFITH. Mr. Chairman, I would like to ask what measures are taken to test and seal the apparatus used by these vendors.

Mr. SWEENEY. That is a very good point. The applicant must come to the sealer of weights and measures of the town in which he intends to do business and make a statement in which is specified the type and capacity of scales or measures he intends to use, and this is filed by the sealer of weights and measures, and before he can get that license he must have them tested. The public is assured that every peddler is using sealed apparatus. Moreover, the applicant is conscious of the law, and if found using incorrect scales or measures or giving short amounts of commodity he can not say it was through ignorance, because everything has been explained to him.

**REPORT OF COMMITTEE ON SPECIFICATIONS AND TOLERANCES
ON SPECIFICATIONS AND TOLERANCES FOR VEHICLE TANKS,
PRESENTED BY F. S. HOLBROOK, CHAIRMAN**

At the Fourteenth Annual Conference on Weights and Measures, held in 1921, the conference referred to your committee on specifications and tolerances the general subject of vehicle tanks, with the suggestion that the committee investigate the subject as to whether or not these tanks should be allowed to be used as measures in the distribution of gasoline and fuel oils.

During the following year the committee gave consideration to this question, and at the following conference reported it as its opinion that vehicle tanks might safely be allowed to be used as measures in the sale of such commodities as are mentioned above when properly constructed and supervised. Whereupon the conference instructed your committee to draft a code of specifications and tolerances for vehicle tanks.

During the year that followed your committee did this work and at the sixteenth conference reported a proposed code. Upon the suggestion of the committee this code was adopted tentatively only, in order that criticisms and suggestions could be made by interested parties and be given careful consideration by the committee.

So many criticisms and suggestions were received that it appeared impossible in the time available to produce a code that would be reasonably satisfactory to the parties in interest. Therefore, when the subject was considered at the conference held last year, your committee recommended that when a reading of the code had brought out the various suggestions of those in attendance the whole subject be referred back to it for further consideration to the end that a further attempt be made to get a satisfactory settlement.

Your committee is now able to report that all suggestions made have been given careful consideration, and that whenever it seemed possible so to do without sacrificing fundamental considerations involving the delivery of accurate amounts, specifications and tolerances have been modified to make them more nearly satisfactory. The result is shown on the mimeographed document which is now

in your hands, entitled "Proposed Revised Specifications and Tolerances for Vehicle Tanks (When Used as Measures)," and which is made a part of this report. Your committee will state that, in its opinion, the code has now been materially improved by the modifications suggested; that it furnishes protection to the buyer without prejudicing the rights of the seller; and that if adopted and enforced conditions in respect to the use of vehicle tanks as measures will be very considerably improved.

The committee desires to make a special comment in relation to specification No. 5. While it is felt that the form proposed here is satisfactory for present adoption, nevertheless it is the intention of the committee further to study this subject of the emptying of the tank, in connection with the officials, the manufactures, and the industry in general, in an endeavor to determine whether some modification will not be possible which will further standardize the manner of emptying these tanks, so that a purchaser from any tank will be further assured that when the tank is drawn up to his establishment in any certain manner it will surely drain completely. Similar action will be taken in relation to the outlets from compartments and the branching of pipes.

The committee desires at this time to acknowledge its especial indebtedness to Ralph W. Smith, of the Bureau of Standards, who has assisted very materially in the development of this code, and to many officials, manufacturers, and members of the industry who have made constructive suggestions in this relation.

(Signed) F. S. HOLBROOK, *Chairman*,
W. F. CLUETT,
A. W. SCHWARTZ,
Committee on Specifications and Tolerances.

DISCUSSION OF ABOVE REPORT

Mr. HOLBROOK. It might be helpful if I read through the proposed revised specifications and attempt to point out very briefly the changes which have been made in the present form over that which was formerly adopted. [Reading:]

PROPOSED REVISED SPECIFICATIONS AND TOLERANCES FOR VEHICLE TANKS (WHEN USED AS MEASURES)

(Based on those tentatively adopted by the Sixteenth Annual Conference on Weights and Measures, May, 1923.)

(The committee recommends that the portions of the following material which are printed in italics be nonretroactive in application.)

NOTE.—The following specifications and tolerances shall apply to vehicle tanks and their accessory piping, valves, etc., in those cases in which the tanks or the compartments thereof are used or to be used as measures to determine the amount of liquid delivered, and such use shall be permitted only when these specifications and tolerances are complied with.

There has been no change in this paragraph. [Reading:]

If a tank is damaged in any way (as from collision, etc.), or if repairs which might in any way affect the accuracy of measurement are made, such tank shall not again be used as a measure until inspected and, if deemed necessary, tested, by the weights and measures official.

There has been no change in this paragraph. [Reading:]

In determining or checking the capacity of tanks water is recommended as a testing medium. In general, petroleum products are not recommended, because the change in volume due to temperature variations is large, and evaporation during the test may result in serious inaccuracies in the calibration. If the conditions are such that the use of a petroleum product seems necessary, a neutral oil of high-boiling point should be selected and great care exercised to eliminate the inaccuracies mentioned or to reduce them to a minimum.

While the wording of this paragraph has been slightly changed, the meaning is not essentially different. Formerly it was stated that petroleum products should never be used. Now it is stated that they ought not to be used but it is recognized this may be necessary under certain conditions, in which case there is specified the character of product which should be selected. [Reading:]

DEFINITION.—A vehicle tank, hereinafter referred to as a “tank,” shall, for the purpose of these specifications and tolerances, mean a container, which may or may not be subdivided into two or more compartments, mounted upon a wagon or automobile truck and used for the delivery of liquids. The term “compartment” shall mean the entire tank whenever the tank is not subdivided; otherwise it shall mean any one of those subdivided portions of the tank which is designed to hold liquid.

The definition is unchanged. [Reading:]

SPECIFICATIONS.—1. *All tanks and all indicators, piping, valves, etc., attached thereto and used in connection therewith, shall be of such design, construction, and material that they may reasonably be expected to withstand ordinary usage without impairment of the accuracy of measurement.*

There has been no change in this paragraph.

Mr. Chairman, it has been our general practice on these specifications to have all comments on a section immediately after the section has been read.

The CHAIRMAN. If that has been the practice, to comment on sections one at a time, the Chair will rule that that is the procedure. If there are any comments in relation to a specification please make them when the specification is read.

There being no discussion on specification No. 1 we will proceed to No. 2.

Mr. HOLBROOK (reading):

2. *An indicator shall be provided within the fill opening of each compartment, which shall be located approximately midway between the ends of the compartment. The indicator shall be so designed that it will clearly, distinctly, and unmistakably define the height to which the compartment must be filled in order to contain its marked capacity. If this indicator is adjustable, it shall be so constructed that it can be sealed in such a manner that its position can not be changed without destroying or mutilating the seal.*

This provision is practically the same as the one of last year except for the fact that it is no longer required that the lowest point of the indicator define the filling point.

Mr. KANZER. In New York we require that the indicator must be at the bottom of the collar in uniformity with all measuring devices like a milk can and other types.

Mr. HOLBROOK (reading):

3. *The indicator shall be so positioned that, when a compartment is filled to the indicator, there will remain an expansion space not less than 0.75 per cent of the nominal capacity of the compartment.*

As a result of considerable discussion the committee is satisfied that 2 per cent is a much greater space than is actually required in practice, and accordingly the specified expansion space has been reduced to the figure shown here. In the case of ordinary gasoline 0.75 per cent will take care of a temperature variation of somewhat more than 10°, and it is probably unusual for the temperature in a tank wagon to change by an amount greater than this.

Old paragraph 4 has been partially deleted and partially incorporated in No. 2. Old No. 4 read:

The filler opening of each compartment shall be so positioned as to allow an indicator in this opening to be located as provided in specification No. 2. The filler opening shall be of such a size as readily to permit of visual inspection of the bottom of the compartment.

But it was brought to our attention that the very necessary splash plates in the compartment made it practically impossible to have a visual inspection of the ends of the compartment in any event, so the latter part of the requirement has been dropped. The next paragraph, which was formerly numbered 5, is as follows [reading]:

4. Each compartment shall be provided with suitable venting means to prevent the formation of air pockets by permitting the escape of air from all parts of the compartment designed to be filled with liquid and to permit the influx of air to the compartment during the process of delivery.

That paragraph is unchanged. [Reading:]

5. Each tank, and all delivery piping attached thereto and used in connection therewith, shall be so designed and constructed and shall be so mounted upon the vehicle that, when this is standing upon a level surface, complete delivery may be made from any compartment through the delivery faucets or valves, whether other compartments are full or empty.

The specification last year required full drainage when the tank was standing on any surface making an angle of not more than 5 per cent with the horizontal. It is now felt that the specification as read is as far as it is advisable to go at the present time, but we expect upon further consideration to be able to specify some additional requirements which will be reasonable ones both in relation to the drainage of the tank and of piping. [Reading:]

6. When emergency valves, designed to close the discharge outlets from compartments, are provided, the capacities of such compartments shall be construed as including the capacity of the piping leading therefrom, and such emergency valves shall always be open when compartments are being filled or their capacities are being checked.

The former specification excluded the capacity of such piping, since it was considered at that time that the emergency valves would hold the liquid up in the compartments. However, the city of Detroit, which formerly excluded the piping from the capacity, found that the specification was extremely undesirable due to the fact that after the tank was filled the emergency valves would very frequently leak, with the result that while the full measure would be there the level of the liquid would fall below the indicator; also, it seems to be a fact that emergency valves are intended to be used for emergency only and are usually closed only when an emergency occurs. We are also advised that it is practically impossible to make and install these emergency valves so that they will not leak at least a

little. It therefore appears that the piping should be made a part of the capacity, otherwise short measure will almost invariably be indicated when the tank arrives at the filling station.

Mr. FOSTER. Mr. Chairman, is there not a requirement that these emergency valves be closed when the vehicle is transporting the liquid?

Mr. HOLBROOK. We have no testimony to that effect. I know that certain companies have tried to make it necessary to close the emergency valves. Nevertheless, very many of the companies state that if they have to open and close these emergency valves every time they fill the tank and thereafter open and close them at the various stations the valves, which are always inclined to leak, would be inclined to leak still more rapidly. The practice is, as a rule, to open emergency valves and leave them open and require them to be closed only when an accident occurs such that they would be likely to lose the liquid in the tank. Mr. Austin may be able to tell something about his experience in Detroit.

Mr. AUSTIN. Mr. Chairman, the changes that have been made in this particular section seem to entirely meet the objections that I found to the exclusion of the piping as a portion of the load. From my experience I am fully satisfied with the present arrangement of this section.

Mr. FOSTER. My idea was that the emergency valves were primarily to protect the load in transit in case of accident, and that if left open you would be likely to lose a goodly portion of the load before you could close the emergency valves. I think they should be closed during transit, and it has been my contention that they should be closed when they are filled. This reverses the purpose of the specification that we had previously.

Mr. HOLBROOK. This specification, of course, does not have any bearing on whether the valves are open or closed during the transportation of the load. There is no objection to closing them after the load is on the truck. There is no stipulation that the emergency valves be in one position or another, except that they should be open at the time the tank is being filled or is being checked. As I suggested before, the part of the specification which referred to the opening or closing of the emergency valves separately or together has been dropped out, because under the present form of specification it is no longer necessary. [Reading:]

7. Each compartment of a tank shall be plainly and conspicuously marked with a designating letter or figure, and each delivery faucet or valve shall be correspondingly marked to indicate the compartment of which it is the outlet. In addition, the tank shall be plainly and conspicuously marked to show the capacity, to the nearest half gallon, of each compartment *and such marking shall indicate that the capacities given are measured to the indicators provided. This latter marking shall be placed adjacent to the faucets or valves.*

There is no change in the character of information required to be given to the consumer. The only change made is in the manner of posting this information. Formerly the value of each compartment was required to be labeled upon the compartment itself. It has been suggested, and it seemed to the committee with much reason, that if each compartment bears some letter or figure to differentiate it from the other compartments, and if the information as to the capacity of

each compartment, similarly identified, is included near the faucets, every purpose is served and the buyer is much more likely to see it than if it were noted on one side of the tank. [Reading:]

8. All markings, figures, and graduations required under these specifications shall be of such size, design, material, and location and shall be so applied or affixed that they will not tend easily to become obliterated or illegible.

There is no change in that specification. [Reading:]

9. All tanks and all devices designed to be attached thereto and used in connection therewith shall be of such design and construction that they do not facilitate the perpetration of fraud.

There is no change in that specification.

Now, as to tolerances, the wording of the tolerance paragraph has been changed slightly, but the meaning remains substantially unchanged. The tolerance values are the same as those presented last year. [Reading:]

TOLERANCES.—The tolerance to be allowed in excess or deficiency on all vehicle tank compartments which are being tested by the weights and measures official for the first time to verify the accuracy of a capacity marked thereon by a manufacturer or user, shall be the values shown in the column headed "On first test" in the following table. The tolerance to be allowed in excess or deficiency on all subsequent tests made by the official to verify the accuracy of a marked capacity, shall be the values shown in the column headed "On subsequent test." These tolerances are to be applied to the difference between the actual result of the calibration and the marked capacity of the compartment. Whenever the result of a calibration indicates that the marked capacity of a compartment is not correct within the tolerance to be applied, if the capacity of the compartment is adjustable, then the compartment shall be remarked in accordance with the provisions of Specification No. 7, or the result of the calibration shall be taken as the basis of an adjustment, and the adjustment shall be so made that the capacity of the compartment agrees as nearly as may be with such marked capacity; if the capacity of the compartment can not be adjusted to agree with the marked capacity, then the compartment shall be remarked in accordance with the provisions of Specification No. 7.

Tolerances

Capacity of compartment		Tolerance	
From	Up to and including	On first test	On subsequent test
Gallons	Gallons	Gallons	Gallons
175	175	$\frac{1}{2}$	$\frac{1}{2}$
325	325	$\frac{1}{2}$	1
475	475	$\frac{3}{4}$	$1\frac{1}{2}$
575	575	1	2
725	725	$1\frac{1}{4}$	$2\frac{1}{2}$
875	875	$1\frac{1}{2}$	3
975	975	$1\frac{3}{4}$	$3\frac{1}{2}$
1,125	1,125	2	4
1,325	1,325	$2\frac{1}{2}$	5
1,500	1,500	3	6

The CHAIRMAN. What is your pleasure in regard to the proposed revision?

Mr. GOODWIN. Mr. President, I want to ask the secretary if any provision has been made for the retesting of these tanks by a sealer of weights and measures.

Mr. HOLBROOK. The sealer of weights and measures, in his own particular jurisdiction, under his own regulations can test these

tanks as often as he deems it necessary. This code contemplates an original test and subsequent tests from time to time. It properly is not a function of a code of specifications to direct how often devices should be calibrated by an official, since this will be handled under rules and regulations promulgated by his office.

Mr. SWEENEY. Is not the use of petroleum products as a testing medium likely to introduce decided variations?

Mr. HOLBROOK. Petroleum products are going to expand or contract depending upon the temperature. The committee recommends that water be used as a testing medium. However, it has been brought to the attention of the committee, first, that if water is introduced in the tank rusting is facilitated, and that rust forming on the inside of the tanks will be carried into the tanks of the service stations and eventually through their pumps and their meters or whatever form of devices they have, very much to the detriment of the pumps and meters. Certainly it is advisable to prevent rust in so far as it is possible to prevent it. Second, the suggestion is made that the wholesale stations are usually upon the outskirts of the city or outside of the city altogether. It is possible quickly to fill the tank with oils or gasoline, but the water supply may be in such a location that it will be very difficult to fill the tank with water. The committee, then, merely takes the position that water is believed to be the preferred testing medium. It is not considered that the length of time the water stands in the tanks, especially if they had oil in them before, will be such as to cause rusting. However, if there is no water at these stations, or if the supply is so located that it would take a very long time to fill the tank, then the inspector decides whether he should use water or the oil that is more readily available.

Mr. SWEENEY. In the case of a tank divided into two compartments, each compartment holding 600 gallons, suppose the driver has various deliveries to make. How will he determine the amount of gas he is delivering from the tank?

Mr. HOLBROOK. In that case the committee believes it would be necessary to measure by buckets or in some other way. The committee never recommends that the compartment be used as a measure except when a full compartment is delivered to one purchaser. If a full compartment is not delivered to one purchaser, then the contents drawn should always be measured.

Mr. SWEENEY. After a tank has been calibrated as holding, say, 400 gallons, would it be permissible for a sealer of weights and measures to check the capacity by means of a measuring stick?

Mr. HOLBROOK. The committee is not inclined to think that the gauge-stick method is a very satisfactory one because it believes it is not susceptible of the required degree of accuracy.

Mr. KANZER. I do not understand what you mean by the subsequent test, and in regard to the use of gasoline or petroleum products in making the tests I would not know what the temperature variation is or what relation that would have to water that might be used in the test.

Mr. HOLBROOK. Answering your second question first, the temperature of the petroleum product makes no difference so long as the temperature remains constant during the test. Suppose you

put a petroleum oil in a tank at 70° F. and establish the capacity of the tank in terms of that oil at 70° F. and then bucket it out in order to find out what the tank holds; if the petroleum oil remains at 70° F. no temperature correction need be applied. However, the danger is this: If you take a petroleum product from an underground tank you may establish the capacity of the tank in terms of that petroleum oil at a temperature of, perhaps, 60° F., and as you bucket the oil out in your 5-gallon measure the oil may be rising in temperature. As the oil rises in temperature it expands, and at the end of your calibration you will have measured out a greater number of gallons than the tank actually holds, due to the expansion of the oil as a result of the temperature rise. Such a calibration will, of course, be in error. Even when using water, if its temperature changes in the tank during the measuring operation, then it is true that you will have an error on account of the expansion of the water; but gasoline and all petroleum oils have such a large expansion per degree of temperature change as compared with water that a very much more nearly correct result will be obtained, as a rule, if water is used. It can always be borne in mind that when the supply of testing liquid, the outside atmosphere, and the vehicle tank are at the same temperature, petroleum oil or water may result in an equally satisfactory test, but if you use petroleum products you must pay much more attention to the temperature conditions. Also, gasoline evaporates so very rapidly that if this is employed, while you are checking out the capacity of the tank an appreciable amount of it may go off into the atmosphere, and it would be virtually impossible to determine the amount of this loss.

As to your other question, the "first test" is the test made by the official to establish the capacity of a compartment or tank. On that first test the labels—that is, the capacities marked on the tank by the manufacturer—are verified. The official measures the tank as accurately as possible, and if it comes within the tolerance specified for the "first test" the manufacturer's calibration is left unchanged. Now, when the official checks that tank on a subsequent test slight variations are bound to occur, and the tank may change very slightly in the meantime also. There is a certain difficulty in changing the calibration of a tank after it is established, and to some extent it is objectionable to change the labeled capacity every six months or every year. Therefore on the first test a certain tolerance is allowed; on any subsequent test a double tolerance is allowed for the same reason that a double tolerance is allowed on a scale after it has been in use, so that slight changes can occur without destroying the calibration. However, as soon as the error amounts to more than the values given in the second column under "Tolerance," when the tanks or compartments are retested, the stenciling or marking of the capacity is required to be changed in accordance with the results found.

Mr. GOODWIN. Has the committee considered any other process of measurement in connection with vehicle tank deliveries?

Mr. HOLBROOK. Yes. The committee considers that under proper conditions the tank or compartments can be used as a measure or measures in delivering commodity from the tank; they also have had in mind the fact that gauge sticks are sometimes used in establishing

the contents of a tank partly full of liquid, but the committee does not consider this method a proper one. Another method is bucketing; the hose delivery is much more rapid than bucketing, and our investigations are to the effect that if these tanks are properly safeguarded their use as measures will give results equally as accurate as will ordinarily be obtained by the bucket method. If you will consult the record of the Fifteenth Annual Conference on Weights and Measures, you will find a very comprehensive report in regard to these various methods.

Mr. GOODWIN. Has the committee ever considered the use of the meter for the purpose of delivering the product to the consumer?

Mr. HOLBROOK. The committee has in mind that meters are sometimes used but is not prepared to say what accuracy is ordinarily obtained in practice by this method.

Mr. GOODWIN. At the time this question came before the former conference I took it up with a manufacturer of meters and asked if it was possible to make a meter for that purpose, and they informed me they could do so.

Mr. HOLBROOK. The use of meters in measuring gasolines and oils from vehicle tanks to the service stations selling oils and gasolines is a common method of delivery in some localities. In regard to the accuracy obtained we have no information.

Mr. PRINGLE. In my territory there are 28 refineries, and these refineries run from 2 to 20 wagons. A meter was used in filling the tank wagons, and it was found that on a given wagon there were discrepancies ranging from 312 to 337 gallons. The refinery people called me, and I measured three times with oil and gasoline, and with gasoline I will say we could not measure accurately. The result of my investigation was that the wagon would hold 325 gallons, and the refinery people have decided that they will use the wagon as 325 gallons without regard to the meter.

Mr. FOSTER. I move that the specifications and tolerances for vehicle tanks be finally adopted.

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

APPOINTMENT OF COMMITTEES

The CHAIRMAN. At this time I will announce two committees which it is the chairman's duty to appoint in connection with this conference, as follows:

Resolutions:

George Warner, of Wisconsin, chairman.
H. N. Davis, of Vermont.
L. R. Travers, of Virginia.
John W. Worden, of Highland Park, Mich.
H. W. Sherman, of Rochester, N. Y.

Nominations:

W. F. Cluett, of Chicago, Ill., chairman.
William F. Goodwin, of Rhode Island.
P. R. Edler, of West Virginia.
George M. Roberts, of the District of Columbia.
Conyers B. Graham, of Philadelphia, Pa.

(At this point I. L. Miller, first vice president, assumed the chair.)

WHAT THE BUREAU OF STANDARDS IS DOING TO INCREASE THE ACCURACY OF WEIGHING REVENUE FREIGHT

By HARRY M. ROESER, *Bureau of Standards*

What the Bureau of Standards is doing to increase the accuracy of weighing revenue freight naturally is based upon what must be done. The Constitution of the United States contemplates a uniform standard of weights and measures throughout the different States and Territories, and the practical accomplishment of this is in some measure intrusted by Congress to the bureau. In our extensive system of interstate commerce, in which transportation charges are calculated in terms of pound or ton units, it is a primary requirement that a ton of goods shall be the same ton in all sections of the country, and that the units of weight be not subject to the vagaries of human nature in its sometimes foolish insistence upon individuality, or to the well-known peculiarities of the force of gravity.

This elimination of the variation in weight of a given mass due to geographical location is, then, one of the first things we have to do, or, in other words, it is our business to see to it that the time-honored high-school physics doctrine that the weight of an object varies with its altitude or its position with respect to the center of the earth does not hold in interstate commerce in this country. We accomplish this by the control of what are called "master scales" located at advantageous railroad centers throughout the country. These are high-class precision scales which we annually test and adjust in terms of the same standard mass, and through the medium of these scales and the test cars operated by the railroad systems all scales used for weighing carload freight are mutually adjusted to indicate weight in terms of this same standard of mass. The result is that a ton in California is the same ton in Maine, and a ton on Pike's Peak is the same ton on the seaboard, which I believe is the end our forefathers had in mind when they wrote the Constitution; and, further, it is not the least of things to be considered when commending them upon their perspicacity.

Our fundamental purpose being as just stated, the practical accomplishment of it takes various important necessary ramifications and involves some rather intricate detail. In brief, it requires, first, a continuing investigation of freight-weighing conditions to establish that the required uniformity is satisfactorily maintained; second, it requires annual calibration and test of master scales, as before stated; third, it requires propagation of specifications for adequate weighing machinery; fourth, it requires acting as a sort of clearing house for technical information on adequate freight-weighing conditions; and, fifth, it requires stimulation of interest in good weighing machinery and good weighing conditions.

Our investigation of railroad track scales involves a great deal of intricate detail on account of the vast territory that must be covered and the great number of forces that must be carefully correlated in order that the program may progress smoothly and efficiently. Without going into this detail it will probably be sufficient to say that we have three testing outfits in the field which test 700 to 1,000 scales each year, or approximately 6 to 8 per cent of all

the track scales in the country, and move on approximately 100 railroads.

With regard to master scales, these, as I said before, are calibrated annually. They are 19 in number and are scattered from Reading, Pa., to Oakland, Calif., and Portland, Oreg. These are tested with loads of 30,000 to 80,000 pounds in 10,000-pound intervals. As an indication of the quality of the foundation upon which the revenue-freight weighing in this country is based, let me interject here that one of the tolerance requirements of these scales is that the error at 80,000 pounds load shall not exceed 6 pounds, or less than 0.01 per cent of the applied load, and still further, as an indication that this kind of performance is seriously considered in the design, manufacture, and installation of these scales, let me add that there is one that has not required adjustment for the last four years and several that have not required adjustment for three.

A matter of first ranking importance in our work is the propagation of specifications for adequate weighing machinery. This is done chiefly by cooperation with industrial engineering committees interested in this work and publication of the results. With particular respect to the revenue-freight weighing problem, a monumental achievement of most far-reaching effect in this field was the publication of a set of specifications for the manufacture and installation of railroad track scales, prepared by a committee representing allied interests, which is now almost the universal basis of purchase of new equipment. This set of specifications comprises Bureau of Standards Circular No. 83, and so wide has been its effect and so deep-seated is the conviction of its merits among railroad-scale men, that I have on different occasions felt called upon to remonstrate against its indiscriminate application, and I might add that on each of these occasions I have been most capably called to task for such temerity. Even so, the salutary effect of the specifications upon the weighing of revenue freight is not subject to question, and although the rigid application of them may cause economical handicaps in more or less isolated cases, yet the general benefits apparent to this time are a revelation of the thoroughness with which our transportation systems push a good thing to the limit.

The dissemination of information on adequate freight-weighing conditions is handled as a detail of our testing program. A report on each scale tested is furnished to interested parties, which contains the results of the test, a statement of the condition of the scale, and recommendations for improvement of conditions if these can reasonably be improved. Much correspondence regarding particular details is handled, and this we are very well equipped to do, since we have on file a rather comprehensive line of technical information covering the field. This sort of thing is encouraged, and, as I say, advantage is frequently taken of the opportunities offered. This correspondence relates to specific problems in the design and construction of scales, weighing layouts, and the like, and is generally of the type technically known as consulting advice.

The stimulation of interest in improving freight-weighing conditions is a problem that requires extreme tact and special measures

to bring about effectively. "Tact," says Epic Peters, the Pullman porter made famous by Octavius Roy Cohen, "is something, which if you ain't got it, everybody knows you ain't, and if you has got it, nobody notices." That is exactly the sort of thing one has to use on railroaders if one wants to stimulate their interest in anything. Pamphlet or circular literature does not meet the needs of the situation. As a matter of fact, our results are not accomplished by paper propaganda at all but by personal contact in the field. Railroad men have a pregnable spot, and attacks upon it are as sure of bringing results as the sun is to rise. This spot is not on their heels, where the redoubtable Achilles carried it, but right smack in the middle of their shirt fronts, and it is their sincere fidelity to the interests of their road and their jealousy of its reputation. If you get one of them in a corner upon an appropriate occasion, and either by direct or inferred statement indicate that possibly his road is not as well advanced in the matter of weighing freight as a rival in the immediate vicinity, he will almost certainly do one of two things. He will either give you the age-old and much-hackneyed alibi that conditions are as good as the financial state of the road will permit, or he will call you a liar, and he may be more or less convinced that you are. However that may be, after having driven the shaft home the thing to do is to change the subject and go off and leave him alone. When you come back a year or so later, it will inevitably be found that no matter what he said in the first place there is much evidence of his having gone harder to work. The results of this stimulation of interest in the matter of weighing revenue freight which have been rather startling, and which I will shortly discuss, are primarily the results of a doctrine preached in the language of perspiration and conscientious effort on the part of our field men from the text, "Go thou and do likewise," which is, in fact, the language of a railroader and the only one in which you can talk to him convincingly.

Bore some as statistics are, a few are essential to a concluding summary of the general aspects of this subject. There are now in the United States between 11,000 and 12,000 track scales, of which I should say approximately 5,000 are owned by railroads and the remainder by industrial concerns. Since beginning the service in 1914 we have made approximately 7,000 tests. In the last fiscal year we made the largest number of tests since the service began, namely, 1,019. This year we will test between 800 and 900. We have three field equipments, and with two, tests are made up to 80,000 pounds load and with the other up to 120,000 pounds load. Our tolerance requirements are, for practical purposes, that the error at any load shall not exceed 0.20 per cent of the applied load, or 200 pounds per 100,000 pounds load. In 1914 and 1915, when the service was inaugurated, 32 per cent of the scales tested passed the tolerance. Last year 57 per cent passed the tolerance. This year to date, 66 per cent of scales tested have passed. These tests are made in all sections of the country and closely represent average conditions. There is not much difference in the average performance of railroad-owned and industrial-owned scales. The increase in the number of scales meeting the tolerance has been practically continuous ever since the service was started, even through the serious depression following the war. The increase has been greater within the past two years be-

cause of the effect of new equipment built in accordance with the specifications previously mentioned, and also because the stimulation-of-interest program just stated has been more widespread and has had more opportunity to show results.

To me one of the most amazing things in this connection is the change in attitude toward the capabilities of a track scale. When I first entered the service, and for a number of years, we had to announce our tolerance of 0.20 per cent softly and exercise a great deal of mental agility in devising tactful apology for it, because it was universally regarded as being too small to be of practical use. Such is not the case nowadays. In these times it is not even a rare occurrence for us to be advised that we have no tolerance at all and to have presented to our abashed countenances a local tolerance in use on particular roads of a half, or a third, or even a less fraction of our own. A startling fact connected with these hair-line tolerances is that they are surprisingly well lived up to, and if you want a decidedly healthy sign of the attitude of American business toward living up to its responsibilities I confess my inability to show you a better one.

As an item of interest, let it be said that the total freight revenue in this country amounts annually to something like \$4,000,000,000, and to get a comparative basis freight revenue exceeds passenger revenue in the ratio of something more than 3 to 1. This revenue from which our mighty transportation systems pay their expenses and distribute their profits is measured on the insignificant, coldly efficient, even if often somewhat rusty, track scale. Practically every article of commerce, at some stage between the producer and the consumer, gets some portion of its value established by one of these scales. Often you hear speakers in discussing certain phases of commerce say that this or that thing is the heart of a great industry. I do not wish to draw such an extravagant anatomical analogy for the railroad track scale, because it is not the heart of the transportation industry. If you want such a comparison, let it be called the ductless gland of the transportation industry, because it lays close to the backbone, up close to the brain, and if it is well nourished and cared for the subject thrives, and if not he turns a sickly yellow and accidents begin to happen to him.

Thus far I have told you what we are doing in the matter of increasing the accuracy of weighing revenue freight and what we have done, and now, if you please, I will conclude by saying a word about what we have to do. Business activities, natural forces, human thought move, grow, and fade in cycles. For us to smugly satisfy ourselves that the attention and zeal in accurate commercial weighing that has come to pass in recent years will continue to grow until perfection is attained and remain so forever thereafter would be the most absurd kind of foolishness, because the sum of human experience shows that it can not possibly do so. Starting about 10 years ago, the pendulum of progress started from an extremely low point and has been swinging continually forward since. Ten years or more it has been on its way, and it is still going. As sure as fate at some time in the future, it is not safe now to predict when, the zeal and economical forces which are carrying it forward will burn out and stagnate. Then the pendulum will start backward, and if not restrained the sickening thud with which it hits the bottom will

have a most disastrous effect upon commerce. We are now laying our plans to be ready when it starts back to hold it as nearly as possible to its peak level, and this proposition, as I see it now, is going to be one of the hardest assignments we have ever drawn.

DISCUSSION OF ABOVE PAPER

The ACTING CHAIRMAN. Is there any discussion of this paper? I would like to take this opportunity to tell Mr. Roeser that we in our State appreciate what has been done for us on track scales by the Bureau of Standards. Your work has resulted in the installation of some very good scales.

Mr. ROESER. That is a thing we like to encourage very much. We like to go as far as we can in accommodating State departments and other departments, but, as I said a while ago, we must, by force of circumstances, make annual tests of these master scales, and that to a certain extent circumscribes the territory in which we can operate. We often find that we can not take care of requests for tests, and while we are very sorry, there is not anything we can do about it.

(It was moved and seconded at this point that the conference adjourn; the question was taken, and the motion was agreed to.)

(Thereupon, at 4.40 o'clock p. m., the conference adjourned to meet at 9.30 o'clock a. m., Tuesday, May 26, 1925.)

THIRD SESSION (MORNING OF TUESDAY, MAY 26, 1925)

The conference reassembled at 9.50 o'clock a. m., at the Bureau of Standards, Dr. George K. Burgess, president, in the chair.

RECENT ACTIVITIES OF BUREAU IN RICHMOND

By B. W. RAGLAND, *Chief, Bureau of Weights and Measures, City of Richmond, Va.*

Mr. President and fellow members, I believe that I am the youngest man in the conference in age and point of service. I was appointed chief of the bureau of weights and measures in September and took my office on October 1. The situation in Richmond had been in a very, very poor condition, due, I might say, to the fact that the bureau of weights and measures had consolidated with the bureau of licenses; and licenses, returning a large amount of money, were naturally given more attention than weights and measures.

When I took my office I found there were two very essential things to do. One of those was to perfect an organization, and the other to find out what laws and what ordinances we had that were really laws and ordinances. I found that the bureau of weights and measures never had an office, but had been given a place or corner in someone else's office. We immediately got busy with the authorities and had the bureau assigned a home, and we are now in our own office. This office, I hope, will be your headquarters when any of you gentlemen visit Richmond.

We have in the State of Virginia, for the first time, a director of weights and measures, L. R. Travers, who spoke to you yesterday. In Mr. Travers we have a most wonderful man, and he is building up a wonderful record in the State of Virginia, and he is a man on whom we can depend for support.

The first question to come up, as I said, was that of organization. Since the gasoline situation, a rapidly growing industry, appealed to me very forcibly as deserving attention, I divided my office force of a chief and six men into a gasoline and a weights and measures department. The gasoline department is headed by a Cornell man who has not failed in a single case. The weights and measures department is presided over by a skilled mechanic who knows his business.

I wish, first, to call your attention to the fact that the ordinances in the city of Richmond were in a very bad situation. Some were obsolete and some were contrary to the State laws; we also observed that other ordinances were needed to make the office efficient.

In the fall of the year I started with the cordwood. I had it whispered to me, "Go gently on the cordwood, your ordinance is

bad." I studied it and said, "That ordinance is just as good as it can be made." The bureau then issued a letter to all dealers in cordwood, notifying them that the law would be enforced, calling attention to the clause which says:

No person shall use a frame or body for the delivery in the city of Richmond of long or block wood in quantities half cord or more which has not been so inspected and marked.

I arrested a man, took him to court, and he was convicted. A rather singular thing in court is that I have not had a single ordinance case that has not been appealed, and when the cases have come up in the Hustings court the ordinances have been upheld.

We made the one case in the Hustings court, and the judge affirmed the police court decision. Feeling satisfied as to the soundness of the law, I issued instructions for the inspectors to get on the roads to Richmond, running north, south, east, and west. At the time we issued the circular letters to all dealers in cordwood we had extensive publicity in the newspapers, so that no one could claim they did not know about it. After that each man caught on the streets handling wood without the proper wagon was stopped, and we have had many convictions.

The next ordinance to be considered in that season naturally was that in relation to coal. The city of Richmond had, on March 14, 1924, approved a coal ordinance, requiring all coal sold in the city to be sold by weight, excepting deliveries of coal by bushel, half bushel, and packages. This exception being in direct conflict with the new State law, it was amended to conform to the State law. The new State law requires all coal sold in the State of Virginia to be sold by net weight, 2,000 pounds to a ton. I did not know whether or not this law was all right, but when I found 1,695 pounds of coal for a ton on a truck I took the man to court and had him convicted. He appealed, as is the custom in Richmond, to the Hustings court, and Judge Ernest Wells, presiding, said, in rendering his opinion, "If any commodity is sold on the streets of the city of Richmond it must be measured by the standard of weights and measures employed in the city." He rendered his decision in January, 1925, thereby confirming the decision of the lower court. Since the above decision, every coal case taken to court has met with a conviction.

May I call your attention to one fact. I despise to go to court. Therefore, my inspectors, after they find law violations, bring the violators to my office. If, in my judgment, we have a real good case, an iron-clad case, I push it, but if I find a little weakness in the case I pat the offender on the back and admonish him and try to get him to keep the law; but if I have the whip hand I take him the whole length. I never fail to do it. We feel that the consumer should receive 16 ounces for a pound—not 14 or 18 ounces. We try to impress upon the merchant that if he is keeping a good set of scales he is keeping two things—a scale that will do justice to the consumer and an extra bank account. It is our aim to use common-sense arguments, and thus educate both dealer and consumer. We want them to know what is right and to do it.

Now, gentlemen, that is the situation in my office. I have found that we must have organization; that we must have proper statutes;

that we must have cooperation in the department. Every man has his specific work to do, and he is held responsible for his job. We have just that fellowship in mind that should be in all well-regulated offices.

When I went into the subject of family scales used for commercial purposes, I found that they were used in large numbers. The law was not clear to some of our friends, and again the bureau thought otherwise, and after a thorough examination of the mechanism and construction it was deemed in our best judgment that the so-called "family scales" must go. Instructions were issued then to the deputies to seize all family scales; this was done, and they took off the market two 1-ton truck loads of scales. This decision was contested, as was the common practice. It was taken to the director of public safety under whom we function, from him to the mayor, from the mayor to the State weight and measure superintendent, and from him to the attorney general. Our action was approved by all, and thus we buried the family scale in Richmond—and may it rest in peace.

The ice problem confronts us at the present time. I think we have a most wonderful ice ordinance. It provides that they can not short weight and can not refuse to sell, nor can they refuse to weigh. On Thursday of last week I arrested my first victim. It was carried through the police court, where I got a conviction; but, as is the usual custom, it will come up in the Hustings court on June 6. If this court fails us it will be necessary to make a new ordinance, but we believe the court will uphold the present law.

I have branched off in Richmond on what are called industrial scales. This is a new departure for Richmond and one of great importance. For instance, Richmond is a great tobacco manufacturing center. In the stemmeries the help is paid by the pound; therefore it is of great importance to the manufacturer that the scales be correct, and the manufacturers are awakening to this fact. In a rubber plant we found that the scales were in such bad condition that we were compelled to condemn all of them. The scales showed that in one shipment of junk rubber, consisting of 33,686 pounds, there was a shortage of 1,277 pounds. The rubber selling at \$9 a hundred pounds, this meant that on that one single shipment this concern lost \$114.92. The president of the company pats me on the back and says I am the most wonderful weights and measures man in the city.

We went through a coffee-roasting establishment. We found that they had mechanical devices for weighing 1-pound packages. We found the machine out of order and learned that the scales had not been inspected for years. We had the scales adjusted, and we have just received a report from the manufacturer, who said that in weighing the coffee he had been losing 1 pound for every 100 weighed; he was shipping one hundred and twenty-five 100-pound bags per day. Therefore he was losing every day he operated, as a result of inaccurate scales, 125 pounds of high-priced and high-grade coffee. He saw what a friend I was to him, and again I had another great admirer.

Shortly after I started this industrial scale inspection I received a request from a manufacturer to test his scales, which were located

just outside the corporate limits. I said, "You are outside the limits, but if you will pay the testing expense and the hauling of the heavy weights I will be delighted to do it." Now I have the pleasure of giving monthly service to various companies outside the corporate limits. This has been exceedingly beneficial to me, and I am much interested in it; and I am going to ask you, if you have never done it, to take on the industrial field, as it is of usefulness to the manufacturer as well as the consumer. So much, my friends, for weights and measures.

I am still more interested in gasoline. On December 13, 1923, the legislative branch of our city government approved an ordinance on the sale of gasoline which requires gasoline sold or offered for sale in Richmond to conform to the specifications and requirements of the United States Bureau of Mines. On November 14, 1924, sections 5, 6, and 8 were amended to cover mixing of gasoline and to provide requirements for tank wagons hauling through the city. Now, all tank wagons must display a sign bearing the legend "Richmond tested gasoline." This enables the bureau to some extent to protect the outlying districts. For instance, formerly when a tank car of gasoline was condemned, this condemned gas, while it could not be sold in Richmond, could be carted through the city to suburban service stations. The change made recently prohibits them from hauling through the city.

By a mutual agreement with the distributors we have perfected a method whereby this service is paid for on a gallonage basis. Our service charge more than pays for our chemist, laboratory rent, etc. This branch of our bureau has proven very popular both with dealer and consumer. The Richmond Rapid Transit Co., with many others who buy for their own use direct, request me to furnish this protection. At the present time we have 500,000 gallons of tested gasoline stored for use in Richmond. I am proud of that.

In Richmond there are about 450 public and 250 private pumps, all sizes and styles represented. The private pumps are only tested upon request. The public pumps are tested at least three times each year. All new installations are tested before being put in service. Whenever occasion demands, time-tests of one hour or longer are made on pumps to determine condition of leathers and foot and check valves. Leaks at piston-rod packing glands or other visible parts are noted and required to be stopped. All indications must be plain and movable parts in good working condition. Inspectors see if the owner has the gasoline permit issued by our bureau, and also attach to each pump the gasoline sign bearing the legend "Richmond tested gasoline sold here." Owners are required under the law to have a sealed measure and test each pump every day before sale commences. If the pumps pass inspection all stops are sealed, and a printed linen tag with date of inspection is attached where it can be plainly read.

There are from 1 to 12 lubricating-oil pumps at every service station. Most of these are of 1-quart capacity. These are tested with a sealed quart measure, and while the quart indication is the most important one, all indications are sealed. All liquid measures in use are also tested and sealed if correct. Patented glass containers of 1-quart

capacity are being generally used as a quicker and handier method of handling heavy oils. These containers are correct within the tolerance, but some cases have been observed where they were not filled to the proper point and again not enough time allowed to properly drain into the car. In these cases the operator's attention was called to these facts and conditions remedied. Two inspectors have to do all this work, and you can appreciate that it is quite a job; but they serve the people faithfully.

Just a word upon the licenses. We require that a man must get a permit from the fire department, after which he comes to us to get the permit to sell. He must also go to the tax commissioner and get a license to sell gasoline. Therefore our offices are somewhat mixed.

During my tenure of office as chief of the weights and measures bureau the trouble experienced in the gasoline department has arisen from three sources: The presence of corrosive sulphur compounds in the fuel, the presence of water and foreign matter in the fuel, and the failure of the hydrocarbons to meet the specifications as to distillation range. As to distillation range, we allow no tolerances to this specification and are insistent that all motor fuel sold or offered for sale in the city of Richmond must at the least meet every clause of what we feel are lenient specifications. The efforts of the department in enforcing this ordinance have resulted in the rejection in the past six months of 210,447 gallons of gasoline and the assurance to motorists in our city that a good grade of motor gasoline is dispensed at all times from every filling station.

I thank you, gentlemen, and assure you that I appreciate being at this, my first conference.

DISCUSSION OF ABOVE PAPER

The CHAIRMAN. Does any one wish to ask any questions or discuss the paper? I was particularly interested to know that they are using the Federal specifications in their work in Richmond. I trust that you find them satisfactory, and if your experience brings up anything that can be of use to the Federal Specifications Board we would be very glad to be advised of it.

Mr. CRAIG. Are you permitted to charge a fee for testing scales or pumps as to their accuracy?

Mr. RAGLAND. The State law says specifically that we can not charge a fee for testing scales or pumps as to accuracy, but we now charge a service fee of all the service companies in Richmond.

Mr. CRAIG. I learned yesterday that the inspectors of weights and measures in Boston deal with licensing questions. The laws in Pennsylvania are still chaotic on the question of granting licenses, so that may provide a new sphere of operation for our weights and measures men; now I learn that in Richmond they inspect the quality of gasoline. Do you also inspect the quality of petroleum or other oils?

Mr. RAGLAND. The State law as drawn regulates "gasoline and other products of petroleum," while the city ordinance regulates "gasoline and all other motor fuels."

SAFEGUARDING THE MERCHANT

By A. W. BACIGALUPO, *Inspector of Weights and Measures, City of Memphis, Tenn.*

Mr. Chairman, ladies, and delegates, responding to the subject which has been assigned to me, I do so with a feeling akin to fear, having full knowledge that there are others present who could cover the matter in a more able and complete manner. However, as I have had experience through many years, I can give you what I have gathered during my service.

At the present time nearly every inhabitant of this great country of ours knows that the mission of the weights and measures official is the protection of the public from the unscrupulous dealer and the elimination of fraudulent overcharges resulting from either intentional or unintentional short weight or short measure. We are accustomed to the laudatory, "That's good work, boy; catch all of the crooks and make them stay in line," or the critical, "Why don't you get after so-and so; he's cheating everyone who deals with him?" The public as a whole and the merchants as a class think that our only activity is the prevention of short weight and measure. This mistaken idea hampers our work when we endeavor to protect the merchant, who sometimes must be safeguarded against himself.

This article is not directly concerned with the sealer's duty to the public—we are trying to confine it to the merchant. But the duties of a sealer are far-reaching; in fact, every phase of his work affects two or more people. In protecting the public he also protects the merchant, and in protecting the merchant he protects the wholesaler, the manufacturer, the producer. Present-day commercial conditions are such that the merchant can no longer say, "This is my business; I'll run it as I please." He can run his business as he pleases only so long as his practices do not unfairly affect others, and the dividing line between fairness and unfairness is often determined by the sealer.

Let us take two concrete examples: Mr. A's gasoline pump is short 1 pint to the gallon. To protect the motoring public the sealer immediately condemns it and no one questions his action. Mr. B's scales give 1 ounce overweight to the pound. Mr. B says that as long as his scales are hurting only himself the public needs no protection; the goods are his, and he can give them away if he chooses. What is the sealer to do in this case? Gentlemen, I say that the sealer must condemn Mr. B's overweight scales as promptly as he did Mr. A's short-measure pump. If only Mr. B were affected, I would say that the quicker he gave away his goods and got a job somewhere the better it would be for all concerned. But a man with Mr. B's business outlook would soon be in debt to his jobber, and that throws a different light upon his contention that he can give his goods away if he wants to.

"Safeguarding the merchant" at the present time consists largely in the education of the users of weighing and measuring equipment in the use and care—especially the care—of their scales, pumps, etc. Very few of them know how to care for the machines they are using,

and only a small percentage of these few will put their knowledge into practice. It is a sad fact that in all too many business houses the weights and measures inspector finds that the scales and pumps are the only neglected appliances in the place. The proprietor will take great pride in showing the cleanliness and orderliness of his stock, his spotless engine room, his silent typewriters, his perfect delivery system, his latest improved machinery—everything about the place is in apple-pie order, and you think you have discovered the model institution. Then the sealer asks to be shown his scales, and this up-to-the-minute business man tells him, "Oh, they are all right; the inspector O. K'd them when he was here two or three months ago." That man, and there are thousands like him, thinks that because the sealer passes his scales they need no attention; that they will stay in adjustment indefinitely; that working parts never wear out; that scales never get out of order. Gentlemen, that merchant will have his floors swept several times a day, he will oil the hinges on his doors regularly, but as for his weighing or measuring equipment—well, "the sealer O. K'd them the last time he was here."

The most vital need in the weights and measures field to-day is the education of users of weighing and measuring equipment in the principles of the machines they use. If the operating principles of his equipment are explained to him, the merchant will readily see why a first-class plumber or pipefitter is not always capable of installing a pump, or why even the most competent auto mechanic or plant engineer can not be depended upon to get the best results from a scale. It is true that there are minor adjustments which every weigher and pump operator should be able to make, but it is also true that there are other adjustments and repairs which only a competent scale or pump mechanic should attempt.

We all realize that accurate weights and accurate measures can not be obtained with inaccurate equipment. Sometimes, when haled into court, a violator will make the plea that he did not know that his scale or pump was wrong. If he is honest in this statement—and he usually is—this ignorance places a strong indictment against himself, against the salesman who sold him his equipment, and against his local sealer. It is the merchant's duty to keep his equipment in proper condition; it is the salesman's duty to teach him how to care for it; and it is the sealer's duty to see that he does care for it.

I am of the opinion that if the sellers of weighing and measuring equipment, together with the sealers of weights and measures, did their part in teaching the users of such equipment what to do in its use and care, more especially, perhaps, what not to do, nine-tenths of the inaccuracy of the present time would be eliminated.

If I have suggested a thought that will in any way be of service, or have opened in the mind of any of you a suggestion that may have merit, I will feel that I have not failed in presenting my subject to you. I am glad of this opportunity of being with you again, and I appreciate the honor bestowed on me by placing me on your program. I know that this gathering will result in great good and further cement the friendships formed in previous sessions. Gentlemen, I thank you.

RAILROAD SUPERVISION OF BAGGAGE AND FREIGHT SCALES⁷

By A. W. EPRIGHT, *Supervisor of Scales and Weighing, Pennsylvania Railroad System*

The question of proper maintenance of baggage and freight scales, exclusive of railroad track scales, is frequently raised by weights and measures officials, and in preparing the following discussion we have endeavored to present the matter from the viewpoint of one of the larger railroads—namely, the Pennsylvania Railroad system—in a way that may prove of value in bringing about a better understanding on the part of weights and measures officials of some of the principal elements of the problem, and with the hope of developing a closer and more intelligent cooperation between the officials and the railroad.

The principal factors involved in the weighing of less-than-carload freight and baggage are the design of the scales and their capacity, location, installation, testing, maintenance, operation, and tolerance. In the case of most other railroads the first factor just mentioned—that is, design—becomes purchase. The opposite is true for us for the reason that the Pennsylvania Railroad is peculiarly situated in that it can economically maintain a well-organized scale shop wherein are built and repaired practically all of the scales used on the railroad.

It may be of interest to know in this connection that the present scale-shop building located at Altoona, Pa., represents a total investment of approximately \$360,000. This building, which is about 220 feet long by 80 feet wide, is especially arranged for the manufacture of plate-fulcrum track scales and is provided with the most modern machinery and appliances for all kinds of scale work. There is now being constructed in this building a new plate-fulcrum master track scale the cost of which is estimated at about \$31,000 over and above the present cost of the building. About 27 mechanics are regularly employed in the scale shop, and for at least the last few months from 2 to 6 draftsmen from the engineering department have been assigned to scale design.

We will now take up one by one the factors previously referred to and in discussing them will endeavor to confine ourselves as nearly as possible to existing conditions.

DESIGN

The method in force for some time in selecting scales for weighing our less-than-carload freight and baggage is to select only scales in whose design is embodied a form of construction which when the load is applied to the main supporting levers will not permit the oscillations of the platform to displace the bearings at points of contact with the knife-edges, nor introduce detrimental effects in the action of the scale due to deflection of the platform under load. By way of explanation it may be said that the above construction ordinarily results in the application of the well-known suspension-bearing principle.

⁷ This paper, prepared by Mr. Epright, was read to the conference by M. J. J. Harrison.

The platform of a modern self-contained or built-in scale, which is designed to insure at all times as nearly as possible equalization of the load on the pivots, is largely constructed of steel. The upper layer of the double floor is of maple, with the joints parallel to the direction of traffic in order to eliminate or reduce the shock or hammer-blow effect on the knife-edges when trucking across the scale platform.

It is the present practice of the Pennsylvania Railroad at its larger freight stations to equip all but one of the scales with automatic dial devices of 2,500-pound capacity, regardless of the size of platform and the supporting capacity of the scale itself. This is done for the reason that on the Pennsylvania Railroad 76 per cent of the less-than-carload freight weighs only from 100 to 500 pounds, 13 per cent from 500 to 1,000 pounds, 7 per cent from 1,000 to 2,500 pounds, and only 4 per cent over 2,500 pounds. The remaining scale is equipped with either a compound or full capacity weigh beam or an automatic dial device of sufficient capacity to weigh the heaviest loads likely to be received for weighing. The value of the minimum graduations of all recently constructed weigh beams, as well as of recently purchased automatic dial devices, is 5 pounds.

At the older freight stations, which are equipped with a number of scales having different size lever systems, but not provided with compound or full capacity beams, the multiplication at the tip of the beam was made the same for all scales in the same building. This was done in order that counterpoise weights might be interchanged as between the different scales without introducing confusion through using on one scale weights belonging to another scale of a different multiplication.

Dials of the larger capacity usually require certain manual operations to weigh the heavier loads. The general practice on the Pennsylvania has, therefore, been for some years to install dials which belong to the strictly automatic class.

The type of scale used for weighing baggage is exactly the same as that used for weighing freight, some scales being equipped with weigh beams and others with automatic dial devices.

CAPACITY

In selecting a scale for a particular station, not only should the question of maximum load to be weighed be considered, but also the maximum loads that are likely to pass over the scale platform. The size of the platform must meet local requirements, which are governed by the character of business to be handled. The sustaining capacity which is governed by the corner rating, ordinarily 50 per cent of the nominal capacity of the scale, must be considered and should be sufficient to take care of impacts due to dropping heavy crates, boxes, and trunks on the scale platform, as well as the strains produced by diagonal trucking of loads across the corners of the platform.

LOCATION

The location of scales, of course, depends somewhat on local conditions, but it is the general practice, when scales are to be used

principally for weighing outbound freight, especially at stations where a large volume of business is handled, to locate them at least 6 to 10 feet from the receiving front when freight is to be weighed as received. When freight is accumulated on the receiving front and weighed as it is loaded in the freight cars, the scales are located as far from the receiving front as possible, and ample trucking space is provided between the scale and the freight car.

There seems to be no fixed rule for locating scales for weighing baggage at smaller stations, but at the larger stations they are located within a few feet of the receiving front in order to avoid excessive handling.

INSTALLATION

With a view of obtaining the best possible results, it is the standard practice to assign a scale erector to supervise the installation of and repairs to all scales on the Pennsylvania Railroad, these men drawing on the local forces for such assistance as may be required. These scale erectors are trained under the direction of experienced field men, after having previously received some training in the scale shop, and they are originally selected for this training and subsequent responsibilities in the field on the basis of their proved merit and conscientiousness in the tool rooms or, in some cases, other metal-working departments of the more important railroad shops.

In their field work the scale erectors are required to adhere to standard plans and practices. At the same time it is frequently necessary for them to exercise considerable ingenuity and initiative. As a case in point, it may be mentioned that our standard plans provide for rigid support, usually masonry, for all scales. However, in stations located on the water front, where the scales must necessarily be located beyond the bulkhead, it is obviously impracticable to secure masonry substructure. For practical reasons the scale platforms must be maintained at the same level as the floor of the building, thus preventing the use of any separate foundation. Hence, the scales must necessarily be suspended from the floor stringers, which are usually of wood. In cases of this kind the scale erector is called on to use his best judgment to secure as nearly ideal results as local conditions, over which he has no control, will permit.

TESTING

The standard of mass for testing freight and baggage scales is derived from primary weights verified by the United States Bureau of Standards. At the larger stations it has been the practice to locate permanently a considerable quantity of 50-pound cast-iron test weights, while for use at smaller stations similar weights are transported in specially designed steel-compartment cars, with the weights stacked inside in such manner as to reduce to a minimum changes in value of the weights due to abrasion in transit. These 50-pound weights when new are adjusted to within 25 grains and are maintained to within 100 grains of their true value, this maintenance tolerance being that specified for weights of this class in Circular No. 61 and in Handbook No. 1 of the Bureau of Standards. As a matter of information, there are approximately eight thousand

five hundred 50-pound test weights, or an aggregate of 425,000 pounds, in use on the Pennsylvania Railroad system.

Scales in regular service for weighing freight and baggage are tested every 2 to 15 months, depending on the design, capacity, and method of installation, as well as the volume of business handled and character of service rendered. Notwithstanding the fact that we have always made a consistent effort to maintain these scales so that the errors on leverage ratio would be within the tolerances adopted by the Eleventh Annual Conference on Weights and Measures, we have not always been able to do so, and will later describe more fully our position in the matter.

In verifying new platform scales the general practice of the Pennsylvania has been to use test weights corresponding to the total indicating capacity of the scale, while in making routine service tests the scales are given a graduated test under both concentrated and distributed loads up to at least the average working capacity. A standard method of testing platform scales has been adopted and in force for some years, and the field inspectors are provided with and required to use the standard forms supplied for the purpose of reporting results of tests and calibrations. Each of the field inspectors is also supplied with a modern portable sealer's outfit for resealing counterpoise weights in the field.

As to the personnel of the field inspectors, it may be said that they are selected from the scale erection force previously referred to on the theory that a properly qualified toolmaker, with his scale-shop training, supplemented by field experience in the installation of and repairs to scales, will develop into the highest type of scale inspector, and we are convinced of the soundness of this theory from observation of our own organization.

MAINTENANCE

As previously stated, the scales in the larger stations are located only a few feet from the receiving front, and as a result they are subjected to weather conditions. Water oftentimes finds its way to the supporting knife-edges and bearing steels, and, notwithstanding the hard grease used as a protection around the pivot contacts, the action of the vibratory system is often seriously impaired by corrosion, and this is especially pronounced at points where the scales are located directly over water, as at New York, Philadelphia, and Baltimore.

The maintenance of scales used for weighing freight and baggage requires eternal vigilance on the part of the supervisory force in order to insure results within reasonable limits of error. In the case of scales located over water and suspended from the building floor, the action is repeatedly affected by boats bumping against the dock which in most instances forms a part of the station structure. The scale proper is also subjected to a great deal of abuse in at least three ways: First, by the carelessness of the truckers or drivers when unloading freight from motor trucks or drays, as these men often permit very heavy boxes and crates to drop from the tailboard to the scale platform; second, from the rough handling incident to the rush to unload trucks and drays just before the closing hour of the freight house, during which time freight is often spotted or stacked

on the scale platform; and third, from comparatively rapid movement across the scale platform, in some cases even diagonally across the corners, of tractors and tractor-drawn trailer trucks loaded with less-than-carload freight. Many of the scales in the larger baggage rooms are subjected to even more abuse than obtains at freight stations, as trunks are rolled from corner to corner across the scale platform. At many points this process is continuous, day and night. Existing instructions provide against all of these practices, but the fact remains that it is not always possible to prevent such occurrences.

OPERATION

In the operation of beam scales we have the following to contend with: Beam out of balance, hasty balancing of the beam, misreading the beam, misreading the counterpoise weights, and errors in the counterpoise weights. All of these are due to the human element or personal equation.

A test conducted periodically during an entire year at three of our largest and best organized freight stations showed that the average error due to careless balancing of the beam was 6 pounds, while the average error due to careless manipulation of the poise during rush period was about 8 pounds. The introduction of the automatic device has somewhat offset the errors from the above causes, as any change from zero is more readily detected.

In behalf of the weighman it must be said that too often, in the rush of shipping, insufficient time is allowed him to secure proper balance of the beam, even if it is operating uniformly and accurately, and what may sometimes be considered carelessness is not always his fault. The advantages of direct-reading apparatus are at once apparent, as no time is lost in waiting for the beam to balance or in moving the poises, and with dial scales any out-of-balance condition, should it exist, is at once apparent; and it has been found that few weighmen can stand a definite zero error staring them in the face each time they make a weighing.

It is an established fact that many of the zero-balance errors result from weather conditions. During periods of precipitation the scale platforms absorb a really surprising weight of water, which, of course, gradually evaporates when conditions are favorable. This obviously necessitates frequent adjustment of these zero-load balances, and the necessity for such adjustment is indicated directly on a dial scale, whereas the indication would not be so apparent on a beam scale.

The Pennsylvania Railroad, realizing the advantages of dial equipment, took up with one company in New York the question of the application of their device to scales used for weighing freight, and, as a result, what we believe to be the first automatically indicating dial device to be used for that purpose was installed by the Pennsylvania Railroad on November 20, 1900, in a temporary freight station then located at the foot of Thirteenth Street, New York, N. Y. As far as we know, the first automatically indicating dial device for weighing baggage had been installed at Broad Street Station, Philadelphia, on November 13, 1900. Since that time over 400 dial devices, including some of the best European makes, have

been connected to scales on the Pennsylvania Railroad system and used for weighing both freight and baggage.

While it has been found that it is not possible to maintain dial devices in as close adjustment, perhaps, as the average beam scale, the use of such devices makes possible advantages in weighing which result generally in increased efficiency. Of course, there is an extraordinary gain in time and convenience, and we have records of less-than-carload freight being weighed at the rate of six weighings per minute.

As to baggage-room scales equipped with dials, our records show that at New York about 2,000 pieces of baggage are weighed on one scale in 24 hours, at Philadelphia about 3,000 pieces in 24 hours, at Pittsburgh about 600 pieces in 24 hours, and at Chicago about 800 pieces in 24 hours.

Of course, there is no place where rapid and accurate weighing is more desirable or important than in the handling of less-than-carload lots of railroad freight, and the American Railway Association, on May 28, 1913, adopted the recommendation of its subcommittee on weighing, as follows:

To insure protection of revenue, the necessity exists for the weighing of a constantly increasing amount of less-than-carload freight. A large percentage of such freight being received near the closing hour of freight houses makes it necessary to weigh and record weights quickly and accurately, that trains may be dispatched on schedule. A number of types of automatic dial attachments for application to scales for weighing less-than-carload freight have been perfected to a practical degree of accuracy and durability. The use of such dial devices will increase the speed of the weighing of the less-than-carload freight from two to three times, and with less liability of error in the recording of weights.

This advantage is evident when it is realized that an indicating scale permits every truck load to be weighed as it is wheeled across the scale platform, the momentary stopping while the weight is being taken requiring but a fraction of the time needed for balancing of the beam and reading the position of the poise and the amount of counterpoise weights on an ordinary beam scale.

The handling of and charging for freight is, of course, a primary operation for a railroad, and the elimination of an inexperienced weighman is a distinct gain in both labor and accuracy, since anyone with good eyesight can read a dial in the minimum of time, and a change in balance at zero load from any cause is likewise instantly indicated.

In the case of excess baggage, where charges are made on a weight basis—and the matter is becoming increasingly important to both the railroad and the traveler—dial scales seem to be giving good service, especially as the weight of the shipment can be seen by the passenger at a glance.

TOLERANCE

Having described the type of scale and the conditions under which it is installed and used for weighing freight and baggage on a busy railroad, we now come to the most important feature of all, especially from the standpoint of the scale department. This is the application of the existing tolerances to the indicated error of the weighing machine as found in service. We have always had the

greatest respect for everything developed by the Bureau of Standards or adopted by this conference pertaining to scales. However, as a result of our experience, we can not help but feel that the existing tolerances for beam scales as adopted by the Eleventh Annual Conference on Weights and Measures, and which are shown in Bureau of Standards Circular No. 61 and in Handbook No. 1, are too fine in so far as their application to scales used for weighing freight and baggage is concerned.

In making this statement, it should be understood that we have made what we believe to be a consistent and honest effort to maintain our beam scales within the limits of the established tolerances, but we are frank to admit that we have not always been able to do so. While we are not prepared to make a definite statement as to how far we have failed to meet the tolerance requirement, we have closely scrutinized repeated tests of about 8,000 such scales used on the Pennsylvania Railroad system. These tests were all made by inspectors whom we believe to be capable and reliable, and our study of the results obtained has convinced us that the present state of the art of scale design justifies a certain broadening of the existing tolerances. It is of interest in connection with this statement to note that our standard freight-house or baggage-room scale, installed complete, actually costs us at the present time anywhere from \$880 to \$1,900.

As to dial scales, we have made a careful analysis of the results of calibration of freight and baggage scales of this type, having grouped the different makes of devices according to their age, going back as far as 1912 and up to the present time, and have classified the various tests for the four seasons of the year in order to determine, if possible, the effect of temperature change. The complete data are, of course, very voluminous, but the following is a general summary of the results:

Total tests.....	497
Total readings taken.....	8,316
Total amount of test weights used.....	11,748,250
Total errors obtained.....	15,464.5
Average test load per 1-pound error.....	760.3

We are prepared to say, in connection with the existing dial scale tolerances, that, if our interpretation of them is correct, we believe that we are able to maintain our scales to weigh within them. In making this statement we have in mind the fact that present usage in weighing freight and baggage permits the user to establish the value of the minimum dial graduation when the device is purchased. As previously stated, we have adopted 5 pounds for this value, which, of course, governs the tolerance at the smaller loads. We are frank to say, however, that we have in mind the possibility, or possibly fear, that some regulatory body may be so misled as to undertake to establish and enforce a smaller limit on the value of the minimum graduations. Such action would, obviously, reduce the value of the tolerance at the smaller loads, and since these are the critical loads, generally speaking, in so far as application of tolerance is concerned, any such ill-advised action as that just mentioned might and probably would result in the immediate condemnation of practically all of our dial scales now in service. This would result in great con-

fusion, to say nothing of the large and unwarranted expense on the part of the railroad company as owner of the scales affected.

We have noted with considerable alarm the tendency recently manifested toward reduction in the value of the minimum dial graduation and feel reasonably certain that the present state of the art does not warrant, in general, such action.

DISCUSSION OF ABOVE PAPER

Mr. BULSON. Mr. Harrison, how often are railroad track scales tested in the State of Pennsylvania?

Mr. HARRISON. I can speak only of the practice of the Pennsylvania Railroad lines and would say that, in general, they are tested every three months.

Mr. BULSON. How heavy a test do you apply?

Mr. HARRISON. Our standard equipment for track scale work consists of one 30,000-pound, self-contained, short-wheel-base car, together with one 80,000-pound car, short wheel-base, self-contained. Those two cars are used first separately and then together.

Mr. SWEENEY. Mr. Chairman, I would like to ask the gentleman what he would consider a fair test load to be applied by a local sealer on a railroad track scale.

Mr. HARRISON. Mr. Chairman, I am very much of the opinion that the local sealer is rarely, if ever, equipped with proper appliances to make such a test. We use nothing less than a test load of 30,000 pounds. That is the minimum load that we would apply to a railroad track scale.

Mr. THIELMANN. Does the State of Pennsylvania inspect your scales also?

Mr. HARRISON. They do in some cases, but generally speaking the State inspectors do not attempt to make any tests of our track scales. As to the smaller scales they do test them in some places. The laws are different in different States.

Mr. DALZIEL. Mr. Chairman, I might state for the benefit of the delegates and others present that the States of Washington and Oregon jointly own a 60,000-pound test car which is operated in the two States under the supervision of the States. The owner of each scale tested pays a fee of \$25, and that covers the expense of operation. I have charge of the weights and measures department for the State of Oregon, but I am not connected with the public service commission, which handles that.

Mr. QUIST. In the State of Minnesota we test all track scales in the State. We have three test cars weighing 100,000 pounds, and additional test weights that we use in testing track scales. We charge a fee against the railroad for the cost of that service. I think the fee is \$10 for each test.

Mr. CRAIG. Mr. Chairman, in regard to the inspection of the scales of the Pennsylvania Railroad Co. in the State of Pennsylvania, I would say that there is no indisposition on the part of the bureau to make the tests, but at the present time we have neither the proper equipment for testing railroad track scales nor the funds to procure such equipment.

Mr. HARRISON. Just one more word. I might say that in some places the local sealers and even the State men have both by word

and action expressed themselves as perfectly satisfied with our tests of the scales.

HEAVY-CAPACITY PLATFORM SCALES

APPARATUS AND METHODS FOR FIELD TESTS IN VARIOUS JURISDICTIONS

(This number on the program consisted of talks given or papers submitted by weights and measures officials from various parts of the country, describing their methods of testing heavy-capacity scales, with especial reference to the equipments used for this purpose. A large number of lantern slides illustrating the equipments used were shown during the progress of this number. A limited number of these have been reproduced as illustrations and appear as figs. 1 to 8, inclusive.)

REMARKS OF GEORGE WARNER, CHIEF INSPECTOR OF WEIGHTS AND MEASURES, STATE OF WISCONSIN

The truck used by the State inspectors of Wisconsin^s is the ordinary 1-ton Ford chassis, equipped with a cab, all inclosed to provide for inclement weather, and a special body. The rear compartment, which is for weights, is provided with rear doors, one of which opens downward and the other two sideways. A specially constructed hand truck having 12-inch wheels, standardized at 100 pounds, is provided for quickly moving the test load from place to place on the scale platform. One of the features of this truck is that it is made entirely of iron. It contains shot cups which provide the necessary weight adjustment to take care of any wear that might occur. The wheels are readily demountable, being held in place during use by self-contained pins in the ends of the axles that drop into place by gravity. The truck can be taken down or set up in a few seconds by one man. In the use of this equipment the truck is driven across the scale so that the body just clears the far side of the platform. Eighteen 50-pound test weights are then placed on the small hand truck, and the total load, amounting to 1,000 pounds, is moved to the four corners of the scale platform and readings taken. The hand truck is then pulled off the scale platform at the opposite end from the autotruck. Another reading is taken of the scale to see whether it maintains its original balance, and the autotruck is backed on to the scale and its weight balanced out. The hand truck is again pulled onto the platform and another reading is taken. After the test is made the weights are placed in the compartment provided in the autotruck. That sort of test is usually considered sufficient for the small wagon scale.

If the scale is large, of the autotruck variety, after the test with the hand truck a large load of coal or other material is placed upon the scale. The 1,000-pound test load is then applied again. In this way the scale may be tested at full capacity.

At one side of the autotruck body is a special compartment for the 5-gallon and 1-gallon field standards of capacity, and on the opposite side is a compartment for the inspectors' working cases and personal grips.

^s See fig. 1, facing p. 58.

REMARKS OF GEORGE F. AUSTIN, SEALER OF WEIGHTS AND MEASURES, CITY OF DETROIT, MICH.

For heavy-duty work we use a Federal truck with two doors at the rear opening into the weight compartment, and on the side, just back of the driver's seat, a door opening into a compartment for carrying the light equipment, such as gasoline testing cans, small weight boxes, etc., necessary to the various inspections that we have to make.

A small truck for the purpose of transporting the weights over the scale platform is provided; this truck is carried on the top of the weights after they have been placed in the automobile truck. The large wheels of this truck are 14 inches in diameter and are on roller bearings, which facilitates the handling of the weights; they can be very easily drawn to the various points of the platform. Wheels and axle are removable for ease in handling and transportation.

We use in the inspection of scales 1 ton of weights. The weights of the truck having been balanced out, the weights are placed upon it and tests made upon each corner of the scale. Readings are taken at each point. Then the truck is removed and a heavy load of coal or some other convenient load is placed upon the scale platform and the ton of weights are again applied at one end of the scale or wherever it is convenient to place them.

REMARKS OF C. A. BRIGGS, LIVESTOCK WEIGHT SUPERVISOR, UNITED STATES DEPARTMENT OF AGRICULTURE

Mr. Chairman, members, and delegates, this is a subject of very great personal interest to me, and it is only by the exercise of self-restraint that I can keep from speaking at length.

In introducing this subject I will put the situation briefly, first discussing in question-and-answer form some of the problems that we have in connection with these heavy-capacity scales as represented by my experience, which extends over some 13 years.

Q. In reference to studies of large-capacity scales, were scales tested at heavier loads than those ordinarily applied?—A. Yes; and in some cases the scales were given capacity tests.

Q. Were the results obtained from the heavier loads in line with those to be deduced from small loads?—A. No; the errors were larger as a rule.

Q. Were the differences important?—A. In numerous instances they would have caused the scales, which had been accepted as correct with the small test loads, to be condemned and removed from service.

Q. What was the cause of the errors?—A. Their origin was in a great variety of things—deflections, binds, interferences, etc., that came into play at higher loads, many of which could not be anticipated by inspection.

Q. Would you say as much as 50 per cent of the scales tested with small loads and passed would be found unsatisfactory at the larger loads at the present time?—A. The percentage is even larger. Where large loads are applied for testing for the first time, generally important adjustments have to be made, and it is an ordinary thing for the scales to be taken out for repairs or replacement.

Now, we have a serious problem before us in regard to these heavy test loads, and often the subject is approached by getting the best we

can. We have the case here [referring to lantern slide] where an attempt was made to get a heavy auxiliary test load, which consisted of a wagon loaded with pig iron. The test weights are first applied to the scale and then removed. The wagon load is then applied, the scale balanced, and the wagon load removed and weights substituted. We then may have a fairly good idea of the weight of the wagon. Then we apply the wagon load and test weights together. That has some advantages; but if the scale does not repeat, there is a tendency to error. When such a test is carried out patiently and intelligently you can find out a great deal. However, much time is required, and experience tends to recommend that more specifically designed equipment is to be preferred.

Here [referring to lantern slide] is another attempt at an auxiliary test load. In this case we have a roller weighing about 8,000 pounds, consisting of a galvanized case filled with concrete and fitted with an iron axle. This can be hauled across the scale by horses. We have no data as yet as to the permanency of this load, but it is probably not much better than the wagon described above. A roller is very valuable in getting a quick test of a scale and in getting errors. However, this particular roller is too large, and experience with it has confirmed our views that the heaviest test weight to be recommended is 4,000 pounds—1,000 to 4,000 pounds, depending on local conditions. The load is highly concentrated, and this is a disadvantage in some cases.

Next is illustrated the most complete equipment that has been put into regular or systematic service in so far as we have information at the present time, and here is realized the form of large-scale tests which I am becoming in favor of, namely, the use of standardized test weights throughout. The auxiliary load will serve as a beginning, but, after all, what is saved in money is offset by the necessity for such a large amount of care and intelligent consideration in making the tests that the use of standardized weights is really the cheapest way after all.

This scale is used for weighing loads up to 28,000 pounds, and it is tested with 28,000 pounds of standard weights. A feature of this equipment is the eight cast-iron weights of 2,500 pounds each, which are supplemented by 8,000 pounds of 50-pound weights. The 2,500-pound weights are substantially of the Bureau of Standards design for cast-iron weights of the intermediate large sizes, a design that has been in practical use for some time and has worked out very well, indeed. A special "buggy,"⁹ designed to carry one weight at a time and equipped with mechanical means for loading and unloading the weight, is used for spotting the weights on the scale platform and in handling the weights from one scale to another when the scales are close together. When the scales are far apart the weights are transported by wagon, a special frame and chain hoist being utilized in loading and unloading.

This equipment [illustrating] represents a 4,000-pound test unit with self-contained wheels which was tried out in Chicago as a result of a joint conference of interested parties. This is designed so that a number of these units may be handled as a train by tractors on

⁹ See fig. 2, facing p. 58.

and off scales, and the design of the units is such that in turning corners each unit will follow in the track of the preceding one, which permits the taking of a string of them around corners without difficulty.

One idea which I would urge on almost anyone testing a scale is that at the beginning a number of small weights be balanced on the scale. When a test load fails to balance the beam with the poise in the appropriate notch the balance is obtained by changing the small weights. The difference in the amounts of small weights originally used and those on the platform when this balance is obtained immediately indicates the value of the inaccuracy in the scale.

REMARKS OF DENNIS KELLY, SEALER OF WEIGHTS AND MEASURES, CITY OF BRIDGEPORT, CONN.

Mr. Chairman and gentlemen, a test that I will describe is one of a scale of 9,000 pounds capacity used in weighing metal ingots. The company owning it was very insistent that I test the scale to full capacity, in view of the fact that they weighed on this scale three or four carloads of expensive metal every week.

In this test I balanced the scale and tested it up to the full capacity of my test weights, namely, 3,000 pounds. Then, removing the weights, I had copper ingots piled on the scale up to the amount shown by the test weights. Then I replaced the 3,000 pounds of test weights and took the reading again. I then removed the test weights and put on additional ingots as before until the former reading of 6,000 pounds was duplicated; finally I again applied the test weights, thereby reaching the capacity of 9,000 pounds.

I do not imagine that there is anything about this test that is any different from what many of you have done in the past, but for my own part I can not see where you can get a test that is any more accurate. I was very careful to bring up the mass on the scale to the total amount as indicated by the weights each time, preserving the same balance. It happened that the test disclosed a considerable error, and it was necessary for the scale mechanics who were present to make some adjustments. The tests and adjustments took considerable time, but when we got through the scale tested very accurately, and when the same test was repeated several weeks later on it was proved that the scale had retained its accuracy.

REMARKS OF A. W. SCHWARTZ, ASSISTANT SUPERINTENDENT OF WEIGHTS AND MEASURES, STATE OF NEW JERSEY

Mr. Chairman and gentlemen, New Jersey has tried from time to time to have included in its budget passed by the legislature a sufficient sum for the purchase of equipment for the proper testing of scales. Although we have tried hard, we have been unable to get a sufficient sum to purchase a State equipment, so it has fallen on the city of Newark to get some sort of equipment and show us the way.

This view [indicating] represents two trucks, each with an equipment of 2,000 pounds of test weights, making a total of 4,000 pounds, with a crew of four men.¹⁰ In making the tests of heavy-capacity

¹⁰ See fig. 3, facing p. 58.

scales the trucks can be used together or can be sent individually into different parts of the city. Newark is one of the largest manufacturing cities in the United States and has approximately 300 truck scales of heavy capacity that are in daily use, and the tests are made in the usual manner, as has been described here by the gentlemen who have preceded me. P. J. Caufield, the superintendent, with his assistant, supervises the work.

In addition to these tests, the trucks are sent around to the industrial districts and manufacturing plants, where the small portable or the dormant platform scales are used and tests are made of these. The two trucks are kept busy in the industrial districts, where piece-work prevails, and the rate of wage is dependent on the weight of the finished product.

I want to say that these equipments represent only the entering wedge. Newark has the distinction of being the first city in New Jersey to have equipment of this character, but I think with that as a nucleus it will be demonstrated to the powers that be that the State may profitably at some future time have adequate equipment of its own.

REMARKS OF EDWARD J. MARONEY, SEALER OF WEIGHTS AND MEASURES,
CITY OF NEW HAVEN, CONN.

The development of the heavy-duty track scale started something like 13 years ago, that of the autotruck scale, perhaps, 7 or 8 years ago. It has progressed in very rapid strides due to greatly increased loads and such conditions as the heavy end thrusts given to the platform by the sudden stopping and starting of these loads. The light-built wagon scale is now practically useless for accurate weighing.

Among the requirements that must be met for a scale to give excellent service are: Knife-edges must be clean as well as sharp; bearings must be smooth and level; levers should be level and remain so under all conditions; connections, plumb; foundations, solid, with no interference between parts; platform disturbances must be allowed for without shifting the pivots on bearings; knife-edges must be ground and honed as near as possible to center line of pivot steel.

I am of the personal opinion, after 27 years of work in this field, that 99 per cent and a very large fraction of the business men of this country are honest; I am also of the opinion that the scale manufacturers and their agents and servants are also 100 per cent honest and try to be, and so I cooperate with them.

One instance of cooperation is with a coal company in my city, which is the largest of its type in the East and which wanted a more efficient way of handling their product, incidentally to reduce their overhead. They put it up to our department to equip their plant. We did it. A scale system was installed. To prevent drivers going over it carelessly or unnecessarily, we conceived the idea of raising the scale so that it was 1 foot higher than the other side of the yard with a 1-inch-to-the-foot pitch. The empty truck was weighed coming in, and when the driver drove out with the load the ticket was given to him with the tare, net, and total weight

Equipments used for the testing of heavy-capacity platform scales in the jurisdictions indicated

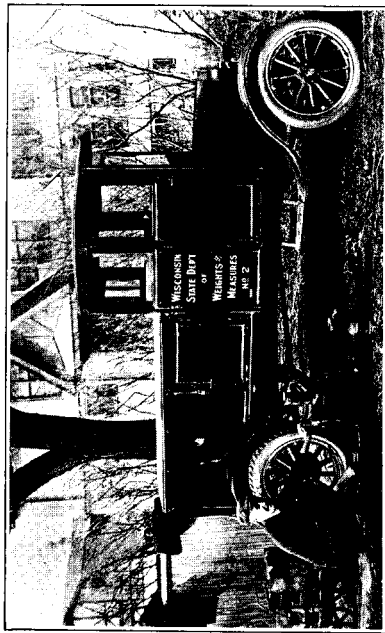


FIG. 1.—One of four State equipments of Wisconsin.
See text, p. 54

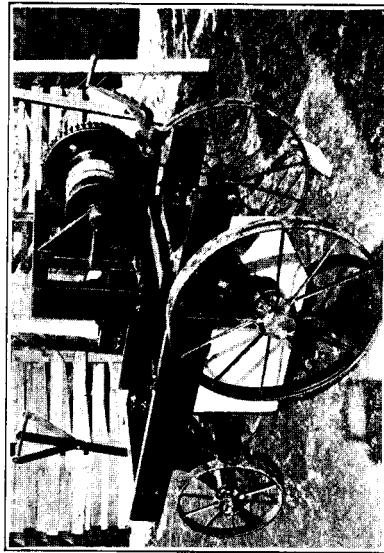


FIG. 2.—Special buggy for lifting and transferring 2,500-pound weights in testing livestock scales at Buffalo, N. Y. See text, p. 56

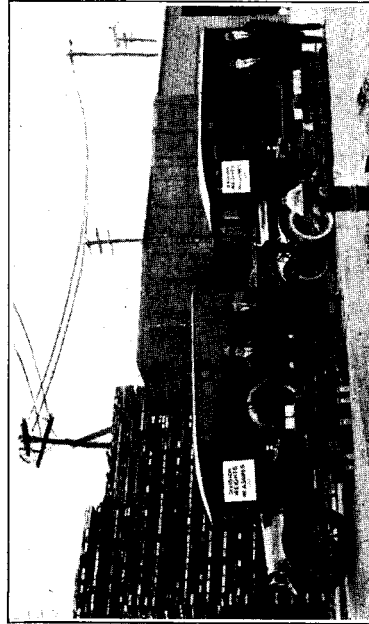


FIG. 3.—City equipments of Newark, N. J.
See text, p. 57

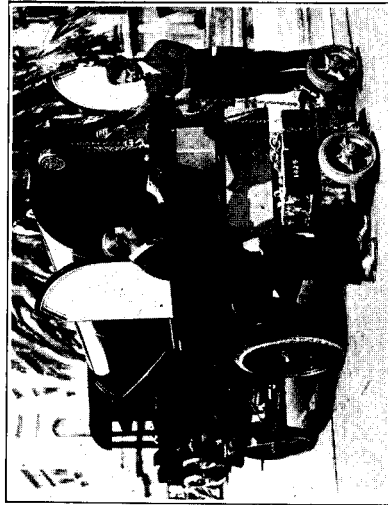


FIG. 4.—County equipment of Alameda County, Calif. See text, p. 59

Equipments used for the testing of heavy-capacity platform scales in the jurisdictions indicated

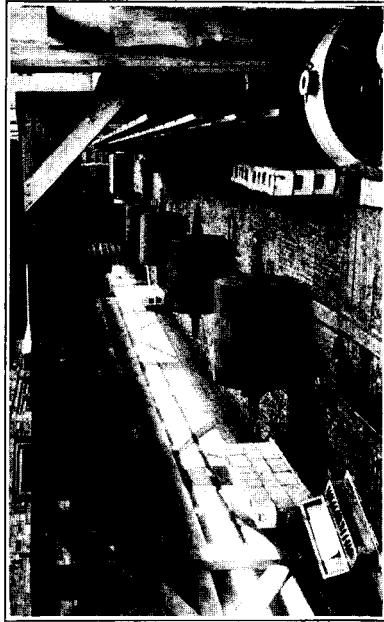


FIG. 5.—Test of livestock scale at South St. Paul, Minn., using rollers and weights. See text, p. 62

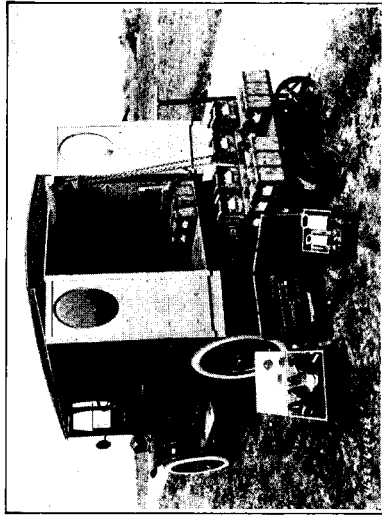


FIG. 6.—City equipment of Seattle, Wash.
See text, p. 63



FIG. 7.—State equipment of Michigan.
See text, p. 63

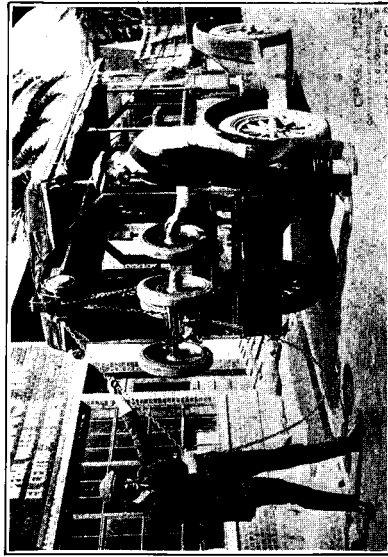


FIG. 8.—County equipment of Los Angeles County, Calif.
See text, p. 64

noted. Many improvements were made in that yard, reducing the overhead, and how well the plant was constructed can be understood when I say to you, gentlemen, that we increased the capacity from one to three loads a day for each truck, since they could be weighed faster than they could be loaded. I merely mention this to you, gentlemen, in the hope that it may indicate new ways in which you can assist and cooperate with industry.

The CHAIRMAN. The secretary, Mr. Holbrook, has received written communications on this subject which I understand he will read.

Mr. HOLBROOK. We will now show and explain certain pictures which have been submitted by officials who were unable to attend the conference.

PAPER OF EDWARD K. STROBRIDGE, SEALER OF WEIGHTS AND MEASURES,
COUNTY OF ALAMEDA, CALIF.

When I came into the department in 1917 there was in use a Ford truck which carried 2,000 pounds of weights, and all our heavy apparatus, including wagon scales, were tested with this weight. In 1919 I conceived the idea of a more thorough test and bought an Autocar and had a body built thereon with a derrick fastened on one side for the loading and unloading of the dolly. We then made a test of 2,000 pounds on each corner of the scale. Our loaded truck weighed 10,000 pounds and was used as an auxiliary weight. On account of its short wheel base we could get a fairly accurate two-spot test.

During the last two years, with the advent of the automobile scales, most of them of the capacity of 20 tons, I felt that we were not giving these scales as good a test as they ought to have, so I conceived the idea of having a larger Autocar truck which is inclosed with sheet iron with an overhead track running through the center along the lines of the Bureau of Standards railroad track scale testing equipment.¹¹ I have tried to get away from the great bugbear of handling the 50-pound weights by having constructed a number of 500-pound weights, which are handled by a Yale spur geared block.

Our dolly, which weighs 500 pounds, is equipped with Timken axles with roller bearings. We place five 500-pound weights on this dolly making a corner test of $1\frac{1}{2}$ tons. Two men have no trouble whatever in pulling this dolly around any place they want to when loaded.

We have standardized the truck at 16,000 pounds. The only variation in this weight will be the amount of gasoline consumed. We take pains to have the gasoline tank filled each morning, and we are fixed so that we can measure the outage of gasoline so that at no time is there a variation over 10 or 12 pounds. We drive our truck onto one end of the scale, weigh the same, and then run the dolly on. This gives us an absolute weight. We then pull the truck on to the other end of the scale and go through the same performance. Some of our old 10 and 15 ton wagon scales are having the surprise of their lives on this kind of a test. This is going

¹¹ See fig. 4, facing p. 58.

to be the means of the elimination of this type of apparatus for the weighing of trucks.

We also carry a small dolly which weighs 350 pounds, which we load with the 50-pound test weights that are used for the testing of dormant scales. There is an opening in the side of the truck where the 50-pound test weights are stored. It is our policy wherever we can to test the scales to full capacity.

PAPER OF W. E. THOMPSON, SUPERVISOR OF SCALES, STATE OF MINNESOTA

Our equipment for testing large-capacity livestock scales consists of two solid cast-iron rollers, each weighing 6,060 pounds, which are placed one each side of the center of the scale platform as the two inner rollers. The two outer rollers, placed near the ends of the platform, are solid cast iron and weigh 4,400 pounds each. We also use 6,000 pounds of 50-pound test weights which are placed on each side at each end of the scale on clean planks, and 20 pounds of brass "correction" weights which are placed on clean boards on the scale platform. A set of demountable wheels is used for transporting the test rollers.

The equipment is supplemented by a master scale, housed in one of the warehouses, the whole being owned by the St. Paul Union Stockyards Co., of South St. Paul, Minn. The original request for this equipment, including the master scale, was made by the Minnesota track and hopper scale department of the Minnesota Railroad and Warehouse Commission in December, 1919. At that time we were using 8,000 pounds of the department's 50-pound test weights in the test of these livestock scales, of which there are to-day 20 in this yard.

The time element involved in making a test with individual 50-pound test weights, even of so small a mass as 8,000 pounds, was extreme and consequently expensive. It not only meant the employment of at least four men to handle these weights, but it meant taking practically a half day to make a satisfactory test of a given scale. Moreover, it has long been recognized by us that scales may return correct results under tests of a small mass of test weights without being correct at larger loads. These considerations led the department to make the request for the mobile equipment described.

This equipment is extremely mobile. The axles attached to the rollers are each equipped with large eyes in which it is possible to quickly engage the tongue or pole, similar to the manner in which, in the old days of horse-drawn fire apparatus, it was possible to pick up the pole and swing the horses away from the engine or apparatus in a moment's time. In moving these testing rollers from place to place by means of the demountable wheels and placing them on clean skids at the end of the scale and using clean skids on the scale we are enabled to keep away from all accumulation of moisture and refuse. The same is true in the use of the 50-pound test weights. All of this equipment being carefully calibrated and being kept in trim shape is conducive to an effort on the part of employees using it to keep it that way.

Two teams are ordinarily used in getting this equipment in the stockyards to a given scale and from it to the next scale or back to

the warehouse, as the case may be. One-half of the equipment is delivered at each end of the scale. The total mass of the equipment is 26,920 pounds.

While this equipment is owned by the stockyards company and is used exclusively in the test of that company's scales, all located within an area of a few acres in the same yards, nevertheless the rapidity of movement from scale to scale and the flexibility of the equipment are such that it may be very readily used for a test of heavy-capacity wagon scales, autotruck scales, or autodump scales used in a city's weighing service.

One lesson learned by the department, which was very distinctly brought home to us several times during the extreme cold weather which is experienced in Minnesota, is that the rollers of 6,060 pounds are too heavy for rapid and safe transportation. The wheels used in their transportation are heavy fabricated wheels, and the extreme weight, coupled with the extreme cold, caused the shearing of the spokes at their points of contact with the periphery. This led the department to suggest to the stockyards company that in making their next two rollers their weight be reduced to 4,000 pounds each.

This idea of the solid cast-iron roller is not new with me personally. It was first developed by Scale Inspector P. D. McFarlane back in 1913, when he proposed such a device, of much heavier weight, for the test of railroad-track scales, using, of course, flanged wheels in place of the demountable wheels, and contemplating that the device be carried in a transporting car.

These rollers are very quickly moved from point to point on the scale, and two men only are needed to handle all of the equipment. The following is a brief description of the method employed in making the test of a scale:

After the planks have been placed on the scale to receive the equipment and at least 20 pounds of standard correction weights have been placed on the scale, consisting of two 8-pound weights, one 2-pound weight, one 1-pound weight, and two one-half-pound weights, the scale is ready for balance and a determination of the SR without load. This arrangement of correction weights has been found very satisfactory, as it allows speed in entering the necessary corrections as the test progresses. While the equipment has been gotten ready and the correction weights arranged, all under the supervision of the millwright of the stockyards company, the scale inspector has fastened a graduated rule on the trig loop and secured the reading pointer, so placed on the beam that its point passes in front of the graduated rule to form an indicator. A medium-sized bulldog paper clip is clamped onto the beam. This is then used in getting a fine balance. The inspector has by this time also arranged his test report with the necessary information filled in, giving the number of the scale, the number of the beam, capacity of the beam and its minimum graduation, the commodity weighed, the scale owner, the number of the test, and the date and page number of the report, together with the time recorded as to the commencement of the test. After getting a fairly close balance with the balance ball, the bulldog clip is used to secure the absolute balance. The SR is then taken both for the upward and downward movement of the beam.

One 50-pound test weight is next placed on the scale and the observation taken and recorded. Correction weights are either added to or taken from the correction weights on the scale to determine the balance at the same point as originally started with. The difference between the correction weights on at the close of the observation and the weights on at its commencement indicates the error at that point. This operation is continued in 50-pound steps up to 300 pounds. Then it is continued in 100-pound steps to the capacity of the fractional poise, then in 1,000-pound steps up to 6,000 pounds. This means that all of the 50-pound test weights have been placed on the scale, and that observations have been taken and recorded for each one of these steps.

One of the rollers weighing 6,060 pounds is now placed over section 2 and the reading taken. The second roller of this same weight is now placed over section 3 and the correction observations and records made. No. 3 roller, weighing 4,400 pounds, is then placed over section 1. Next No. 4 roller is placed over section 4. It is understood, of course, that for each increment of testing equipment added the proper observations and records are made, indicating the results that are found at each individual step. After the addition of No. 4 roller we now have all available standard equipment on the scale, totaling 26,920 pounds.¹² The SR is again taken at this point, both for the upward and downward movement of the beam. The poise is now rolled back to zero and a ratio reading is taken, using the proper amount of standard weights on the tip hanger. This makes a check of the weight of the poise and also determines the error in the lever system. This method of taking a ratio reading is followed frequently at the 6,000-pound and at the 18,120-pound steps. Following the ratio reading at 26,920 pounds, all of the weights are now removed and the balance is checked. The time of completion of test is then recorded.

An inspection of the lever system and pit is then undertaken. All of the working parts are carefully examined, notation of conditions found is made, and all necessary corrections with subsequent retest follow. On completion of the final inspection and final test, the time is again recorded. This inspection service following a test of the scale is essential, even though the scale tests out at all points within the tolerance. It is a part of the regular maintenance service and should not be slighted.

It may be asked why we jump from 6,000 pounds to 12,000 pounds, then to 18,000 pounds, then to 22,000 pounds, and last to 26,000 pounds, seeming to ignore the other notches of the beam. In this connection it should be stated that all weighbeams are calibrated by us in the scale shop, either of the manufacturer or of the department, whether they are from the first hand, new stock of the manufacturer, or have been shop repaired, before such beams are placed in any scale.

The full and complete test and inspection report is made at the scale. The original is sent to the State supervisor of scales and a copy each to the State supervisor of public stockyards, the weight supervisor for the packers and stockyards administration, and the scale owner, which in this case is the St. Paul Union Stockyards Co.

¹² See fig. 5, facing p. 59.

PAPER OF L. J. ALLEN, CHIEF INSPECTOR OF WEIGHTS AND MEASURES,
CITY OF SEATTLE, WASH.

Our equipment consists of a 1-ton capacity Garford chassis with top built to order.¹³ The gross weight of the truck and equipment is 6,400 pounds. A small door on either side just to the rear of driver's seat opens into a compartment extending across the truck, wherein small equipment is carried. Also in the rear of the driver's seat, opening from the inside, is a hinged-cover box for tools and miscellany.

A telescopic or extension rail track is attached to the ridge board running from the driver's seat to the rear doors. This track is capable of a 2-foot extension beyond the doors when in use and is made in part from R-W 14-gauge standard channel track. It carries a four-wheel hanger to which is attachable a ¼-ton Yale differential block. This attachment is used in handling the steel dolly, also for suspending a specially constructed 200-pound capacity checking scale. When raised and lowered by means of the chain block the dolly is empty.

A cradle is provided on which the dolly rests when loaded in the truck. The weight of the steel dolly is 215 pounds. It is equipped with wheels 14 inches by 2¼ inches, with roller bearings, and with a detachable handle. The purpose of this dolly is obvious, but I will add this comment on the odd 15 pounds: Its value lies in the quick determination of differences on the heavy-draft scales, on which the major graduations range from 100 to 500 pounds, it being necessary in such cases to employ only the tare beam.

There is also provided a small hand truck weighing 50 pounds with a specially constructed long nose capable of supporting nine 50-pound weights, thus giving a total of 500 pounds.

Supplementing the equipment described above, the department has both a Dodge and a Ford roadster, which are used in connection with pump inspection and other light work.

Mr. HOLBROOK. The next equipment illustrated is used by the State of Michigan. I will ask one of the representatives from that State to explain it.

REMARKS OF H. R. ESTES, SEALER OF WEIGHTS AND MEASURES, CITY OF
FLINT, MICH.

A Reo truck with inclosed cab and open body is used by the State division of weights and measures of Michigan.¹⁴ Permanently mounted on the floor of the body is a hand-operated drum hoist by means of which a standard load of 1,000 pounds is lowered from the truck to the scale platform, and vice versa. This hoist is equipped with such an efficient braking mechanism and is so geared that one man has no difficulty at all in raising or lowering the 1,000-pound load and in keeping it under control at all times. This load consists of a dolly, 50-pound weights, and a metal cover, and is handled as a unit during the tests of large scales. The 50-pound weights can readily be removed, however, whenever this becomes necessary for the testing of smaller scales.

¹³ See fig. 6, facing p. 59.

¹⁴ See fig. 7, facing p. 59.

When the loaded dolly is being lowered from or raised to the truck a removable metal track, engaged at the back of the truck body and leading to the ground, is utilized. In testing a scale the dolly is moved about to various positions on the scale platform for corner tests, center tests, etc., after which the truck is run onto the scale to supply dead weight, following the method with which all of you are familiar.

Other equipment, including small weights, tools, gasoline measures, etc., are, of course, also a part of the truck equipment. When in transit a weatherproof cover protects all of the equipment carried.

REMARKS OF GEORGE B. MOORE, CHIEF INSPECTOR OF WEIGHTS AND MEASURES, COUNTY OF ALLEGHENY, PA.

This seems to be quite a problem to solve in many of the State and county departments, due usually to the lack of funds appropriated for equipment.

Allegheny County took a step forward when the county commissioners purchased the following equipment for the county department of weights and measures: One $\frac{3}{4}$ -ton White truck of the ambulance type, equipped with a 50-inch stormproof cab, express type body with lattice screen sides and door, curtained for stormy weather, fitted with angle guide rails running the full length of the body, two sets of rails on each side, fitted to the width of a 50-pound square standard weight, permitting 10 weights to stand in a row, or a total of 40 weights, equaling 1 ton. This gives an equal distribution of the load over the entire body of car and prevents sliding of weights from one side to the other.

The car is also equipped with a box of smaller standard weights, ranging from one-sixteenth ounce to 10 pounds, and other apparatus. This truck makes it possible for the inspector to take care of all heavy-duty scales in his territory and to test scales of stores and hucksters. Three Dodge touring cars were also purchased.

After trying several different kinds of trucks and equipment we are firmly convinced that our present outfit is the ideal equipment, permitting our inspectors to go out in all kinds of weather and always to be assured that they will have power and speed to approach any mine in our district. This is a very important factor and one that caused us many difficulties in the past, as our cars usually lacked the power to travel the steep approaches to the mines and meet the demands made upon them in long and difficult drives, causing many delays to our inspectors and lack of efficient service to the public, which is always the most important in our minds.

REMARKS ON EQUIPMENTS USED IN SOME OTHER JURISDICTIONS

Mr. HOLBROOK. In the equipment used in the city and county of Los Angeles¹⁵ we again find a truck fitted with an overhead trolley and carrying an auxiliary truck to be used in moving the test load about on the scale platform. In a letter about this outfit C. M. Fuller, the sealer, says:

¹⁵ See fig. 8, facing p. 59.

Our idea for equipping the truck for testing heavy-duty scales was derived from the outfit used by the Bureau of Standards in testing railway track scales. It is equipped with a trolley block moving on an overhead I-beam. The small buggy which is shown being unloaded in the picture is sealed to 500 pounds, and we have a number of weights of 500 pounds each which are loaded on this buggy.

You will also observe that 50-pound weights and other equipment are also carried with this truck.

This view [indicating] shows another California equipment being used in the vicinity of Sacramento by the State department of weights and measures. In this case it is apparent that 50-pound weights are employed as a testing means with a dolly somewhat similar to those described in other discussions. The weights are swung off by means of a crane, and corner tests can then be made. Probably 2 tons of weights are shown in that equipment.

(At this point Mr. Holbrook briefly described a number of views including the equipments used by the Bureau of Standards in testing mine scales and railroad track scales, wagon scale testing by the bureau, etc.)

APPARATUS AND METHODS FOR FACTORY TESTS

REMARKS OF A. BOUSFIELD, CHIEF ENGINEER, E. & T. FAIRBANKS & CO.

Since the advent of the I. C. C. docket 9009, section 2-B, pertaining to hopper scales, and the somewhat active demand for scales to meet these specifications for terminal elevator service, E. & T. Fairbanks & Co. supplemented their existing testing equipment for heavy scales and are now able to test a 2,500-bushel hopper scale up to full capacity at the factory and be sure of its performance in the field under capacity loads.

The scale is set up on a structural steel subframe resting on a concrete foundation in the factory erecting shop. The main bearings are attached to an I-beam framework, which approximates field conditions. The various parts of the scale are carefully inspected as they come through the various manufacturing departments and are subjected to a final check by an experienced erector when they reach the erecting shop and before being set up. The scale is then carefully erected and the beam balanced, care being taken to see that its action is constant and the SR satisfactory. We usually adopt an SR of from 3 to 3½ pounds with the scale unloaded; anything less than this makes the beam very sensitive to air currents and difficult to handle for testing. The plus errors are read by applying grain weights to the counterpoise, and the minus errors are read by applying small weights to the hopper frame.

After balancing, the first operation is to seal the corners, using a 10,000-pound weight for this purpose. Nose-iron adjustment is continued until all corners are correct to within one-half pound. The 10,000-pound weight is then removed and a 2,000-pound load applied to each corner, so as to approximate the conditions of a field test. Beam readings are taken and the 2,000-pound weights removed. Each corner is then loaded with a 10,000-pound weight, or a total load of 40,000 pounds is applied, and a beam reading taken and the SR determined. An additional 10,000-pound weight is then applied to

each corner, thus giving a total load of 80,000 pounds. A beam reading is then taken and the SR determined. Two thousand pounds is then applied to each corner so as to approximate half-load field conditions of testing, and a beam reading is taken.

The 2,000-pound weights are then removed and an additional 10,000-pound weight applied to each corner, thus giving a total load of 120,000 pounds. A beam reading is then taken and the SR determined. A 10,000-pound weight is then added at each end opposite the beam and a 2,000-pound weight at the center, thus giving a total load of 142,000 pounds. Again the beam reading is taken and the SR determined.

A 2,000-pound weight is then applied to each corner so as to again approximate the conditions of a field test. The scale is then tested to 150,000 pounds, or full capacity. Again the beam reading is taken and the SR determined.

The test weights are then removed and a balance check taken at the points where the beam readings were taken. The following is the record of a typical test of this kind. It will be noted that the field-test error would be minus 6 ounces on the test load of 8,000 pounds, or well within the manufacturers' tolerance of one-fourth pound per 1,000, as set forth in docket No. 9009.

Full capacity factory test

Corner	Load	Total load	Error	Sensibility reciprocal
	<i>Pounds</i>	<i>Pounds</i>		<i>Pounds</i>
1.....	0	0	0.....	3
2.....	2,000	8,000	0.....	3
3.....	2,000		0.....	
4.....	2,000		- 3 ounces.....	
1.....	2,000		- 4 ounces.....	
1.....	10,000	40,000	+2 $\frac{1}{2}$ pounds.....	3
2.....	10,000			
3.....	10,000			
4.....	10,000			
1.....	20,000	80,000	-2 $\frac{1}{2}$ pounds.....	3 $\frac{1}{2}$
2.....	20,000			
3.....	20,000			
4.....	20,000			
1.....	30,000	120,000	0.....	3 $\frac{1}{2}$
2.....	30,000			
3.....	30,000			
4.....	30,000			
1 and 2.....	$\frac{1}{2}$ 10,000	142,000	+1 pound.....	4
3 and 4.....	$\frac{1}{2}$ 10,000			
Center.....	$\frac{1}{2}$ 2,000			

READINGS FOR ADDITIONAL 2,000-POUND CORNER LOAD ²

1.....	2,000	.....	+2 ounces.....	.....
2.....	2,000	.....	0.....	.....
3.....	2,000	.....	- 2 ounces.....	.....
4.....	2,000	.....	- 2 ounces.....	.....
Total load.....	.....	150,000	+ $\frac{1}{8}$ pound.....	4

¹ Removed after readings were taken.

² In addition to preceding load.

In conclusion, I wish to add that as a result of some 50 full-capacity tests which have been conducted in the factory within the

last year or so we believe the heavier the corner load the more accurate are the results given for the actual performance of the scale. With an 8,000-pound corner load the error seems to be somewhat excessive, while with 24,000 pounds on the corners we get pretty accurate results. I simply mention this because in some of the recent tests that we have made in large terminal elevators for this type of scale 24,000 pounds have been used instead of 8,000, 10,000, or 12,000, and I think it has probably given more accurate results.

REMARKS OF C. A. LINDSAY, DISTRICT MANAGER, HOWE SCALE CO.

Mr. Chairman and gentlemen, the views to follow on the screen illustrate our standard practice of sealing each scale with a full-capacity test load. Levers for scales are first sealed individually. A scale is then completely assembled for the full-capacity test. About 160,000 pounds of sealed weights are in constant use. These weights are in 50, 100, 200, 500, and 1,000-pound units. Special apparatus has been designed for the handling of these heavy weights with ease and rapidity.

This slide [indicating] shows the sealing of the levers of an industrial scale. A special jib crane with traveler is handling a 1,000-pound weight.

This slide [indicating] shows the sealing of the levers of a wagon scale. The scale is under a full-capacity test load of 500 and 1,000-pound units. Cylindrical weights are used because square pattern weights are subject to broken corners in handling.

The same method is carried out on all scales, and this illustration [indicating] shows the 500-pound weights used, totaling 3,500 pounds, on an automatic dormant scale. Note the jib crane with the traveler by means of which the test weights can be placed on the extreme edge of the platform with ease and rapidity.

This slide [indicating] shows a total capacity of 72,000 pounds on a 1,200-bushel hopper scale. The method of testing, of course, is the same except that instead of using the crane we are now using tracks and test car which can be controlled by hand operation.

This slide [indicating] shows a railway track scale being assembled on the floor for sealing. This is a four-section scale, and each section will be tested to capacity. It will be built up to permit the test car to be brought forward and supported on any one section.

This slide [indicating] shows a similar assembly of a four-section ball-bearing platform scale. It will be built up and given a similar test.

We have now [indicating a slide] built up the platform and are sealing the railway track scale. Two 20,000-pound and one 40,000-pound test cars are used to make a sectional capacity test load of 80,000 pounds.

We are sometimes asked to explain and suggest methods for recording tests in factories and so have designed a scale test record form which is self-explanatory and not too detailed. This has been used for factory inspection and general inspection work. I will be very glad to supply a copy of this form to anyone interested.

REMARKS OF M. H. WINSLOW, PRESIDENT, WINSLOW GOVERNMENT STANDARD SCALE WORKS (INC.)

I am an inventor and manufacturer of heavy-capacity scales and have worked on them during the past 38 years. The first few years were devoted to learning the trade, helping to manufacture in the factory, and installing, inspecting, and testing in the field. In this way I acquired actual experience and became familiar with the various types. In those days heavy-capacity scales were installed in very shallow pits, so that inspection was extremely difficult. Railroad track scales were built with as many as eight sections, had a very large number of parts, and were set on wood. Is it any wonder that they had trouble in keeping the scales weighing correctly?

The first railroad track scale I designed was 64 feet long and had only four sections. It was installed in a pit deep enough to be accessible for inspection. Later I made scales 72 and 82 feet long, some of which are still in service, though not with my approval. Then was built a master scale designed exclusively to weigh test cars, and we operated such a car for the testing of scales. Then came the track scale using steel I beams for platform supports, followed later by a scale set on solid concrete without a substructure of steel or wood. There was much criticism of this at first on the ground that wood was necessary on account of its cushioning effect, but the scale did not break down, and now this character of installation is very common. Finally, in 1920, the Bureau of Standards issued Circular No. 83, recommending that not more than four sections be used in a railroad track scale. This marked a new era in railroad track-scale construction.

Now, I respectfully invite your attention to a new development in railroad track scales, namely, the two-section scale. I wish to say in all earnestness that I am convinced after observation on such a scale installed for nearly two years that just as the four-section scale is conceded to be a long step ahead of the old six or eight-section scale, so the two-section scale will be another long step in advance, for I think it has the following advantages: First, there are no inner sections to reflect errors; second, all levers are of the same class; third, there are only seven levers in this scale; fourth, the maintenance cost will be much less; and, fifth, there are no links or loops under the platform to rust or cause friction. I will be pleased to answer any question about the two-section type of scale. I thank you.

The ACTING CHAIRMAN. This has been a very interesting list of papers. Are there any questions from anyone?

(At this point, at 1.15 o'clock p. m., the conference took a recess until 2 o'clock p. m.)

FOURTH SESSION (MORNING OF WEDNESDAY, MAY 27, 1925)

The conference reassembled at 10 o'clock a. m. at the Bureau of Standards, I. L. Miller, first vice president, in the chair.

THE PROGRESS OF WEIGHTS AND MEASURES IN THE FAR WEST

REMARKS OF WILLIAM A. DALZIEL, DEPUTY SEALER OF WEIGHTS AND MEASURES, STATE OF OREGON

Mr. Chairman, brother delegates, and visitors, I wish to say that it is an extreme pleasure on my part to attend a national weights and measures conference. For the six years that I have been with the department I have endeavored to make the trip, but this is the first time my ambitions have been realized, and I certainly appreciate the privilege of being here.

In our vast and growing western country great progress has been made during the past few years, and we have advanced from the crude practices of the early days to more modern ideas. There was a time in our country when a great many people had an idea that the heavy team or truck scale was like a sidewalk—when once put down it was there forever and required no attention; but time has changed this erroneous idea, and through the ceaseless efforts of the weights and measures officials and the educational work of the department many old-time customs have been abolished and a very generous co-operation is manifested from owners and operators of this type of scale.

During the remarks yesterday and the pictures that were shown of the tests to determine the accuracy of team or truck scales, I was reminded of a story told me by a gentleman who claimed that he saw the occurrence. In the early days the weights and measures department was conducted on the county plan. Each county would appoint an official called a county sealer, and the equipment furnished this official was very meager, indeed. In a remote town in the State my informant was in a store when a gentleman came in dressed in the old-fashioned western style and carrying a 5-pound weight in his hand, who told the storekeeper he had come to test the team scales. My friend was interested in team scales and went out to see the man make the test. The inspector removed some clods and mud that were on the scale, balanced the beam, set his little 5-pound weight on each corner, and took the readings. Of course, we all realize that that would not be considered a very good test these days, but it just goes to show the idea that they had in the early days.

A word might be said here relative to the good work carried on through the office of secretary of state, which department has charge of all licenses issued to the owners of automobiles in our State. No weight will be taken over any scale that has not been approved by

the weights and measures department. This has resulted in a better understanding with the operators of heavy-capacity scales and teaches them the benefits derived from keeping their scales in proper condition.

To-day the State of Oregon is divided into four districts, each assigned to a State inspector. Each man has an automobile with as many weights as the car will conveniently carry together with his other equipment. It is the duty of each district sealer to get over his territory as often as he can with the funds with which he has to work. Considerable difficulty has been experienced during the past years in sending proper equipment into some of the more remote parts of our State; in fact, it is almost impossible to meet some of the conditions that exist even at the present time, due to the magnitude of this vast country so different from the thickly congested Eastern States. It might be interesting to some of the representatives to know that in Oregon the smallest district embraces over 5,000,000 acres of land and the largest over 25,000,000, and scattered through this vast country are small towns and settlements which receive the same attention that is given the larger cities. Thus it will be apparent to all that we have tremendous problems to meet that do not exist in the eastern cities or States.

From the following report you can readily understand that we have done a remarkable work with the money placed at our command, and I may say that were it not for the very loyal men who work through our office, men who have placed real, true citizenship above the dollar, we could never have accomplished this amazing result. Every scale, gas and oil pump, and other piece of weighing and measuring apparatus receives at least one inspection each year, and in the larger cities as many additional tests as possible are made after the first inspection.

During the past biennium we have made the following inspections: Scales, 24,475; weights, 52,067; liquid measures, 24,592; oil pumps, 4,468; and gas pumps, 3,622. In addition to this, we make a miscellaneous inspection of various articles of foodstuff, including flour, mill feeds, small berries, prunes, and all other commodities which are sold upon our markets. We also inspect all mercantile establishments, which include groceries, confectionery stores, fish and poultry markets, ice plants, fuel yards, hop yards, etc. In fact, it is necessary for our inspectors to go through almost every kind of mercantile establishment in order to locate the various apparatus used in the commercial world.

In addition to the regular inspection work required through the weights and measures department, we also have additional work which has been placed upon us through a new law which is termed our bedding inspection law, which requires the inspection of mattresses, pillows, and other articles of bedding that are manufactured or sold throughout the State.

Another problem which confronts us is the gentlemen known as the "short-weight artist," whose activities keep our inspectors ever on the alert, for no matter how correct his scale may be he always bears watching; and while at times the shortages are small, yet we believe that the purchaser is entitled to the full weight for the money he pays for the commodity.

I expect to learn many things of value from my attendance at this conference, things that will be of great value to the State of Oregon, and which I may be able to communicate to the people through the department in which I am employed; and from the benefits we may derive from this information I will be able to give a greater report to this honorable body should it be my good fortune to again be in attendance.

REMARKS OF R. H. THEILMANN, INSPECTOR OF WEIGHTS AND MEASURES,
STATE OF ARIZONA

Mr. Chairman and delegates, for the benefit of the gentleman who preceded me I will say that I also come from a State that has a fairly large territory, and the progress that has been made since we were admitted to the Union as a State in 1912 has been very great.

It is plainly seen that this was the last and greatest valentine Uncle Sam had the good fortune of receiving. The Territorial laws were adopted and became the laws of the new State by virtue of the enabling act approved June 20, 1912, and there being no Territorial statutes on the subject of weights and measures, the congressional laws were the rule of action in the matter.

The third session of the first State legislature of the new State, being in session from April 14 to May 17, 1913, passed the first law entitled to the designation of "weights and measures." This law was codified into the civil code of 1913, constituting the State and Territorial statutes up to that time, and has remained the weights and measures law of the State without amendment, except as the same was affected by the budget and appropriations of administration. This law is no different, either for better or for worse, from the law ordinarily made by a State legislature under the same circumstances. The bulk of it seems to have been copied from the suggested model forms contained in the handbook series given out by the Bureau of Standards. In general, the laws are general, reciting in stilted legal phraseology the work to be done by the inspector after his appointment by the governor and giving his surety bond as provided by statute.

Since the admission of the State there have been two governors and five inspectors of weights and measures. The law calls for an inspection each year, but the territory is so large that it is physically impossible to get over the ground more than once in two years and cover the important scales in the cotton regions once each year. The progress, therefore, has consisted chiefly in the completeness with which the work is done one year following another.

Arizona is an arid State. Desert and mountains are the chief characteristics. There is just one system of streams in the State—the Colorado River system. Practically all the State is in this system, and it constitutes 43 per cent of this third largest river system in North America. The earliest settlements naturally were along the river valleys and in the mountain mining districts. The economic interests are those of the range, mines, and agriculture. Naturally the aggregations of population are wide apart. Eight cities of over 5,000 inhabitants each constitute the urban strength of the State. These, by statute, manage their own inspection, with a general super-

vision by the State. These towns are, in the order of their age: Tucson, Prescott, Globe, Phoenix, Nogales, Bisbee, Douglas, and Miami. These range in population from 7,000 to 40,000. All the rest of the State comes under the direct control and authority of the State office.

Progress is dependent upon the ability to go from one place to another. Little could be done by the first inspector in 1912 and 1913. He visited the principal places reached by rail, and hired transportation to other minor localities, and in this way made a fair showing under the circumstances. The drawback was principally in the matter of transportation. Since that time the system of State and county highways has been so much improved that in the present incumbent's first two years every village and hamlet, every railroad station, and many isolated stores and ranches where any commercial business was carried on were visited and their devices inspected and sealed. In so wide a range there have, of course, been a few exceptions. The remarkable feature has been that in the inspections made, reaching in scales to 3,552 and in gas and oil pumps to 1,230, there have been necessary less than 2 per cent condemnations, and the citizens of Arizona can be counted on as giving between 99 and 100 per cent cooperation in carrying out the purposes of the law.

The difficulties we have encountered are the same as in other States and cities. Our conclusion is that gas and oil are best measured by actual containers, but our legislature failed to pass bills introduced to accomplish this. We had some trouble relative to the weighing of hay for shipment out of the State, not on account of the scales themselves but on account of the tare weights of the cars. The jurisdiction relative to the cars is under the corporation commission and also the Interstate Commerce Commission. I should like to consult with State inspectors from States shipping agricultural products, particularly hay and cotton, and also from States such as Colorado and Montana, relative to the inspection of scales in connection with smelters, mills, and mines.

DISCUSSION OF ABOVE PAPERS

The ACTING CHAIRMAN. This, I think, indicates the universal interest in the subject. These two papers are open for discussion.

Mr. WARNER. Mr. Chairman, I would like to ask the gentleman from Arizona for more details of the bill that he introduced in the legislature regarding the sale of oil and gasoline.

Mr. THEILMANN. The bill was about like this: That containers that are actual measures should be exempt from inspection during the unimpaired life of the container after the device has once been inspected. That would result in all apparatus for measuring by means of a pump gradually passing out of existence. The pump would be used merely as an elevator to the container. The bill did not get further than the senate.

METHODS OF SALE OF HAY AND WOOD

Mr. EGAN. I would like to ask the gentleman from Arizona what he considers a ton of hay? Of course, if it is in bales the weight

can be determined, but there seems to be a difference of opinion as to the number of cubic feet in a ton of well-mowed hay in stacks.

Mr. THEILMANN. We have no statute in Arizona with respect to that, but in measuring hay in the stack rules are adopted that are followed in common usage in some of the other States.

Mr. VAUGHAN. Mr. Chairman, I would like to ask the gentleman from Connecticut if the statutes in Connecticut specify the displacement.

Mr. EGAN. No, they do not; and the reason I inquired from the gentleman from Arizona is that we had some authorities taken from California to the effect that a ton of well-mowed hay contains 555 cubic feet. We also have no statute in regard to a cord of wood.

Mr. DALZIEL. I would like to state, Mr. Chairman, that in our State we have a law that wood must be sold by a cord or fraction of a cord, and that a cord is 128 cubic feet. We also have a rule that wood delivered in the condition in which it is bought must contain 128 cubic feet to a cord. For instance, if you bought wood cut in 16-inch lengths and specified that you wanted a cord, it would have to be 128 cubic feet of wood. We believe in the 128-cubic-foot cord.

In regard to the hay situation, in the eastern section of Oregon they have very little rain, and the result is that in that section the hay will shrink differently from hay grown in other sections. We have no hay law, although measurement in stacks is not so hard. With the stack measurements there is a little difficulty in determining the tonnage, but we require 2,000 pounds to the ton the same as for coal.

Mr. SWEENEY. Mr. Chairman, I would like to state that in Massachusetts we have at the present time what we consider an exceptionally good law concerning the sale of wood. We have, in the first place, a statutory definition of what cordwood is and what firewood is. Under the statutory definition cordwood is defined as wood cut in 4-foot lengths, including half the kerf. All wood cut less than 4 feet in length is termed firewood. The law prescribes that wood shall be sold by the unit of measurement termed the cord, and that a cord shall consist of a pile of wood 8 feet long, 4 feet wide, and 4 feet high, close stacked. In addition, when wood is sold, either as firewood or cordwood, a certificate or memorandum must be delivered to the purchaser and this must show the name and place of business of the seller, the name and address of the buyer, a statement of the quantity of wood in terms of cords or cubic feet, and the signature of the measurer.

Mr. THEILMANN. Our law in regard to wood is almost precisely the same as the Oregon law. Wood must be sold by cords and fractions of cords, and it is unlawful to advertise or sell wood by the rack or wagonload or anything like that.

CHANGE IN NAME OF CONFERENCE

Mr. HOLBROOK. Mr. Chairman, this conference since its inception has been usually known as the "Annual Conference on Weights and Measures." There are a number of State conferences on weights and measures which are also held annually; therefore, this organization is not identified as a national organization by its name. It is

suggested that the name of this organization might well be changed to the "National Conference on Weights and Measures." In that connection I might state that it would help considerably in writing to the governors and mayors of cities and the boards of counties if we could invite delegates to the "National Conference on Weights and Measures" rather than to the "Annual Conference on Weights and Measures," since the scope of the conference would thus be emphasized. I would like to get the consensus of opinion of the delegates present as to whether or not that is a wise move.

Mr. EGAN. Mr. Chairman, I move that this organization be designated by the name of the "National Conference on Weights and Measures."

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

The ACTING CHAIRMAN. I am sure that we are extremely fortunate in having with us again the Secretary of Commerce. He has shown very much interest in the work of weights and measures and has shown us a very sympathetic attitude; he also has a very wide grasp of the problems that we meet in the field of this very great work. He needs no introduction from me, and I take pleasure in presenting the Hon. Herbert Hoover, Secretary of Commerce.

**ADDRESS BY THE SECRETARY OF COMMERCE, HON. HERBERT
HOOVER**

Gentlemen of the conference, I have had the opportunity of greeting this conference for five successive sessions, and it is with very great pleasure that I welcome you here to-day. I am always glad to assist in this movement in any way I can, or any movement that has for its object the solution of existing problems through the joint action of the people who are interested in them. When the problems, as in this case, are so directly a part of the whole purpose of the Department of Commerce in its many ramifications, it is of even greater interest. Furthermore, these conferences have to my mind a rather more penetrating and deep-seated importance than might appear on the surface.

We are all interested and we are all struggling with the great problem of the border line of relationship between the Federal Government and the State governments in matters of the most diverse and intricate character, particularly those that have come out of our economic life. Where we can solve these problems by cooperation between the Federal Government and the State governments we have established a new and a much sounder basis of relationship than by Federal legislation. You are making a distinct contribution to that problem.

From my knowledge of this conference on weights and measures I am convinced of two facts: The first is that, of course, your objects are highly important; and the second is that the methods that you employ to accomplish these objects are the ones that are calculated to bring lasting solutions. Your efforts have been directed to the end that the laws and regulations affecting any of the manifold phases of weights and measures be as uniform throughout the States as the proper consideration of the varying conditions will warrant. Moreover, it is obviously our wish that the instrumentali-

ties of weighing and measuring shall be accurate; that they shall provide fundamental safeguards against fraud and that they shall establish equity in all the commercial determinations of quantity. Your methods of procedure are consonant with our whole national thought; you have instituted preliminary studies by special committees, consultations with representatives of manufacturers and industry, the open discussions at these annual conferences in which all the interested parties are invited to participate, then the period of tentative application of your tentative recommendations, followed by further study and discussion before final adoption of any given regulation. The utility of these methods has not only been demonstrated by your organization, but we also follow this your procedure in many other branches of the Department of Commerce as the only one which is fundamentally sound in the solution of these complex questions.

A great many examples of the efficiency of this cooperative method in settling problems have already been demonstrated in the department in the last five years. We are continually in touch with groups and associations of business people and manufacturers representing every section of the country for the purpose of solving these relationships with the public by action within the industries themselves.

We find generally that the American business people, manufacturers, and service institutions are anxious enough to cooperate with us the instant they realize that the day of arbitrary judgments based upon insufficient information and blindly administered has yielded to one in which conclusions are reached only after all the elements of the problem have been weighed and debated. There is developing to-day a mutuality of thought and action which is most gratifying and which does infinitely more to improve the conditions whose remedy is sought than can ever be hoped for by any amount of arbitrary Government action.

The Bureau of Standards has developed these relationships further than the old questions of standards and weights and measures. We have now penetrated into the great problem of elimination of waste in industrial methods by development of commercial standards. We are cooperating to simplify standards in products and to establish better grades of quality by common consent. Generally, we are trying to bring about the thing that is the dominant sense of weights and standards themselves, and that is agreement on some kind of unit and some kind of accepted nomenclature in commerce generally. Fundamentally, if we are to have rightful competition we must compete on the same object of precisely the same description. We must have terms which will express the same idea both to the manufacturer, the producer, and to the consumer. This is simply extending the idea of weights and measures into a broader field of use.

We have had an example recently of the relationship generally of the Bureau of Standards to two very widely different problems in one case furthering the efforts of industry toward the standardization of their products and the other to simplify the processes of manufacture coordinated with it.

The manufacturers of paper bags have adopted standards of capacity for bags of the different recognized nominal sizes, and

they desire to deposit with the Bureau of Standards samples of these bags as standard reference samples for the guidance of the industry. The plan is that when a manufacturer makes bags conforming to these standard samples he will place on such bags a uniform mark indicating that fact. That mark, which will be used throughout the industry, will inform the consumer that he is buying a bag of standard capacity and will enable the dealer to make direct comparisons as to price and quality of the products of different manufacturers. This program, the details of which are not all worked out, will not alone be a contribution to standardization but will be a contribution toward lessening the cost of production, because once we have arrived at the standard packages the producers will be able to concentrate on identical articles in manufacture. It will simplify the processes of manufacture; it will eliminate a great number of sizes and varieties of packages.

I could cite to you a great many other examples of a similar character. Perhaps the largest program ever undertaken in the department has been that in connection with lumber. It is your duty to see that the instruments of measurements are kept accurate while questions as to grades and dimensions are simply commercial questions. Now, in that industry they have been for years basing their measurements on the board measure. The unit of board measure, as you know, is presumed to be a piece of wood 1 foot square and 1 inch thick; but commercial practice has long since abandoned 1-inch-thick boards, which have been gradually thinned down until some are only five-eighths of an inch thick and still pass for an inch board.

The problem there was to agree upon what thickness of board constituted a 1-inch board; and it is not as simple as it might appear, because this problem revolved on whether or not this was to be 1 inch thick when green in the tree or dry in the mill, or whether it had been planed on one side or both sides. So you can get four honest differences of opinion as to the thickness of a 1-inch board. As a matter of fact, we found there were something like a dozen different thicknesses in current use, but finally, after a prolonged debate extending over practically three years, the industry has arrived at what they will call a standard board. So long as the thickness which they agreed upon performs its functions from a structural point of view, and so long as the public knows exactly what it is, then real progress has been made. The main issue was to insure that all boards shall be of that thickness, and that whenever a man buys a standard board he knows exactly what he gets. It assists in eliminating fraud and simplifies the entire processes of manufacture and distribution.

Furthermore, that problem goes further still. It has more extensive ramifications. There is an enormous nomenclature in the lumber industry. Not only do they have five or six grades in order to express the quality of boards, but they also have some 500 or 600 different varieties of trees out of which to make them, and there being no standard nomenclature the buyer was never quite assured as to what he would receive under any given term, so that we have carried that standardization to the point of agreement as to the whole of the nomenclature of the woods, the precise definitions that

make up the distinctions between grades and quality, as well as the standardization of dimensions. I give that to you as an illustration as to how far the whole philosophy of standardization has extended into the economic fabric. That has the effect of protecting the American people from fraud just as your regulatory measures have done. It means a great deal in the elimination of waste in production and distribution and waste of our natural resources. In fact, one of the associations in the lumber industry has estimated that this standardization action has saved the American people fully \$250,000,000 a year already; and in your work you have this same contact day after day with the business fabric of the country, and I am anxious, and I am sure that you are anxious, that we shall develop these relations upon a basis of intelligent cooperation.

You have yourselves been the expression of that cooperation in your conferences in Washington and have yourselves spread this gospel of cooperation between your own agencies and the business fabric of your own States. The cooperation on your part will enable you to make your office a greater power for the common good in your community; it will enable you to render greater service under the statutes enacted; and it will enable you to raise to their highest usefulness the technical knowledge and the skill which you have in your chosen fields. Therefore, I am glad again at this time to welcome you to Washington. You are a part of the machinery by which we are all trying to make progress through cooperation. I thank you.

SUGGESTED AMENDMENT TO MODEL LAW

Mr. HOLBROOK. It has been called to the attention of the conference very strongly in a paper given by Mr. Barron, of Minnesota, two years ago that the penal section of our model law may be said to be weak in one particular. In the model law it is provided that all weighing and measuring apparatus shall be tested, including that used for hire or award. However, the penalty section seems to limit penalties to weights and measures which are used in determining quantities of commodities only. Now, there is the sale of service for which weighing and measuring apparatus is frequently used. For instance, taximeters do not measure a commodity; they measure a service, the service being the transportation of the passengers. Another instance of the sale of service is that of a laundry which does wet washing at a certain price per pound. They do not sell the wash; they do not sell a commodity; they sell a service. The courts of Minnesota, and perhaps those of one or two other States, have held that a man can not be penalized under the law for short weight or measure in service.

Under the circumstances would it not be advisable to add a few words to the penalty section which would specify that the present penalty for the use of false apparatus should also be applicable to apparatus used in the sale of service? If so, we could readily do this.

The ACTING CHAIRMAN. Gentlemen, we have for consideration the last matter presented by Mr. Holbrook, namely, the question of amending the model weights and measures law. I might say in

this connection that we have endeavored to cover this in the revised law of Indiana by the words, "Provided it is used for the measuring of service or the calculating of the value of a service," etc.

Mr. SCHWARTZ. Mr. Chairman, in relation to a change in the model law suggested, I would suggest that that include not only the taximeter and laundry-weighing scale for the weighing of wet wash, but also the personal weighing machine. In our State we made investigations and tests of these weighing machines and in many instances found that they were inaccurate. We tried to bring prosecutions, and when our cases came up in court the defendant's learned counsel usually brought up the question that no commodity was sold over the scale in dispute. The courts held that there was no sale. In many, many instances people under the care of physicians are instructed to determine their weight from time to time, and in doing so must continually rely on the accuracy of coin-controlled personal weighing machines, since they usually have not the means of having their own bathroom scale. It follows that these coin-controlled scales should be tested the same as any other commercial weighing apparatus.

Mr. ESTES. Mr. Chairman, in order to conserve the time of the conference I believe it would be more appropriate to put that in the hands of a special committee. I move that the chair appoint a committee to consider the amending of the model weights and measures law.

(The motion was seconded.)

Mr. WARNER. Mr. Chairman, why not refer that to the committee on specifications and tolerances as long as we have that committee?

The ACTING CHAIRMAN. Do you make that as an amendment?

Mr. WARNER. Yes, sir.

(The amendment was seconded.)

Mr. THEILMANN. Mr. Chairman, I would like to ask if the matter under discussion is not important enough to be placed in the hands of a special committee, and, further, whether the committee on specifications and tolerances has not enough to keep them busy without tackling such an important subject in addition? For this reason I would oppose the amendment.

(The question was taken, and the amendment was adopted.)

(The question was taken on the amended motion, and the motion was adopted.)

PROPOSED METHOD OF TEST OF TAXIMETERS

By RALPH W. SMITH, *Bureau of Standards*

Most of you will remember that the question of taximeters was first brought before the conference at the session held in 1923, when a request was made that the subject be given consideration by the executive committee for inclusion in the program of the succeeding conference, and that the committee on specifications and tolerances make a study of the subject of taximeters with a view to the recommendation of specifications and tolerances for these devices. It was further requested that the Bureau of Standards make a study of taximeters with particular reference to the development of a simple

but efficient test method which might be followed by inspectors of weights and measures throughout the United States.

Pursuant to the request of the conference the bureau got in touch with the various manufacturers and distributors of taximeters in the country after the close of the sixteenth conference. The interest of the bureau in the subject of taximeters was explained to the manufacturers and distributors and their cooperation was solicited in the study which we expected to make. The companies were requested to furnish the bureau with samples of their taximeters, and they were requested to make any suggestions which occurred to them on the general subject of proper methods for the testing of these devices. We received a very gratifying degree of cooperation from the industry and before long had available at the bureau seven different makes of taximeters representing, so far as we have been able to discover, all the types of these devices which are in general use in the United States.

As rapidly as we were able to do so we proceeded with our study of these taximeters, but at the time of the seventeenth annual conference, which met last year, our investigation had not progressed to a point where we felt that we were in a position to make a report. Our study has proceeded during the past year, and we now feel that we can give a report which will be of value to the members of the conference and which will be of real assistance in enabling weights and measures officials properly to test the taximeters within their several jurisdictions.

The objects of this paper briefly stated are, therefore, to present what we consider to be proper testing methods for taximeters, together with such other information relevant to the general subject of taximeters and their inspection and testing as seems to be necessary for a complete understanding of the essentials of the subject.

GENERAL CONSIDERATIONS

In the "model ordinance regulating the operation of taxicabs" prepared by the National Association of Taxicab Owners a taximeter is defined as "a mechanical instrument or device by which the charge for hire of a public hack is mechanically calculated, either for distance traveled or for waiting time, or for both, and upon which such charge shall be indicated by means of figures." In the United States the employment of taximeters is limited, so far as we know, to use on motor-driven vehicles. This is contrary to the situation which prevails in many foreign countries where taximeters are commonly used on horse-drawn vehicles. As developed up to this time in the United States the regulation of taximeters is closely associated with the licensing of cabs and operators, the same governmental agency in many cases administering the regulations of both classes. This is a logical connection, although we believe that where special considerations do not govern efficiency demands that the actual testing of taximeters for accuracy be handled by the same department which is charged with the duty of examining other measuring devices for accuracy, namely, the weights and measures department. This department and the license bureau should work hand in hand, however. Just as the license bureaus

by law or by voluntary cooperation now very generally refuse to license a hawker or peddler until after he can show that his weighing and measuring apparatus has been duly tested and found correct, so a regulation which makes the granting of a license to operate a taxicab contingent upon the approval by the proper authority of the taximeter used thereon is, in our opinion, a very good one and affords an efficient means for controlling the taximeter situation and enforcing the requirements for a periodic inspection and testing of taximeters.

The frequency with which taximeter tests should be made is usually specified in the laws or ordinances regulating taximeters and taxicabs. As a suggestion, we may say that we believe taximeters should be tested at least once in six months, this departure from the provision requiring yearly tests in the case of weighing and measuring devices in general being due to the special nature of the devices in question and to the severe treatment to which they are subjected in use.

DESCRIPTION

A taximeter, as commonly used in the United States, consists essentially of a system of gears and a clock movement in combination with a fare-indicating mechanism. The gear train utilized for mileage registration is, in present practice, actuated by one of the cab wheels, to which it is attached by means of a flexible shaft. The clock movement is of the ordinary type. The indicating elements may be in the form of drums or disks, and these are marked in terms of money values. By means of a manually operated "flag" the mileage gears and the clock movement may be connected with the indicating mechanism, so that the meter will register the amount of fare which should be paid by the passenger. Return of the flag to its initial position serves to "clear" the meter face of the accumulated fare for any given trip.

The amount of this fare is determined by two factors—the mileage traveled and the amount of "waiting time." Charges for waiting time are registered as a result of the operation of the clock movement, and when the meter flag is in normal operating position (usually designated as the "hired" position), even though the cab is not in motion, charges continue to accrue against the passenger at the waiting-time rate of so much per hour; also, if the speed of the cab when in motion drops below the point at which the rate of mileage revenue per unit of time equals the waiting-time rate, the clock movement automatically assumes the actuation of the indicating elements. At another position of the meter flag (usually designated as the "time not recording" position) the clock movement is disconnected from or is rendered inoperative with respect to the fare-indicating elements. This provision is made so that charges may not be assessed against the passenger for delays due to the inefficiency of the cab—as, for instance, a delay occasioned by a punctured tire—and also that the clock movement may be prevented from causing any change in the fare registered after the conclusion of a trip while the passenger is engaged in paying his fare.

In addition to the fare indicators, taximeters are ordinarily equipped with what are known as "extras" indicators, these being manually operated. They are utilized to record such additional fixed charges as those for extra baggage, extra passengers, etc. The present tendency, however, appears to be for taxicab companies to eliminate charges for extras, such action already having been taken in a number of cities during the past year. In fact, one taximeter manufacturer recently stated that, in his opinion, it would be but a short time until all taxicab companies in the United States would have voluntarily discontinued charging "extras" of any kind.

It is also customary for taximeters to be so designed that, by means of a series of totalizing counters or their equivalent, the individual indications of the taximeter are summarized or totalized. These counters usually show such items as total mileage; "live" mileage or mileage for which a fare is collected; number of trips or "flag pulls"; number of unit charges, exclusive of the initial charges, which have been registered by the meter; and the amount of "extras." Different makes or models of taximeters may show variations from the general features outlined in a number of respects, notably in that special totalizing counters are sometimes provided giving a more detailed record of what the cab has done during a given interval, and that printed or graphic records instead of the ordinary totalizing dials are provided in some cases.

All taximeters are so designed that the rates of fare both for mileage and waiting time may be modified to meet the desires of the various cab companies. These variations may be in any one of the following particulars: (a) The value of the initial "money drop." (b) The value of subsequent "money drops." (c) The initial mileage interval; that is, the interval corresponding to the initial money drop. (d) Subsequent mileage intervals, corresponding to subsequent money drops. (e) The waiting-time rate. (f) The initial waiting-time interval. (g) Subsequent waiting-time intervals. (h) The value and number of the "extras" units.

Taximeters may be adjusted for use with tires of various sizes by means of the interposition of suitable gears between the meter head and the driving cable. On account of the two general plans which are followed by manufacturers with respect to these gears, meters are spoken of as having "outside" or "inside" gear boxes. In the former a separate gear box is used, this being attached directly below the meter head when this is installed on a cab. In the meter with the so-called "inside" gear box, the change gears may actually be inside of the main housing of the meter head, or the gear assembly may be attached at the bottom of the housing as an integral part thereof.

Each make of taximeter using an "outside" or separate gear box is designed to have a fixed number of revolutions per indicated mile of the spindle to which the flexible driving cable is attached, and in the meters of this type that we have examined we have found the range of spindle revolutions per mile to be from 16 to 80. While speaking of spindle revolutions it may be mentioned that some meters are so designed that the mileage mechanism is advanced only when the cab is traveling in a forward direction, while on other meters the meter mechanism advances whether the cab be moving forward or backward.

At the cab wheel itself a further gear reduction of 8 or 10 to 1 is provided, the so-called "star and ring" gear being now almost universally used for this purpose. This consists of a ring gear attached to the cab wheel, this ring gear meshing with an 8 or 10 tooth "star" gear which is attached to one end of the flexible taximeter-driving cable. It will thus be seen that for every 8 or 10 revolutions of the cab wheel the flexible driving cable makes 1 revolution; and that the cable not infrequently revolves several times to one revolution of the main spindle of the meter.

TESTING (GENERAL)

The object of testing a taximeter is, in the main, to determine that the various indications on the face of the meter occur following the proper number of revolutions of the cab wheel or the proper intervals of waiting time, so that when the meter indicates a charge for a given distance or a given waiting time that distance will, in fact, have been traversed by the cab or that time will have elapsed. As a general principle to govern the testing of taximeters, we may say that here, as in the case of other measuring devices, the test should, as nearly as may be, approximate service conditions. In many cases, however, considerations of testing expediency make it advisable to introduce variations from actual service conditions. We believe it will be found that, whenever this is the case in the recommendations which follow, the variation is a reasonable one and is amply justified.

One of the troublesome factors, both in the use of taximeters and in their testing, is the nonuniformity in automobile tire sizes. It is well known that the effective diameter of tires when mounted upon a vehicle often differs materially from the nominal diameter or the value marked upon the tire. There is a difference between cord and fabric tires of the same nominal diameter and of the same manufacture. There is a difference between tires nominally identical in all respects but made by different manufacturers. The degree of inflation of a tire has a noticeable effect upon its effective diameter when in use, as has also the degree of wear. Were it not for the fact that in most localities taxicab construction tends, for that locality at least, to become standardized along certain lines, and that in no locality do taxicab operators seem to favor more than a few types and sizes of tires for use upon their cabs, this divergence in tire sizes would be a much more serious problem than is actually the case in any limited jurisdiction. We have not up to this time attempted to prepare and publish any complete list of tire diameters for different sizes, kinds, and makes of automobile tires. If it appears that such information would be of service, we can probably arrange to furnish it. It is believed, however, that inasmuch as each inspector will probably have to contend with only a limited number of varieties, the following plan, which is extremely simple, will be found effective: It is suggested that the inspector compile a table showing the description, the mean effective circumferences, and the number of revolutions per mile, for all varieties of tires in use on taxicabs in his jurisdiction. This information can be secured from time to time as cabs equipped with tires of sizes not previously examined are encountered.

To secure the desired data, it is only necessary that a new tire, mounted upon a cab in the customary manner and inflated to normal pressure, be caused to travel for several complete revolutions; that the total distance traveled be carefully measured; and that the average distance traveled per revolution be computed. Then, since the wearing away of the tire tread as a result of use will cause a reduction in the effective circumference of approximately 2 per cent by the time the tire is discarded, a deduction of 1 per cent should be made from the measured circumference determined as just described, so that the value entered in the table may represent the average circumference of such tires in use. Upon the basis of this information the inspector can proceed with entire confidence in the examination of taximeter installations, knowing that the basic data upon which he is proceeding are the result of practical measurements which may readily be verified should occasion ever arise. This system in substance has been in use with entire satisfaction in Detroit for a number of years and is also probably already in use in other jurisdictions.

There are three general types of tests which are applicable to taximeters—the bench or laboratory test, the wheel test, and the road test. The bench test, as the name indicates, is a test of the meter head itself without specific reference to the other elements of a complete installation. This test makes possible a very complete and satisfactory examination of the meter head and is to be recommended in all cases where provision can be made for such a test. It is obvious that such a test should, however, not be the sole test made but should be supplemented by some form of test and inspection after the meter head is mounted upon a cab. It is for this purpose that the wheel test is used in some jurisdictions and the road test in others. In the wheel test the meter mechanism is actuated by the rotation of the cab wheel to which the ring gear is attached, and therefore it serves to test the ring and star gears, the gear box or other supplementary gears, and the connections between gears, cable, meter head, etc., and to establish whether or not the entire installation is functioning properly.

The road test accomplishes all of the purposes of the wheel test and, in addition, subjects the meter head and other parts of the assembly to road shocks such as are encountered in the everyday operation of a taxicab. Also, this test eliminates some computation in relation to tire sizes, inasmuch as the tire with which the meter is to be used is operated under actual service conditions. It is perhaps possible to simulate road conditions in a laboratory by means of some sort of vibration test, but the fact that special apparatus is necessary, as well as the complications resulting from its use, make this a somewhat doubtful expedient. The objections to the road test are the difficulty of traversing exact distances due to the cab not following a perfectly straight course throughout the test, the difficulty of applying tolerances, the limited distances for which it is practicable to operate a taxicab on road tests, and the time consumed.

In some places road tests alone are depended upon as a basis for the approval of taximeter installations by the official. It is recognized that where the number of taximeters to be tested is small and

the funds available for providing special equipment limited it may be necessary to confine the tests of taximeters to road tests, but when this is done the efficiency of the examination is lowered because of the restricted number of tests which can be made, the relatively low speeds of operation, and the other objectionable features previously mentioned in this connection.

EQUIPMENT

The equipment for a bench test of taximeters may be very simple or more elaborate. The essentials are some means for rotating the driving spindle of the taximeter and some means for mechanically counting the revolutions. It will be seen that a simple hand device can be designed to accomplish this purpose; likewise, if desired, a machine can be employed utilizing an electric motor as the motive power and having such refinements as a clutch to engage and disengage the taximeter, means for varying the speed of rotation, etc. Where a large number of taximeters are to be tested, the use of the motor-driven machine will be found advantageous. If the number is great enough, arrangements can be made for several brackets, so that several meters may be tested at the same time, all being driven from the same motor. In this case it will be almost essential to provide clutch mechanisms so that the operation of individual meters may be commenced and discontinued at will.

The equipment for a wheel test must be heavier and consequently more expensive than that for a bench test. Here it is necessary to provide means for turning the taxicab wheel, and the use of some power device is a practical necessity. A mechanical counter should also be provided, as in the case of the bench testing apparatus.

For the road test a measured course laid out upon some street or road is essential. The course should be accurately surveyed and should preferably be straight. In length it should be either 1 or 2 miles; the longer distance is more desirable and should be provided where it is possible to do so. Markers should be provided indicating not only the miles but also those subdivisions of miles which are utilized in taximeter rates, namely half miles, quarter miles, third miles, fifth miles, and sixth miles. If the legal or customary rates in a given community do not involve all of these fractional parts of miles, it is unnecessary to include all of them in the measured course; only those which must be referred to in the testing of the taximeters need be shown. It is relatively simple to add additional markers for other fractions if the need for this develops at any time.

INSPECTION

Each taximeter should be given a general inspection to establish the fact that certain parts are functioning in the manner designed. The flag should be placed in each of its various positions, being manipulated both rapidly and slowly and being operated in a backward as well as in a forward direction in all cases where the backward motion is a proper one. It should be noted that the actual position of the flag is properly indicated on the face of the meter in

all cases, and that any shutters or shields which may be provided operate in a proper manner. The "clearing" of the meter and the centering of the figures in the proper apertures should be observed at this time as well as throughout all of the tests which may be conducted. With the flag in the "time not recording" position it should likewise be noted that the operation of the clock mechanism is actually stopped or that the fare indications are, in fact, not affected by the operation of the clock movement. The "extras" may be tested (as explained under "bench test") at this time. The general character of all of the meter indications should be observed, and the meter should be examined for the presence, in proper form, of all markings which may be required and for compliance with all other provisions of the regulations that are susceptible of being checked by inspection of the meter head. The meter should also be examined for possibilities of fraudulent manipulation by the operator of a taxicab.

TIME TEST

The time test of a taximeter is very simple and consists, essentially, of timing the intervals elapsing between money drops. We prefer dividing the test into two parts, which may be spoken of, respectively, as the "separate-interval" and the "average-interval" tests. The separate-interval test, in which the periods of individual intervals are separately timed, is desirable for the purpose of learning the magnitude of the errors on individual intervals. From the standpoint of results alone this character of test should be continued throughout the entire period of the time test, but in order to save time as a matter of testing expediency this procedure is not urged in all cases, because it is felt that the average-interval test, in which the average time interval is computed from observations made at the beginning and at the end of a relatively long period, may safely be relied upon if the results of a short separate-interval test are satisfactory.

In the separate-interval test observations should be made to the nearest second, and for this part of the test the use of either a watch having a sweep second hand or a clock of similar construction (such as the one on exhibit) will be found much more convenient than the use of an ordinary watch with a small second hand, because with one of the former observations can be made more readily and with greater precision under average conditions.

In starting the test the flag of the meter is thrown into the "hired" position, and at the same moment zero time is observed and recorded, or the second hand of clock or watch is started, depending upon whether an ordinary watch or a special watch or clock is being used. If the ordinary watch is being used it will be found slightly more convenient to throw the flag as the watch indicates some even minute, thereby avoiding an entry of seconds for the original time observation. As subsequent money drops occur the observed times are recorded and the actual time intervals and their errors computed. It is recommended that not less than 5 separate intervals be determined in this manner; 10 would be a more representative number, but in routine tests, unless some unusual condition is noted, the

advantages to be gained by so testing 10 or more intervals probably fail to compensate for the time consumed in making that number of observations.

As an example of the manner in which the observations may be recorded, let us assume that we are testing a meter having an initial money drop of 20 cents, subsequent money drops of 10 cents, a nominal initial time interval of eight minutes, and a time rate of \$1.50 per hour, or 10 cents for each four minutes; let us also assume that we are using in our test a clock with a sweep second hand. Our results might then appear something like this:

Drop.....	30	40	50	60	70
Elapsed time.....	8.10	12.14	16.14	20.12	24.14
Interval.....	8.10	4.04	4.00	3.58	4.02
Error.....	-10s	-4s	0	+2s	-2s

It will be noted that we have denominated the initial interval as the 30-cent drop, the second interval as the 40-cent drop, etc. These money values are the ones actually corresponding to the second interval, the third interval, etc.; but since these are the values registered by the meter at the conclusion of the first interval, the second interval, etc., it is simpler to record them as observed, and this method introduces no complications in any subsequent computations.

These results shown above would indicate that excessive variations on individual intervals are not to be anticipated, and the inspector might, therefore, safely proceed with the average-interval test. If, on the other hand, the results of the separate-interval test are such as to indicate the existence of some unusual condition, it is recommended that the number of separate intervals observed be raised to 10 or more, so that no doubt may exist as to the soundness of any conclusions which may be drawn from these results. It may also be said in passing that if a meter is to be rejected upon the results of a separate-interval test, as for consistent overregistration, for instance, little purpose will be served by proceeding with the average-interval test on that meter.

For the average-interval test the meter is not cleared following the separate interval test but is permitted to continue in operation for not less than one hour and preferably for a longer period. When the test is to be concluded, observe and record the time at which a money drop occurs and also record the reading of the meter, after which the meter may be cleared. Then compute the number of time intervals since the meter was started and the elapsed time, discarding the first interval. It is recommended that the first interval be disregarded for three reasons: First, to simplify the calculation; second, to eliminate the effect of other portions of the taximeter mechanism not primarily a part of the time-recording mechanism; and, third, because such lost motion as may exist in the gear train will thereby be eliminated and a more nearly correct average be obtained.

Reverting to our previous example, let us assume that the value of \$2.20 dropped after 84 minutes and 51 seconds from the time we started. We then enter these observations, so that our record appears as follows:

Drop.....	30	40	50	60	70	2.20
Elapsed time.....	8.10	12.14	16.14	20.12	24.14	84.51
Interval.....	8.10	4.04	4.00	3.58	4.02	-----
Error.....	-10s	-4s	0	+2s	-2s	-----

Our next step is to eliminate the first interval and arrive at an average error for the remaining intervals. The difference between \$2.20 and \$0.30 is \$1.90, and this represents the charge for 19 intervals having a nominal value of 4 minutes each; the nominal elapsed time in minutes is therefore the product of 19 and 4, or 76. The actual elapsed time for these 19 intervals is the difference between 84 minutes 51 seconds and 8 minutes 10 seconds, or 76 minutes 41 seconds. The difference between the actual elapsed time, 76 minutes 41 seconds, and the nominal elapsed time, 76 minutes, is 41 seconds. We have, therefore, an underregistration error of 41 seconds for 19 intervals, or an average error per 4-minute interval of slightly more than 2 seconds.

No difficulty should be experienced in applying the separate-interval test to three or four meters at the same time if suitable intervals—one minute, for instance—are allowed to elapse between flag pulls; there will be ample time for recording the observations and computing the results between money drops unless the meters are very irregular. After the inspector becomes experienced it will be found that the number of meters under observation at the same time on this test may be still further increased without complications arising.

BENCH TEST

The purpose of the bench test is to determine the accuracy and the consistency of performance of the meter head with respect to its various indications. The time test is really a part of the bench test, but for convenience has been treated under a separate heading. The remaining elements to be considered are the "extras," the mileage indications given in terms of money values on the face of the meter, and the totalizing counters on the back of the meter.

The "extras," which are manually operated, present no difficulties in the way of testing. On most meters the maximum amount which can be registered as extras is small, and in these cases the inspector should satisfy himself that this portion of the mechanism is functioning properly throughout its entire range. In those cases where the maximum registration is large a test should be made throughout a sufficient portion of the total range to exceed all ordinary demands; it is believed that testing up to \$2 will be sufficient. The drops should occur in proper sequence and the dials or drums should properly "clear," or return to zero registration, when the meter flag is returned to the "vacant" position.

It should be mentioned at this time that whenever it has been decided by a taxicab company to abolish all charges for extras, or whenever such charges are prohibited within a given jurisdiction by law or ordinance, the taximeters used by such company or in such jurisdiction should be of such design or so modified that charges for extras may not be shown on the meters. This result may be accomplished in the case of taximeters originally designed to register charges for extras, by removal of the operating knob or lever by

means of which extras are registered, or by providing means for effectively obscuring any registration which might take place. If the latter alternative is adopted, any shield covering the "extras" aperture should be beneath the glass face of the taximeter, so that protection may be afforded by the inspector's seals on the taximeter housing. Similarly, if paint or a paster is applied directly to the glass, it should be applied to the inner and not to the outer surface of the glass. Whatever method may be employed, the inspector should insist that it be effective in accomplishing its purpose, and that an opportunity to indicate a charge for extras on the face of the meter is thereby denied the unscrupulous cab driver.

The functioning of the mileage drops is the most important consideration of the entire test, since it is here that the principal charge against the passenger is registered. We prefer dividing the mileage test into two parts, which may be referred to as the "short-haul" and the "long-haul" tests. A very large number of taxicab trips are for relatively short distances where only the first few money drops are involved; it is also in these first few drops that the largest percentage errors of registration are apt to occur. It seems proper, therefore, to give special attention to the performance of the meter throughout this portion of its range, hence the short-haul test. At the same time the short-haul test can not be solely relied upon, because it does not bring all of the meter parts into operation in such a way as to demonstrate that they are functioning as they should; therefore a test corresponding to a greater traveled distance, or the long-haul test, is also necessary.

In the short-haul test it is recommended that the meter flag be thrown into the "time not recording" position, so that the mileage portion of the meter mechanism alone will affect the registration. It is also recommended that the mechanism be operated at a slow speed, so that observations may be made with precision. Each interval of the first mile, and preferably of the second mile also, as represented by separate money drops, should be tested and the initial interval should be tested several additional times. It not infrequently happens that an error on a given interval in one direction will be reflected by an error on the succeeding interval in the opposite direction; also errors observed on the first interval may not be consistent among themselves and with the errors on succeeding intervals. These conditions can be brought out by the method of test recommended, whereas they might well be lost sight of entirely if a long-haul test alone were used.

In the long-haul test it is recommended that the meter be operated for not less than a 5-mile and preferably for not less than a 10-mile interval. The position of the flag may be either "hired" or "time not recording." Here it is desirable that the speed of operation be increased at least to one corresponding to the greatest speed at which a cab is apt to be operated, for instance, 40 miles per hour; and, according to the best information which we have been able to secure from the manufacturers of taximeters, the speed at which the meter is operated during test may be increased to several times the amount mentioned with entire safety to the mechanism of the meter and with the added advantage that at the high speed some conditions which should not exist, such as loose or worn

parts, and which would probably not be revealed by a test at a slow speed, may be brought to light. Throughout the long-haul test the meter head should be kept under observation, so that any sticking of the money drops, any incorrect alignment of figures, any failure of money drops to occur in proper sequence, or any other similar abnormal condition may be discovered. Needless to say, the existence of any of the conditions enumerated is proper cause for the rejection of a taximeter. The rejection of a meter head on account of a defect developed at a speed of operation corresponding to a speed considerably in excess of normal cab speed may be justified on the ground that conditions of operation when a meter is in actual service on a cab are approximated in some respects by a high speed of operation during the laboratory test, and that any defects which may so be brought to light would eventually manifest themselves in the course of ordinary operation.

In conducting a mileage test the revolutions of the meter spindle should always be carefully counted for all intervals under examination, and these results should be compared with the money values indicated by the meter. Reliance should not be placed upon the mental counting of revolutions except perhaps for very short intervals; a reliable mechanical counter invariably should be employed for all long intervals, and its use even for short intervals is to be recommended. In this connection it should be remembered that one revolution of the meter spindle may represent several revolutions of the driving cable, and that one revolution of the cable represents 8 or 10 revolutions (usually the latter) of the front wheel of the cab. It is obvious from this that an error of even a fractional part of a spindle revolution may correspond to a cab travel of a very considerable amount.

A meter with which separate ("outside") gear boxes are to be used is universally designed with some nominal, fixed number of spindle revolutions per indicated mile, and this value determines the values used for the gears in the gear boxes. If desired, such a meter may, therefore, be tested without using a gear box, the number of cable revolutions which will result from the use of different gear boxes being computed from the values of the gears used. It is believed that on such a bench test a meter head which overregisters with respect to the nominal number of spindle revolutions should not be approved. If the error is in the direction of underregistration, the actual number of spindle revolutions per mile may be noted on the "approved" tag, this to be considered later with respect to the particular size of tire used when a complete installation is presented for approval and when the question to be determined is the compliance of the entire assembly with the tolerances established.

Since the various gear reductions used by any taximeter company are standard for that company, it follows that where a gear box is made use of in the bench test the meter head may confidently be expected to give the same performance results with any other gear box of the same designation as the one used in the test, and the difference which will result from using a different gear box may safely be computed without resort to a retest of the head.

It should be borne in mind that operating a meter without counting the spindle revolutions and depending for the test upon a com-

parison between the money indications on the face of the meter and the indications of the totalizing counters on the back thereof is merely checking one part of the mechanism against another part and is in no sense a proper mileage test. Even if the money indications are found to conform to the indications of the totalizing counters there can be no positive assurance that the latter are correct, and as a result no assurance that the meter will register correctly when installed on a cab.

In the case of meters that automatically print a statement of the fare to be paid by the passenger, this statement constituting the passenger's receipt for the money paid, the accuracy and legibility of the printed statement are equally as important as the accuracy and legibility of the indications on the face of the meter. It will, of course, be out of the question for the inspector to check more than a very limited number of the possible fare combinations which might be printed, but he should critically examine all of the passengers' receipts issued by the meter in the course of the regular tests and should withhold approval on any meter which does not print the essentials of the receipt accurately with respect to the indications on the face of the meter and in a legible manner. In the type of meter in question the totalizing counters customarily employed on other types of taximeters are replaced by means for automatically printing a record summarizing the various operations of the meter. The attitude of the inspector toward this record should be the same as toward the ordinary totalizing counter as discussed below.

The totalizing counters on the back of the meter comprise an essential part of the registering elements, since these counters are made use of by the cab company to determine the amounts due from the cab drivers for fares collected and to compile its records of cab performance, costs, etc. These counters do not, however, have anything directly to do with the fares paid by passengers, and they are, therefore, perhaps, of secondary importance to the inspector in his examination of the meters. It is a moot question whether or not an inspector should withhold approval on a meter which is correct except in respect to the totalizing counters. My own thought in the matter is that the inspector should check the registration of all of these counters in connection, wherever possible, with other tests, reporting inaccuracies, if any are found, to the proper parties; but in the absence of specific authority to that effect I question the legal right of the inspector to condemn a taximeter solely on the ground that the totalizing counters are inaccurate or inoperative.

WHEEL TEST

The object of a wheel test of a complete installation, following a bench test of the meter head, is to secure a check upon parts, other than the meter head, which enter into the installation, to demonstrate that all connections are properly made, and to determine that the tires with which the cab is equipped are of the proper size for use with the particular meter assembly in question. It would be possible to conduct all of the tests of the meter head in conjunction with the wheel test, actuating the meter mechanism by revolving the cab wheel which causes the meter to operate when the taxicab is in

actual service; but the bench test possesses so many advantages over this method that the latter is not to be recommended. Mention may be made, however, of a modification of this method used in the city of Detroit, Mich., where meters are customarily submitted for examination only after they are mounted on cabs. The plan is to disconnect the cable from the meter, replace it with the motor-driven cable of the testing device, and conduct a test without removing the meter from the bracket. The revolutions of the cable are mechanically counted, and the error in the number of cable revolutions for a given meter indication and for the particular tire size used is determined through reference to a table giving the number of revolutions per mile of various makes, kinds, and sizes of tires.

In the wheel test under consideration a speed of operation corresponding to a cab speed not less than the average traveling speed of a cab, and not more than the maximum speed at which a cab may ever be expected to travel, should be used. Since the meter head installed has already been approved on a bench test, it is unnecessary again to test individual intervals, and all of the purposes of the wheel test will be accomplished if the performance results at one or two longer intervals are observed. It is recommended that a minimum of one 2-mile or two 1-mile tests be made; since this can be conducted without interruption, the position of the meter flag is immaterial as long as the meter is in condition to register mileage charges. As in the bench test, the counting of revolutions should always be done mechanically. The meter head should be under the observation of the inspector throughout the test, so that evidences of any unusual conditions may be observed. Approval of an installation should be contingent upon the correct mechanical functioning of all of the parts, and upon agreement, within tolerance, of the counted wheel revolutions for the indicated interval with the tabular values of the particular tire used for the same interval.

At the time of making the wheel test inspection of the complete installation is a matter of course, and compliance with such requirements as relate to the position of the meter, illumination of the meter face, etc., also can be checked.

ROAD TEST

Two types of road tests are to be considered—the road test which is supplementary to the bench test and the road test which alone is depended upon to demonstrate the accuracy, as to mileage indications, of a taximeter installation.

When a meter head has been approved after a bench test, the road test is resorted to for the same purposes as have been mentioned under the discussion of the wheel test, that is, to check tire diameter, gears, and connections, and for the further purpose of subjecting the meter head to the shocks incident to travel on the road. It appears, therefore, that here, as well as in the regular wheel test, it is unnecessary again to test the indications for fractional parts of miles by bringing the cab, and thus the taximeter mechanism, to a stop at each fractional mile indication. All of the purposes outlined may be accomplished if the meter is tested at one or two longer intervals, the individual intervals being subject to check as described

below. We recommend for this test that the meter flag be placed in the "time not recording" position, so that if it becomes necessary to halt the cab during the progress of the test this may be done without affecting the meter indications. It is also recommended that the cab be operated for a minimum distance of 2 miles. If only a 1-mile course is available, two 1-mile tests should be made, recording observations in each case for the total interval only. If a 2-mile course is available, one or two 2-mile tests should be made, recording observations for the total interval in each case. During these tests the meter should be kept under close observation to detect any effects of road shocks on the mechanism, and the continued accuracy of the individual intervals should be checked. The cab should be operated in this test at the maximum legal speed and, of course, every effort should be made to cause the cab to travel in a straight line, so that the distance actually traveled may correspond to that indicated by the measured course.

If the road test is the only mileage test to be applied to a meter, an effort must be made to have this cover as many as possible of the elements embraced in the separate bench and road tests as performed when both tests are used. In addition, the general inspection of the meter and of the entire installation, the test of the "extras" if provision is made for registering these charges, and the time test are to be made as has been previously outlined.

When this combined test is to be made, the following procedure is recommended: (1) With the meter in the "time not recording" condition, make at least one 2-mile test to determine the accuracy of the individual intervals, operating the cab at a slow rate of speed so that the observations may be made with precision. (2) With the flag in the "time not recording" position, make at least two additional tests on the first interval at a slow cab speed. (3) Unless convinced that no "time and mileage interference," as discussed hereafter, can occur, make a test of the first mileage interval with the flag in the "hired" position and at a cab speed of approximately 12 miles per hour, comparing the results of this test with the results previously obtained on the same interval. In this test it must be remembered that if for any reason it becomes necessary to run the cab very slowly or to stop it altogether, the results of the test will be affected by the normal functioning of the clock mechanism; if either of these contingencies arises it will probably be found preferable to repeat the test rather than to try to eliminate the normal effect of the clock movement by manipulation of the flag. (4) With the flag in the "time not recording" position, and the cab being operated at the maximum legal speed, make a minimum of one 2-mile or two 1-mile tests, recording observations in each case for the total interval only, but checking the accuracy of the intermediate intervals and keeping close watch for premature money drops, etc., which might result from road shocks, as has been mentioned previously in connection with the simple road test. In the foregoing discussion it is to be understood that the meter is to be cleared between each "test" recommended.

In carrying out this type of road test a 2-mile course, properly divided into fractions, will be found more suitable than a 1-mile course. Certain 2-mile tests are very desirable, and in attempting a 2-mile test on an ordinary 1-mile straightaway course the distance

traveled by the cab in turning around introduces some complications which are avoided when the longer course is provided. However, this difficulty can be overcome even on a 1-mile course, provided that the course is wide enough for cabs to turn without backing, and that it can be kept free of parked vehicles, by having the course so surveyed and marked that turns at either end are included in the measured distance and may be utilized in continuous runs of 2 miles or more; this can be done without in any way interfering with the 1-mile straightaway.

In all cases where any question of tolerances is involved the estimation of distances from a moving cab is to be discouraged; no rougher approximation than the pacing of the distance between the points in question should be countenanced. The driver of the cab should be on the alert to make a quick stop at a signal from the inspector, and as each money drop occurs the inspector should mentally mark the corresponding spot along the curbing, so that if the need is apparent the cab may be stopped at once and the error determined by an actual linear measurement.

MULTIPLE TARIFF METERS

Taximeters are sometimes so designed and constructed that the mileage fares may be registered at any one of several rates. So far as we know, meters with more than two tariffs are never used in the United States, and these two-tariff meters are ordinarily used only in cities permitting a higher tariff to be charged for carrying more than a specified number of passengers. Where such a provision is not made by law, such a meter could only be used where the higher tariff did not exceed the legal maximum; but, even so, its use should not be countenanced by the weights and measures official unless specifically recognized by law, on account of the facility with which passengers may be deceived as to the rate paid for transportation. In our opinion, even legal provision for two-tariff meters is usually unwise because of the possibility, which amounts almost to probability, that drivers will, with great frequency, overcharge passengers by exacting fares at the higher tariff from those passengers who should rightfully be carried at the lower tariff. A two-tariff meter must be given a complete mileage test for each tariff, because different gears, the performance of which must be checked, are used for the two mileage rates.

TIME AND MILEAGE INTERFERENCE

In the course of the bureau's investigation it was found that with one type of construction large variations developed when the meter was operated at speeds corresponding to cab speeds of from $9\frac{1}{2}$ to 24 miles per hour. At the former speed the meter was in error by 15.6 per cent in the direction of overregistration; at the latter speed it was substantially correct. At intermediate speeds the errors were consistent in that they grew less as the speed increased, but they were not proportional, the percentage errors mounting rapidly at speeds under 12 miles per hour. The discrepancies found could not be attributed to the normal functioning of the clock mechanism, because

at the rates for which the meter in question was adjusted the normal rate of mileage revenue would not drop to the level of the waiting-time rate until the cab speed had been reduced to 5 miles per hour.

Upon careful examination we discovered the cause of these discrepancies to be the improper design or adjustment of the mechanism used to advance the gear trains. This was in such a condition that at slow speeds, when the flag was in the "hired" position, the operation of the clock movement caused the mileage ratchet mechanism occasionally to advance two teeth instead of one. The slower the operation of the mileage mechanism the more frequently this occurred. Obviously, this condition did not manifest itself when the flag was in the "time not recording" position, since with a taximeter flag in this position the clock movement is inoperative with respect to the money drops. To meet this condition it is recommended either that the inspector satisfy himself that the type of the taximeter is such that this condition can not develop, or else that, with the flag in normal operating position ("hired"), a comparison be made between performance results at operation speeds corresponding to cab speeds of approximately 12 and 25 miles per hour, and that these be required to be in substantial agreement.

SEALING

Where meter heads are separately submitted, provision must be made, of course, for appropriately marking them after approval or rejection. The mark may best take the form of a tag, and this should always show the date of test, the make and number of the meter, its disposition, and the signature or initials of the inspector who made the test. In addition to this information, the tag should show the results of the test in sufficient detail so as to be fully informative when it is later examined by either inspector or service man. For example, it appears to be appropriate for the "approved" tag to show (1) the number of revolutions per mile of the driving spindle as determined by the test, together with a statement that this value was determined either with or without a gear box attached and, if the former, the designation of the gear box or of the gears used, and (2) the actual time rate as determined by the test. A "rejected" tag should likewise clearly indicate in what respects the meter head to which it is attached failed to conform to the specifications and tolerances, so that the meter service man may proceed intelligently in making the necessary repairs or adjustments. It will be found convenient to have the "approved" and the "rejected" tags of different colors and to have them so printed that the desired information may quickly be entered by the inspector.

It may be appropriate to mention here that when a meter head is approved the inspector should at once apply the necessary lead seals to secure the adjustments, so that if subsequent alterations are made to the meter mechanism this fact will be evidenced by the mutilation of these seals. It is also desirable for the "approved" tag to be fastened to the meter head by means of a lead and wire seal, so that there may be no opportunity for meter and tag to become separated.

Considering next the meter mounted on a cab, this may be one which has previously been approved on a bench test, or it may be one which has never been examined by the inspector. In the former

case the inspector's tag, showing the results of the bench test, will be attached, and so far as the head itself is concerned, it is only necessary for the inspector to assure himself that the seals are intact. When the examination and tests of the entire assembly are completed, if the assembly is approved, the tag should be removed, the description of the cab should be entered thereon, and the tag should be retained by the inspector to enable him temporarily to close his file on that particular meter head; if the assembly is not approved, the tag will, of course, remain attached to the meter head until the faulty installation is corrected.

If the mounted meter has not previously been approved, and if upon test the entire assembly, including the meter head, is found to be in proper condition for use, the tag which we have been discussing need not be made out, the cab description being entered directly upon the test record. However, if either the meter head or the remainder of the assembly is found unsatisfactory, the meter head should be properly marked, according to its condition, as has been indicated before.

When an assembly is approved, the inspector should apply the necessary lead and wire seals properly to secure the various connections from cab wheel to meter—star gear to cable, cable to gear box, and gear box to meter head, or the equivalent of these where the construction differs from that indicated. So that the riding public may be advised that meters in use have been tested and approved by the weights and measures officer, it is desirable that there appear on the passenger's side of the meter head a conspicuous statement to this effect. A metal tag may be used for this purpose, but because it is perhaps more conspicuous the gummed paper seal may be preferred. In any event, the shape, size, and location of the seal should be such that the passenger's view of the meter indications is in no way obstructed. This seal should be affixed by the inspector as the last act of approving the entire installation. Thus the mark which the public will be taught to look for upon taximeters as evidence of the protection afforded by the weights and measures official, will be placed on the meter head only after the inspector has found that the meter, the gear box, the star and ring gears, and the tires on the cab all bear the proper relations to each other, and that the connections between these various parts have been properly made.

If a system of street inspections—that is, a check-up of cabs on the street—is to be maintained—and such a system seems to be essential if full protection is to be given—the metal or paper seal referred to above should give enough information to guide the check-up inspector in his work. The date of approval should be shown so that meters overdue for retest may be called in or that other suitable action may be taken. The proper size of tire should be indicated in some manner so that the inspector may assure himself at once that tires of a smaller diameter have not been substituted for those used at the time of approval. Perhaps the best way of indicating this is for the seal to show the maximum number of revolutions per mile which the tire should make. By noting the tire in use and referring to a table showing the revolutions per mile for different makes, kinds, and sizes of tires, the inspector can readily determine the desired facts. Another method would be to show on

the seal the make, kind, and size of tire in use at the time of approval. If the check-up inspector found a different sort of tire in use, he could then refer to his table and learn whether or not the second tire in question made the same or a greater or smaller number of revolutions per mile than the original one.

RECORDS AND REPORTS

It is recommended that the inspector make and preserve complete records of the performance of all meters tested as well as a record of the cabs upon which they are installed. Occasion will frequently arise to refer to the data which are filed in the office, and these should be sufficiently detailed to show clearly just what conditions were found by the inspector at the time of test. As was mentioned by Mr. Cluett last year, the cab record will be found especially helpful in the case of complaints by passengers and in many cases will obviate the necessity of an inspection to determine what meter is in question. The cab record is also valuable in following up meters for retest. We believe that the most expedient arrangement is so to plan the original test record sheets that these may also serve as the original file records of meters tested.

It has been mentioned that the operator or owner should be fully advised as to the condition of a meter which the weights and measures official permits in use, and that similar information should be given in respect to rejected meters so that the proper repairs or adjustments may be made. A carbon copy of the test record, if this is informative, is a satisfactory and convenient means of conveying this information; this plan has the further advantage of reducing to a minimum the clerical work involved.

CONCLUSION

Our final recommendation in relation to the testing of taximeters is addressed particularly to the weights and measures officer who is about to undertake this branch of weights and measures activity for the first time. From the knowledge and experience which we have gained in the course of our investigation here at the Bureau of Standards we are convinced that the official examination of taximeters is a matter of genuine importance to a community in which they are used, and that this work should be undertaken promptly in those jurisdictions where such supervision does not now exist; but we are likewise convinced that this supervision should be inaugurated only after the official has made a careful study of the subject and has familiarized himself not alone with the taximeter as a machine but also with the service demands made upon it and the many special conditions surrounding its use. Fortified with this information the official will then be in a position to proceed confidently and expertly with the inspection and testing of the mechanical devices themselves and with the development and enforcement of the necessary rules and regulations governing their operation.

Mr. SMITH. There are present at this conference representatives of several taximeter manufacturers. I know that during the recesses of the conference those gentlemen will be very glad to go into the

details of how their taximeters work and explain all matters about which you may be unfamiliar; also, I will be glad to do my part and go as far as I can with you along the same line. We hope that you will familiarize yourselves with the taximeters which are here on exhibit.

**REPORT OF COMMITTEE ON SPECIFICATIONS AND TOLERANCES
ON SPECIFICATIONS AND TOLERANCES FOR TAXIMETERS,
PRESENTED BY F. S. HOLBROOK, CHAIRMAN**

In connection with the investigation of taximeters conducted in accordance with the instructions of the conference over a period of the last two years, your committee has drawn up and now presents for your consideration a proposed code of specifications and tolerances for taximeters. The specific recommendations have been mimeographed and are already in your hands. In accordance with the usual practice, your committee presents this code for consideration and, if satisfactory, adoption. It is our recommendation that any action taken be tentative only, so that during the ensuing year they may be tried out, and if any amendments appear to be necessary or desirable these can be recommended before final adoption.

Your committee desires to acknowledge its indebtedness to Ralph W. Smith, of the Bureau of Standards, whose large fund of information was freely offered and freely drawn upon in the preparation of the code.

Respectfully submitted.

(Signed)

F. S. HOLBROOK, *Chairman*,
WM. F. CLUETT,
A. W. SCHWARTZ,

Committee on Specifications and Tolerances.

**CONSIDERATION OF PROPOSED SPECIFICATIONS AND TOLERANCES
FOR TAXIMETERS**

Mr. HOLBROOK (reading):

TENTATIVE SPECIFICATIONS AND TOLERANCES FOR TAXIMETERS

(The committee recommends that the italicized portions of the following be nonretroactive in application.)

DEFINITIONS

A "taximeter" is a machine adapted automatically to calculate, at a predetermined rate or rates, and to register the charge for hire of a vehicle.

The "fare" is that portion of the charges to be paid by the passenger for the hire of a vehicle, which is automatically calculated by the taximeter through the operation of the mileage mechanism, the time mechanism, or a combination of these.

The "extras" are those charges which are to be paid by the passenger in addition to the fare, and include any charges at a flat rate assessed for the transportation of passengers in excess of a stated minimum number as well as any charges for the transportation of baggage.

The "face" of a taximeter is that side upon which the charges to be paid by the passenger for the hire of a vehicle are indicated.

A "single-tariff" taximeter is one designed to calculate fares based on mileage at a single rate only.

A "multiple-tariff" taximeter is one so designed that it may be set to calculate fares based on mileage at any one of two or more rates.

A taximeter shall be considered to be "cleared" when it is inoperative with respect to all fare registration, when no figures indicating fare or extras are exposed to view, and when all of the parts are in that position in which they are designed to be when the vehicle to which the taximeter is or may be attached is not engaged by a passenger.

A "money drop" is an increment of fare registration. The "initial money drop" is the initial fare registration following the flag pull.

The "flag" is the metal plate attached to the end of the lever arm by means of which the operating condition of the taximeter may be manually controlled.

SPECIFICATIONS

1. Taximeters shall be so designed and constructed as to calculate the fare only upon one of the following bases:

- (a) Mileage traveled.
- (b) Time elapsed.
- (c) A combination of mileage traveled and time elapsed such that when the taximeter is operable with respect to fare registration, the fare-registering mechanism is actuated by the mileage mechanism whenever the vehicle upon which the taximeter is installed is in motion at such a speed that the rate of mileage revenue per unit of time equals or exceeds the time rate, and may be actuated by the time mechanism whenever the speed of the vehicle is less than this, or when the vehicle is stopped. When constructed upon this principle, provision shall be made whereby the driver of the vehicle may cause the clock mechanism to be operative or inoperative with respect to the fare-registering mechanism, as the occasion may demand.

The ACTING CHAIRMAN. The usual procedure will be followed, and any comments on each specification should be made following its reading. Are there any comments or questions on this specification?

Mr. HOLBROOK (reading):

2. Taximeters shall be so designed and constructed that the following indications are shown upon the face:

(a) The condition of the taximeter; that is, whether it is inoperative or operative, and, if the latter, the character of fare registration for which it is set. This specification shall be construed to require (1) that while a taximeter is cleared the indication "not registering," "vacant," or an equivalent expression shall appear; (2) that in the case of single-tariff taximeters, while the taximeter is in condition for fare registration on any basis, the indication "registering," "hired," or an equivalent expression shall appear; (3) that in the case of multiple-tariff taximeters, while in the condition described in (2) preceding, the basis for the particular tariff for which the taximeter is set shall be shown. In the case of the lowest rate for which the taximeter is adjusted the indication specified in (2) preceding shall be considered satisfactory; *in the case of any higher rate the indication shall be shown by such an expression as "three or more persons," etc.*; and (4) that while the taximeter is so set that the clock mechanism is inoperative with respect to fare registration the indication "time not recording," or an equivalent expression, shall appear, except when the taximeter is cleared. This indication may replace the indication specified in (2) preceding, *but shall be in addition to the indication specified in (3) preceding for the higher rates on multiple tariff taximeters.*

(b) The accumulated fare. The indications shall be identified by the word "fare" or by an equivalent expression, and their values shall be defined by suitable words or monetary signs.

(c) The extras. Taximeters are not required to be constructed so as to register charges for extras, but when so constructed the following shall apply:

Extras shall never be included in the fare registration, but shall always be indicated as a separate item. They shall be identified by the word "extras" or by an equivalent expression, and their values shall be defined by suitable words or monetary signs.

Whenever charges for extras are prohibited by legal authority, or whenever the assessment of extras has been discontinued by a given taxicab operator, if the taximeters in use in the jurisdiction or by the operator in question are

constructed to register extras, the extras mechanism on such taximeters shall be rendered inoperable or all indications on the faces of the taximeters of charges for extras shall be effectively obscured by permanent means.

The indications required by this specification shall be displayed through, and shall be entirely protected by, glass, which shall be securely attached to the metal housing of the taximeter, so that the indications will be protected by the official seals.

3. Except as provided by the second paragraph of specification No. 2 (c), and except when a taximeter is cleared, indications of the amount of fare and extras registered shall never be obscured, and the apertures through which such indications are read shall never be covered.

4. All apertures through which any indications or markings are viewed at any time shall be of such location, size, and design that the indications may be read with precision. This specification shall be construed to require that in the case of drums or dials designed to advance intermittently, but one indication shall be exposed to view at one time, and that in the case of graduated drums or dials designed to advance gradually and continuously and to be read in combination with an indicator, a sufficient number of graduations and figures shall be exposed to view at all times readily to permit the indications to be read correctly.

5. *All taximeters shall be marked upon their faces to show the rates, both for mileage and time, for which they are adjusted, and the schedule of extras when such charges are recognized. This specification shall be construed to require a statement of the mileage and time rates for the initial as well as for subsequent intervals whenever the rates are not uniform throughout. The words "rate," "rates," or "rates of fare" shall precede the actual statement of the rates, and the latter shall be self-explanatory and readily understandable by the ordinary passenger.*

It may be said in relation to this part of the specification that taximeters are not ordinarily so constructed at the present time. In many cities it is customary for an ordinance to require that the schedule of rates be posted somewhere in the taxicab, as on a card under a glass in the front of the passenger compartment. However, it is considered that that is not a sufficient protection, inasmuch as the card rate can at any time be changed while the taximeter may continue to register upon a different rate. It seems that information as vital as the rate upon which a taximeter is adjusted should be shown integral with the machine and in such a position that the schedule of rates can not be changed without breaking the seal. If at any time the operator desires to operate under a new schedule of rates, then the meter can be adjusted and the rates shown on the face of the meter can be changed at the same time accordingly. [Reading:]

The marking required by this specification shall either be of a permanent character or shall be displayed through, and shall be entirely protected by, glass securely attached to the metal housing of the taximeter, so that the marking will be protected by the official seals.

Mr. SWEENEY. Mr. Chairman, I would like to ask the secretary if in the drawing up of these specifications relative to the marking of the rates on the meter it was considered if they would be presented in a manner which would be understandable to the passengers. I would like to know where you will put on the face of the meter all the matter required by this specification 5. In Massachusetts, up until a short while ago, we merely indicated the diameter of the wheel by a number, such as "32" or "33," but under the rules or regulations made by the director of standards there are required these words: "This meter tested for a 32-inch wheel," or "This meter tested for a 33-inch wheel."

Mr. HOLBROOK. The committee has given consideration to that question and has come to the conclusion that all meters shown here except one have sufficient room to give the information required. In that one case a slight modification of the face will be necessary in order to incorporate the proper information. In relation to the second consideration which Mr. Sweeney has raised as to marking the meter on its face with the tire size, the committee is of the opinion that such information is not of very much value to the passenger, since it is extremely unlikely that he will check the tire size, and for the additional reason that the tire size specified upon the face of the meter ought to be the actual diameter, and our tire situation is now such that actual tire diameters and nominal tire sizes are often not the same.

Mr. FOSTER. Mr. Chairman, I would like to ask the secretary if he does not think the tire size would be important to the sealer in case a smaller tire was substituted after the inspection.

Mr. HOLBROOK. The tire size should be marked on the seal by the inspector by means of a figure which need be intelligible only to him to show that the meter was supposed to be attached to a taxicab having tires of a certain size. For instance, in the case of a tire having an actual diameter of 32 inches, the figure "32" written any place on the seal would be sufficient information to the inspector.

Mr. SWEENEY. Mr. Chairman, this specification indicates that the reading shall be self-explanatory and readily understandable by the ordinary passenger.

Mr. HOLBROOK. That is in relation to the rate; the tire size is not a part of the information required to be given to the public by this specification.

Mr. MILLS. Mr. Chairman, on the Ohmer printing meter it is absolutely true that it is almost impossible to cover that data by glass. It would be very expensive in the first place, and the opening through which you view the drums is too small. It is possible that a plate bearing the information could be riveted on.

Mr. HOLBROOK. The specification is to the effect that the marking required shall either be of a permanent character or shall be displayed through, and shall be entirely protected by, glass securely attached to the metal housing of the taximeter, so that the marking will be protected by official seals. A plate could be attached by riveting it on the housing from the inside of the case, so that it could not be replaced without the seal being broken. [Reading:]

6. All individual change gears utilized in compensating for differences in tire diameters shall be plainly marked to show the number of their teeth.

This specification is nonretroactive, but as a matter of fact I think all gears are now labeled. [Reading:]

7. All indications and markings required under these specifications shall be of such size, design, material, and location and shall be so applied or affixed that they are definite and distinct and that they will not tend easily to become obliterated or illegible.

8. All taximeters shall be equipped with a flag. The positions of the flag, corresponding to the different conditions of a taximeter, shall be mechanically defined, and displacement from any one of these positions shall be sufficiently obstructed so that the accidental or inadvertent changing of the condition of the taximeter is improbable. The flag shall be at its highest position when the taximeter is cleared, and in this position the whole of the flag shall be above the level of the taximeter housing.

Adequate provision shall be made so that the attempted movement of the flag to an operating position immediately following its movement to the cleared position will automatically be so delayed that the taximeter mechanism may come to complete rest in the cleared condition before such subsequent movement is begun.

You will note that a small portion of that is nonretroactive because of one meter, the whole flag of which is not in sight. That can be easily remedied in the future by lengthening the staff to which the flag is attached. [Reading:]

9. The knob, handle, or other means utilized to actuate the "extras" mechanism shall be inoperative whenever the taximeter is in the cleared condition; that is, whenever it is not in a condition to register fares.

10. Adequate provision shall be made for sealing all taximeters, and in the case of complete assemblies—that is, installations upon cabs of taximeters and the various gears and other parts required for service operation—adequate provision shall be made for sealing all of the parts in place in such manner that no adjustments, alterations, or replacements, affecting in any way the indications, the time or mileage rates, or, in general, the accuracy of the taximeters or the assemblies, can be made without mutilating or destroying the seal or seals.

11. When mounted upon a cab a taximeter shall be so placed that its face is in plain view of a passenger seated upon the rear seat of the cab. Adequate lighting facilities shall be provided for so illuminating the face of the taximeter that the indications thereof may be conveniently read by the passenger, and the face of the taximeter shall be so illuminated whenever the taximeter is in operation and artificial illumination is necessary for the convenient reading of its indications.

12. *Taximeters shall be of such design, construction, and materials that they may reasonably be expected to withstand ordinary usage without impairment of their accuracy or the correct functioning of their operating and indicating parts. This specification shall be construed to require that in the case of ratchets and pawls and similar combinations, wherever the accuracy or consistency of the indications of the taximeter would be affected by the wearing away or the deformation of one or both of the cooperating parts, the ratchets and pawls shall be fabricated of such material and shall be hardened to such a degree and extent that the wear or deformation resulting from use will be reduced to a minimum.*

13. All taximeters and all mechanisms and devices designed to be attached thereto and used in connection therewith shall be of such design and construction and shall be so installed for use that they do not facilitate the perpetration of fraud.

TOLERANCES

NOTE.—In computing road results and calculating the values of change gears for the purpose of applying tolerances the mean effective circumference of tire shall be used. This shall be determined upon a new tire of the size, kind, and make in use, inflated to the pressure recommended by the manufacturer, and mounted upon a vehicle, by causing the tire to describe several complete revolutions upon a smooth surface, finding the average distance advanced per revolution, and deducting from the result 1 per cent.

The reason for this figure of 1 per cent is that it has been found that the wear on a tire from the time it is new until the time that it would usually be discontinued by a taximeter company will result in a shortening of the effective circumference of about 2 per cent. Therefore, when a meter is tested upon a car equipped with new tires, if we subtract 1 per cent from the circumference of the tire we will calibrate the meter to the average circumference of the tire during its normal life. [Reading:]

DEFINITIONS.—A "bench test" is a test of a taximeter head alone, except that the gear box—that is, the change gears designed to compensate for tires of different sizes—may be attached.

A "wheel test" is a test of the entire taximeter assembly when mounted upon a vehicle, the mechanism being actuated by the mechanical revolution of the vehicle wheel while the cab remains at rest.

A "road test" is a test similar to a wheel test, except that the mechanism is actuated as a result of cab travel.

The "initial" mileage or time interval is the mileage or time interval corresponding to the initial money drop.

"Tolerance in deficiency" and "tolerance in excess" are the allowable errors in the directions of overregistration and underregistration, respectively.

TOLERANCES.—The tolerances to be allowed on all taximeters shall be as follows:

1. Tolerances on mileage tests.—(a) On bench test: With respect to the nominal number of spindle revolutions, no tolerance in deficiency and a tolerance in excess of 100 feet plus 2 per cent.

(b) On wheel and road tests: With respect to distance computed or actually traveled, no tolerance in deficiency and a tolerance in excess of 100 feet plus 4 per cent: Provided, however, That on a road test if the vehicle tires are obviously worn a tolerance in deficiency of 1 per cent shall be allowed.

2. Tolerances on time tests.—(a) On individual time intervals: A tolerance of 3 seconds per minute (5 per cent) in deficiency and a tolerance of 6 seconds per minute (10 per cent) in excess: Provided, however, That on the initial time interval the tolerance in excess shall be 9 seconds per minute (15 per cent).

(b) On the average time interval (computed after excluding the initial interval): No tolerance in deficiency and a tolerance of 3 seconds per minute (5 per cent) in excess.

A note should be added at the end of these specifications somewhat to the following effect:

Conflict of laws and regulations.—In the above specifications certain items may appear which may conflict in certain jurisdictions with present State or local laws or ordinances. In such cases of conflict an attempt should be made by the weights and measure official to harmonize the requirements, and in the meantime it may be found necessary to suspend the enforcement of such specifications.

As before mentioned, the recommendations of the committee in respect to the code on taximeters will be the same as their general recommendations in the case of any new specifications, namely, that any adoption of them be made tentative.

Mr. SWEENEY. Mr. Chairman, I understand that these are not to go into effect immediately.

Mr. HOLBROOK. The committee's recommendation in these cases always is that any adoption thereof be tentative, so that the matter can be negotiated with the officials, the manufacturers, the industry, and the consumers, and so that the officials will be given the opportunity of observing what the results would be of enforcing these as they stand. Then, if it has been demonstrated during the year that changes are desirable, such changes can be recommended.

Mr. SWEENEY. I arise, Mr. Chairman, to speak upon the time test and to make this explanation: I presume I have had as fair an amount of experience in the testing of taximeters as any man in the conference. We have practically 1,000 in our city to-day, and we do not permit any to be put on cabs until they receive a time test; but we are a little more generous than these specifications and tolerances state here, because we have come to a realization that due care should be taken not to do an injury to the manufacturers of taximeters. Adjustments required to correct errors in mileage registration necessarily affect the action of the time mechanism, and I fear the time tolerances proposed are not liberal enough. I am taking this matter seriously, and I raise this question because I do not want

anyone to ask me why I accepted tolerances which seemed to me to be too small.

Mr. KELLY. In view of the fact that we must again consider these at the next meeting, I move the tentative adoption of these specifications and tolerances.

(The motion was seconded.)

Mr. AUSTIN. I want to say, Mr. Chairman, that one or two questions that I have had in mind have been solved to my satisfaction, but I want to ask Mr. Smith if he has given any consideration to the testing of meters operated through a transmission drive. That is a question that is going to confront the weights and measures officials in the near future, because I understand that one company expects to put on about 200 cabs so equipped in my city and are waiting anxiously for my decision as to whether they may use them. They claim that with the four-wheel brake cars there is apparently no manner in which they can connect the star and ring gears.

Mr. CRIST. I want to state that in New York we use the star-gear car. We always find that in the case of the transmission drive the meter records faster than the mileage traveled. In wintertime the rear wheel, operated by the transmission, spins in the snow, and with the transmission drive the passenger is paying for it. We have some makes of cars with four-wheel brakes, and we have found it is not such a hard job to add the star and ring gear drive.

(The question on the tentative adoption of the specifications and tolerances for taximeters was taken, and the motion was agreed to.)

(At this point a motion to recess was made and seconded, the question was taken, and the motion was agreed to.)

(Thereupon, at 1 o'clock p. m., the conference took a recess until 2 o'clock p. m.)

FIFTH SESSION (AFTERNOON OF WEDNESDAY, MAY 27, 1925)

The conference reassembled at 2.05 o'clock p. m., I. L. Miller, first vice president, in the chair.

WEIGHING IN THE CUSTOMS SERVICE

By FRED W. GAST, *Engineer of Scales, Treasury Department*

The customs service of the Treasury Department is almost as old as the constitutional government of our country, and its function is the administration of the "tariff law" or the collection of the revenue on imports into the United States. For the efficient administration of the law the organization consists of a main administrative office in Washington, with a director of customs at its head, and 47 collection districts, geographically divided, each in charge of a collector of customs with subordinate appraisers, surveyors, inspectors, weighers, and guards.

Imports may be entered at approximately 300 ports of entry and 600 stations along the coasts and borders. In the "tariff act on imports into the United States" practically all specific duties are based on the weight of the article or commodity, thus making one of the prime functions of the service the quantity determination by weighing.

The weighing equipment required in the performance of this duty consists at the present time of 2,035 scales and balances of all types, ranging in size from the most sensitive balance for weighing precious stones to the large autotruck scales for weighing bulk merchandise in truck-load lots. The equipment of the ports or stations varies from the single counter scoop scale for weighing an occasional parcel of produce at a Canadian or Mexican border station to the vast equipment of over 900 scales for all purposes at the port of New York.

Many and varied are the problems which arise in providing and maintaining the equipment necessary to economically weigh the vast stream of commodities which pours over the boundaries of our country from all corners of the earth. On some commodities—pig iron and limestone at 75 cents per ton, for instance—the duty is so low that the revenue collected thereon will almost be absorbed by the cost of weighing if it is not economically done; and again on other commodities it is so high that the loss of a small fraction of a pound per draft, if the scales do not weigh extremely accurately, will mount to an astounding figure per month on the enormous quantities imported and necessitates constant vigilance in keeping the scales to the required degree of sensitivity. Wrapper tobacco pays a duty of \$2.10 per pound, is weighed in bales averaging about 85 pounds each, and the quantity weighed over one scale in a day frequently represents a duty of over \$35,000.

**Portable 5,000-pound automatic weighing and recording scales used
for sugar weighing in the Customs Service**

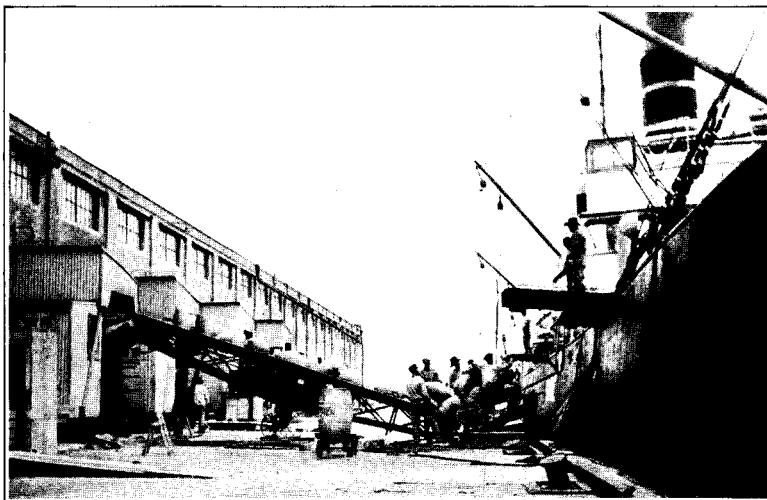


FIG. 9.—*Bags of sugar passing from ship to scale chute by electric conveyor*

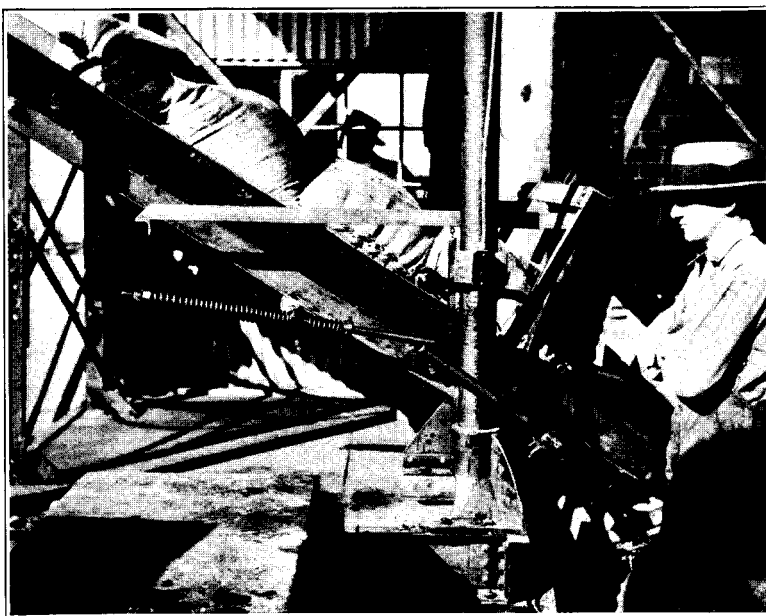


FIG. 10.—*Bags of sugar being weighed*

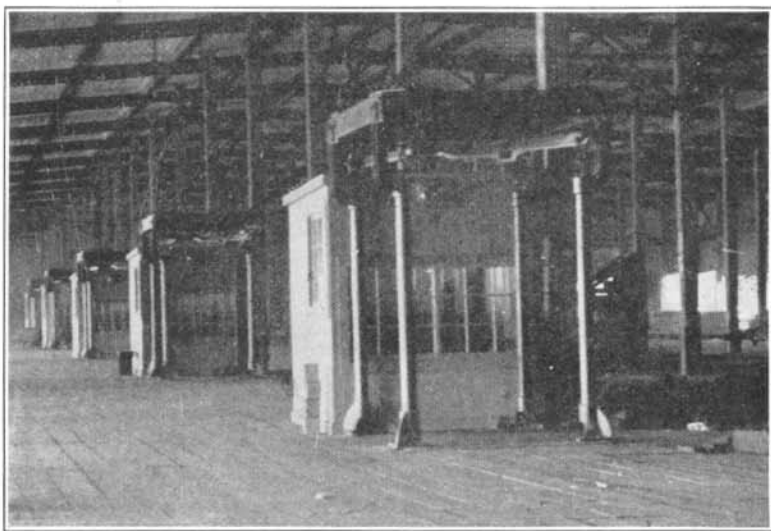


FIG. 11.—*Battery of 5,000-pound automatic weighing and recording scales*

These scales are used by the Customs Service for weighing sugar on electric trucks

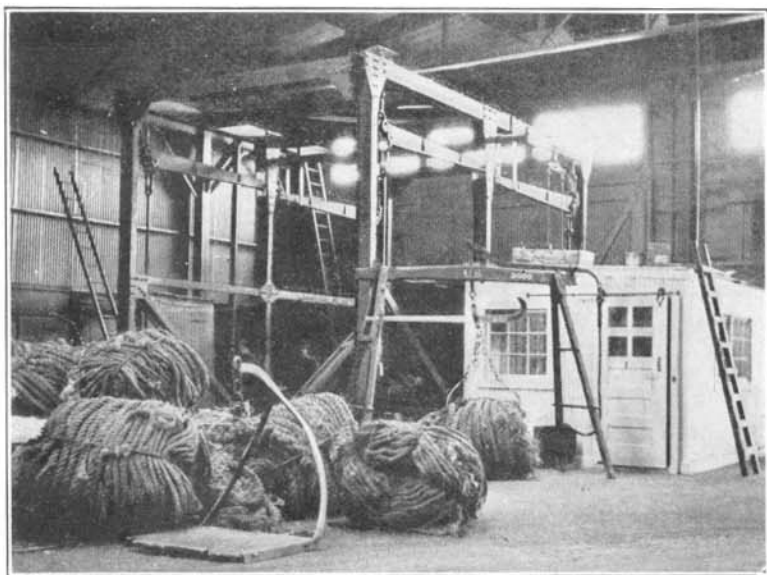


FIG. 12.—*The oldest and the newest types of equipment used for customs weighing*

Portable steelyard of 3,000-pound capacity used for weighing miscellaneous merchandise and 15-ton automatic weighing and recording scale used for weighing merchandise from steamship piers in truck-load lots

Sugar represents the article of greatest revenue, the importations last year having totaled approximately 7,000,000,000 pounds, with a resultant revenue in excess of \$100,000,000. Because of the fixed points of discharge of this commodity, usually at sugar refineries' own wharves or piers, the weighing has resolved itself into a comparatively simple routine. The sugar is generally weighed on the importer's industrial electric trucks, of which frequent tare weight is taken, and which are run over the Government scales directly on their way from the shipside to the storage warehouse. Specially designed Treasury Department automatic weighing and recording scales¹⁶ of 5,000 pounds capacity and of the overhead suspension lever type, with uniform test-weight equipment, have been permanently installed, and weighing is done with extreme accuracy (well within the one one-hundredth of 1 per cent) and at a cost to the Government approximating 2 cents per ton. It is not at all uncommon for one scale on this work to weigh four thousand eight hundred 330-pound bags of sugar, or 1,500,000 pounds, in eight hours.

The customs service is always prepared to cooperate with importers in eliminating labor waste and with that end in view has developed a semiportable automatic weighing and recording scale of 5,000 pounds capacity, equipped with a chute to permit loading of the scale from electric belt conveyers which transfer the sugar directly from the ship side to the scales. Four 330-pound bags represent a load and are held in the chute by a gate, which is released by hand upon the conclusion of each weighing, allowing the sugar to be discharged by gravity onto another conveyer. A battery of four of these scales has been installed at the new Texas City Sugar Refinery.¹⁷

Not all commodities, however, present such favorable conditions for weighing. Express cargo from the large trans-Atlantic liners, which is discharged from the steamers with as great a dispatch as possible so as to speedily release the steamers, can not be weighed simultaneously with the discharge from the ship because of its mixed nature, and must be rehandled for weighing. The congestion on these piers makes impossible the use of platform or dormant scales, and only an extremely portable equipment which can be moved along as the merchandise is passed over it will serve. The old-fashioned weighmaster's beam¹⁸ has been used on this class of weighing for years and still is largely used. Fortunately this express cargo is of such a nature, usually standard package goods, that satisfactory weight is obtainable by weighing and taring a percentage of the goods selected at random out of each importation. The weighmasters' beams used for this purpose range in capacity from 100 to 3,000 pounds. This same type of equipment is generally used whenever a weighable importation is discharged in a location to which cargo is delivered only infrequently—perhaps once a year.

In the year 1910 it was found advisable to establish an engineering office in the customs service for the purpose of better handling and systematizing the weighing. The author was detailed to this position, and a vast field of opportunity for improvement presented

¹⁶ See fig. 11.

¹⁷ See figs. 9 and 10.

¹⁸ See fig. 12.

itself. Great progress has been made in reducing weighing losses and in expediting the handling of cargo, with the result that in many instances the cost of handling is now one-tenth of what it was 15 years ago. Much more suitable weighing equipment is being provided for specific purposes. The Treasury Department automatic weighing and recording scale, previously referred to, and of which 120 are now in use on sugar weighing, is one of the products of this work.

A 15-ton truck scale¹⁸ of this type, which is sensitive to 1 pound, and with a 5-pound beam increment, is now being provided in the vicinity of the large steamship piers at the larger ports. These scales are proving highly effective in reducing the cost of weighing bulky commodity, such as mahogany and boxwood logs, steel, dry colors, print paper, grindstones, and the like, on which the cost was quite an item. This scale saves in cost of labor alone in a year more than the initial cost of the scale, and the benefit resulting is threefold, for it also minimizes the loss on perishable merchandise and helps to relieve congestion of traffic on the piers.

Much difficulty has been experienced in finding commercially constructed scales which will, on continuous daily weighing, indicate uniformly correct. In using such scales, especially of the platform type, on bulk-cargo weighing when running hand trucks over same generally in one direction, it has been found that the drifting of levers and loops introduces a progressive error which frequently exceeds the tolerance allowed on the scales. This error, even if slightly within the tolerance, nevertheless is greater than permissible when it becomes, perhaps, one-fourth of 1 per cent of the load weighed. This error on an involved revenue of \$10,000 per day would, of course, mean a loss of \$25. Constant vigilance is necessary in keeping the scales in proper order.

Since 1911 it has been required that whenever a battery of scales is in continuous operation a truck load of standard test weight equal to the average weight of the load is kept with the scales and weighed every hour. For this purpose alone over 2,000 standard rectangular 50-pound test weights are used. In most instances the weights in 900-pound lots are locked in a steel box, which is sealed off to weigh 100 pounds, mounted on a 200-pound hand truck.

At the port of New York two scale experts and two experienced weighing inspectors are kept busy constantly with checking standard and sealing-off sets, keeping the weighing equipment calibrated. At that port the 50-pound field test weights are maintained accurate to within 5 grains and all the weights are checked once in three months. The portable equipment is calibrated every time when it is returned to the equipment room, and if not found within the required tolerance is sent to the shop for repair.

Every customs headquarters port is provided with a set of brass checking standards, and the regulations require that the surveyor of customs witness the comparison of the weights with this standard twice a year. Every effort is made to maintain the equipment in the best possible order, and it is believed that the splendid condition of the customs equipment has been an inspiration to importers in

¹⁸ See fig. 12.

maintaining their equipment in better condition than it would have been otherwise.

DISCUSSION OF ABOVE PAPER

Mr. DALE. Mr. Chairman, I would like Mr. Gast to tell us what method the Government adopts to determine the scoured contents of the wool on which the duty is 31 cents a pound of clean content. Wool comes into the country with from 30 to 70 per cent of grease and dirt, and it seems to me there is a chance there for error and fraud.

Mr. GAST. There seems to be quite a contention at the present time about weighing wool. The wool importers are very anxious to have their wool released as quickly as possible and there seems to be a difference of opinion among the importers themselves as to whether 100 per cent of the wool should be weighed, as is advocated by some, or whether a small percentage of the wool should be weighed. The practice is to extract certain samples of unwashed wool and take it to the appraiser's warehouse, where the wool is thoroughly examined to determine its quality and characteristics. Does that answer the question?

Mr. DALE. It answers the question, but it conflicts with information that I have from the customhouse to the effect that very few loads are tested by either small or 100 per cent test loads. I understand that they are using the estimates of the exporters in New Zealand, Australia, South Africa, and South America in order to accommodate the importers in this country and save time.

Mr. GAST. I can not give definite information on that. I am glad to hear what you say, because the policy of the Washington office is to have 100 per cent weighed wherever possible.

The ACTING CHAIRMAN. Are there any questions anyone wishes to ask Mr. Gast? If not, I wish to thank Mr. Gast for giving this paper on a subject which I think is new to most of us.

DISCUSSION OF TENTATIVE SPECIFICATIONS AND TOLERANCES FOR TAXIMETERS

The ACTING CHAIRMAN. It has now come to the attention of the Chair that we have as guests representatives of the taximeter companies who have not been heard, and in line with the policy of the conference I am going to give these gentlemen a few minutes in which to make comments on the tentative specifications and tolerances for taximeters.

Mr. J. W. WEIBLEY (representing the Pittsburgh Taximeter Co., Pittsburgh, Pa.). Mr. Chairman and gentlemen, first of all I want to take this opportunity to congratulate Mr. Smith on the able manner in which he has handled the technical side of this taximeter question. He has, without doubt, prepared the most able and illuminating article that I have ever seen prepared on taximeters. It is a great deal of satisfaction for me to know that the United States Bureau of Standards has such an excellent understanding of the whole technical side of the question.

With reference to the report of the committee on specifications and tolerances, I am thoroughly in accord with the report of the committee with one or two exceptions. It may be of interest to you

gentlemen to know that in the whole United States there are only 40,000 taximeters in use; there are 160,000 vehicles for hire on which the fare is computed by speedometers. This whole matter of taximeter regulation should be approached very carefully. Wherever the taxi industry has sprung up in the small town the first thing the city fathers have done has been to prepare and pass laws to regulate these taxis. In many cases these laws are absolutely inoperative because they are not applicable and because there are no facilities to enforce them.

We would like to see uniform taxicab laws and uniform taximeter regulations throughout the country. A year ago I made a plea before your body for some uniform regulations—standard specifications which might be adopted by the various cities throughout the country. At present, in one place they want one kind of tolerances, and in another place they want something else. In the large cities it does not make much difference to us what the tolerances or the specifications are. It is a question of cost. We can make anything. We can make clocks and get them so fine that there are practically no variations. It might cost \$500, but it can be done.

But referring to the specifications which have been drawn by your committee, it is not the easiest thing in the world to take care of the adjustment and inspection of taximeters in all places, especially in the smaller towns. In the large cities, where we have service organizations, we adjust the meters to suit the sealers; whatever their specifications are we try to comply with them; but let me try to picture what may happen in other places. In the remote town of St. Augustine, for example, it is impossible for a taximeter company to have the service of experts to take care of such a complicated mechanism as a taximeter. In all your weighing devices I doubt if you have anything so complicated. Well, the men in those small towns will buy taximeters; but if you do not provide a reasonable tolerance and if the sealer of weights and measures condemns the taximeter the operator will go back to the speedometer, in which case the sealer of weights and measures will probably never bother him at all. Now, the taxicab company is trying to operate on a basis that is far better than a speedometer basis. The taximeter is certainly better than an instrument which is never accurate and which is never supervised, and the favor you should do is to start with specifications and tolerances liberal enough so that these small towns can conform with them.

The only suggestion I would offer in relation to these specifications and tolerances this year is that we should leave off the special lettering, and that we should increase the tolerances on the initial fare. When a taximeter goes into operation many small gears are loosely engaged at first, but this lost motion is quickly taken up on the first interval. So far as the drive of the mechanism goes, that should be left open at this time, because many cities will not take that into consideration, and if you specify that a taximeter must be driven by the front wheel you are likely to complicate the situation very seriously.

Start out with your tolerances and specifications liberal enough, and next year, if necessary, tighten them up. This is a new industry, and it is a very small industry. We are trying to make the

baby industry grow, and we are trying to get smaller cities to adopt taximeters; but remember we now have only 40,000 out of the 200,000 cars for hire.

While your specifications are tentative, the only danger about them that I see is that some cities or municipalities may take them as a pattern and adopt ordinances that may become dead letters, like they did when they took ordinances from cities that were too large to fit in with their local conditions. I am only considering this from the standpoint of the greatest good to the greatest number.

Mr. J. B. MILLS (representing the Ohmer Fare Register Co., Dayton, Ohio). Mr. Chairman and gentlemen, I heartily concur in what Mr. Weibley has said. This problem means more to us than, perhaps, you gentlemen realize, and after all there are two sides to the question. There is the phase of the limitations and allowances, and we believe in getting those just as close as we possibly can.

As Mr. Weibley said, the taximeter is in its infancy. I believe this is only the second time it has been up for discussion here, which proves the fact. Since Mr. Smith has been on this work we have made improvements to increase the efficiency of our taximeters. We believe in those things which will improve taximeters, and the manufacturers are considering this from a business standpoint. The taximeter field is more or less limited, and it is not like other measuring devices. There are not so many competitors in the United States yet, and what few there are have to divide the business so that we can all make a living. If we are to grow, we must get some of the operators who are not using taximeters to install them. This will result not only in selling taximeters but in protecting the people.

Now, we are tuned up to make taximeters and we want to make them, but, as Mr. Weibley says, we can not get the business if we are held to too strict limits at this time. We have no difficulty with the taximeters in the large cities where we have a great many cabs and where we maintain service stations; in those places we are prepared to adjust the meters and take care of them at all times; but when we go to the small town and try to sell taximeters our prospects say it will be a big job to keep these meters in shape; and the stricter the regulations the harder it will be to increase the use of taximeters. Another problem confronting us at this time is the foreign market; the duty is low and foreign manufacturers are cutting prices and that is hurting us. So with the limitations that are suggested in the specifications it is going to make it doubly hard for us.

I appreciate what you have done. I know your representatives have been to our plant, and I think to all the other manufacturers as well. While we want to make the meters as accurate as we possibly can, we hope you will make your regulations as reasonable as you possibly can and by and by we can give you just what you want.

Mr. HOLBROOK. In relation to the tolerances that have just been tentatively adopted, do you think they would be reasonable for the larger cities, such as New York, Chicago, Detroit, and Boston?

Mr. MILLS. Yes; absolutely.

Mr. HOLBROOK. Of course, I see your argument, but there would be considerable difficulty in the way of administration if we recommended something for the large cities and something else for the

small cities and towns; and there is one other thought. The committee has taken into consideration that the taximeter is far from being a perfect machine, which is illustrated, for instance, by the nine seconds per minute tolerance in excess on the initial time interval. Those tolerances now are so much greater than the conference has established on less complicated pieces of apparatus that they appear entirely reasonable to us. However, have you any concrete suggestions as to the size of tolerances you need in cities outside of the metropolitan class?

Mr. MILLS. The trouble in regard to the initial fare is this: When you throw the flag, the gears may not come together just right and there is apt to be a little movement throwing them too far ahead. After a long time the average accuracy will be fairly good and will be well within the limitations. In my opinion, if we could increase the tolerance in excess on individual intervals after the first from 10 to 13 per cent and on the first interval from 15 to 20 per cent it would help out wonderfully.

Mr. HOLBROOK. A question has been asked me as to the meaning of a portion of the tolerance section. The wording in question is "On bench test. With respect to the nominal number of spindle revolutions no tolerance in deficiency and a tolerance in excess of 100 feet plus 2 per cent." The 2 per cent refers to 2 per cent of the interval under test, whatever that may be, and does not mean 2 per cent of the 100 feet. The 100 feet is a flat tolerance in addition to the 2 per cent of the interval under test. For example, suppose the interval under test is the first one-half mile, or 2,640 feet; 2 per cent of that is 53 feet, to which we add a fixed amount of 100 feet, giving 153 feet as the tolerance in excess on the first half mile.

The committee has already considered the point raised by these gentlemen about the necessity for an increased tolerance on the first interval, and, of course, that is what the 100-foot allowance is for. It was considered that no difficulty would be encountered in meeting a tolerance of 2 per cent on long distances.

I wish to inquire from the manufacturers whether it is only on the clock that they desire to increase the tolerances or whether they also wish an increase in the mileage tolerances.

Mr. BROWN. I am quite sure it is only on the time test.

Mr. HOLBROOK. I am trying to get the record clear on the matter so that it may be considered by the committee. When the subject is studied further by the committee we want all the suggestions possible.

THE NECESSITY FOR TOLERANCES IN EXCESS AS WELL AS IN DEFICIENCY

By H. W. BEARCE, *Bureau of Standards*

The term "tolerance" as applied to weights and measures apparatus and to commodities that are weighed and measured may be defined as the permissible error in the indication of the apparatus or in the quantity of product weighed or measured.

Tolerances are a necessary evil. That is to say, if all weighing and measuring apparatus were free from error and could be used without error then tolerances would be unnecessary.

The establishing of a tolerance carries with it two basic ideas: First, a permission, and, second, a prohibition; that is, under certain specified conditions errors of a certain amount may reasonably be expected to occur, and such errors will be tolerated. Errors in excess of that amount, however, are unnecessary, unreasonable, and will not be tolerated. Fixing the tolerance is, then, a recognition of the fact that perfection in apparatus and in its use can not be attained, but that a reasonable approach to perfection should be required.

Tolerances are sometimes regarded by the purchaser simply as an insurance against short weight or measure; that is, as an insurance that the amount received will not be less than the correct amount by more than the tolerance. While that should be true, it is only a part of the story.

The seal of a weights and measures official or department on a piece of apparatus should mean that the apparatus is correct, not simply that it does not give short weight or measure. To give the seal any other meaning would seriously detract from its value. It should be remembered that in every commercial transaction there is a seller as well as a buyer, and that the interests of both must be safeguarded. A scale or a measure which underregisters may be as fraudulent as one which overregisters, and an official who would place his seal on such a piece of apparatus simply because it does not give short weight or short measure is forgetting half his duty to the public. The real object sought in establishing tolerances is to aid in the standardization of equipment, and true standardization can be effected only on the basis of accuracy.

Let us consider what would be the effect if tolerances were limited to deficiency only; that is, if no attention were paid to errors in excess. First of all, what would be the general effect on the accuracy of weighing and measuring devices if weights and measures departments should adopt the policy of sealing all apparatus that did not give short weight or measure? You may be sure that it would not take manufacturers of such apparatus long to discover that they could avoid all rejections of apparatus by making sure that such errors as occurred were in the direction of safety, and there might be too little regard for the magnitude of the errors. Such a course would inevitably result in a very considerable increase in the average error of apparatus.

In general, the tolerance on apparatus should be such that on the average the correct amount of commodity will be delivered to the consumer. It is evident that if the tolerance is in deficiency only, then on the average less than the correct amount will be delivered, while if the tolerance is in excess only, then on the average more than the correct amount will be delivered.

As a general principle in establishing tolerances, the permissible variation should be in the direction of least danger. For example, in the manufacture of machined parts, where it is important that two mating parts fit together properly, it is apparent that in order to insure that the parts will go together it will be necessary to specify that the maximum size of the internal member shall not exceed a certain value, and that the minimum size of the external member shall not be less than that value; that is, on the internal member the

tolerance should be in deficiency, and on the external member it should be in excess. In case the danger is equally great in both directions then the tolerance should be in both directions.

In the case of weights and measures apparatus, where the object is correct average results, it is apparent that, in general, there is equal danger in both directions, and that the tolerance should, therefore, be in both directions from the nominal value. This, however, is not always the case. When conditions of filling and transportation are such that the greatest danger is in the direction of short measure, it is proper to specify that the tolerance in excess shall be greater than the tolerance in deficiency, or that the container shall have a capacity at least equal to the nominal capacity or even in excess of the nominal capacity, in order that the correct amount may on the average be delivered to the purchaser.

Another aspect of the question of tolerances to which I would invite your attention is the importance of limiting tolerances in excess on commercial weights and measures apparatus. It may be asked, "Should not the merchant be permitted to give overweight and overmeasure if he desires?" The answer is, "Yes; but he does not need incorrect apparatus in order to do that."

Among the reasons for limiting errors in excess, the following may be mentioned:

1. To avoid the possibility of confusion of units and the fraudulent substitution of a smaller size for a larger size. For example, in the case of bread, without a limitation of errors in excess it would be possible for a baker or dealer to substitute an overweight half-pound loaf for a pound loaf, or an overweight pound loaf for a pound-and-a-half loaf, by making the smaller loaf of such a size as to simulate the loaf of larger nominal size.

2. Possible change of use of apparatus. Weights and measures apparatus which to-day is used in the sale of commodities may to-morrow, as a result of sale or relocation, be used in the purchase of commodities.

3. Use in the checking of purchases. Without a limitation of errors in excess, apparatus used in checking of purchases might improperly indicate that short weight or measure had been received, and thus unjustly cast suspicion upon a dealer who had, in fact, given full weight or measure.

4. Use of measured quantities in checking performance of equipment. In many cases it is desired to check the performance of equipment in terms of weight or volume of fuel consumed. For example, most of you who drive motor vehicles like to know what type or grade of motor fuel gives you the best fuel economy; that is, the most miles per dollar. To get this information, you must know the price per gallon and the miles per gallon. When the motor fuel is purchased at several different filling stations, as is usually the case, if the comparative figures are to mean anything it is essential that the pumps be accurate, not simply that they do not give short measure. Judging from personal experience, however, there is no very grave danger of having your calculations seriously upset by overmeasure in this particular type of equipment. The example is, perhaps, of academic interest only.

Another case is that of the odometer, or distance-measuring device, on motor vehicles. It is understood that many taxicab companies purchase their tires on a mileage basis. It will be readily seen that if unlimited errors in excess were permitted the concern furnishing tires on a mileage basis would suffer a financial loss as a result of such errors.

Again, suppose that in calibrating the speedometer on your own car no attention had been given to errors in excess—that is, to underregistration of the instrument. In Washington you would be in imminent danger of a trip to the traffic court even though your speedometer never indicated a speed in excess of 22 miles per hour.

5. Elimination of waste. In certain cases failure to limit errors in excess would result in needless economic waste. For example, in the use of linear measures, fabric-measuring machines, etc., any errors in excess will result in waste of material, since, in general, such materials are purchased in the quantities required by the patterns to be used, and any over measure received will be of no value to the purchaser.

Since the Supreme Court decision with reference to the Nebraska standard-weight bread law the question of tolerances in excess has taken on a new interest and significance. There has been a difference of opinion as to the basis of the decision that the Nebraska law was unconstitutional. Some have held that the opinion was based on the fact that the law specified tolerances in excess. Others have held that the opinion was based on a belief that the tolerances in excess were unduly small. The decision contains, among other things, the following statement:

There is no evidence in support of the thought that purchasers have been or are likely to be induced to take a 9½ or a 10 ounce loaf for a pound (16-ounce) loaf, or an 18½ or a 19 ounce loaf for a pound and a half (24-ounce) loaf; and it is contrary to common experience and unreasonable to assume that there could be any danger of such deception. Imposition through short weights readily could have been dealt with in a direct and effective way. For the reasons stated we conclude that the provision, that the average weights shall not exceed the maximums fixed, is not necessary for the protection of purchasers against imposition and fraud by short weights and is not calculated to effectuate that purpose, and that it subjects bakers and sellers of bread to restrictions which are essentially unreasonable and arbitrary, and is therefore repugnant to the fourteenth amendment.

In the dissenting opinion presented by Mr. Justice Brandeis, and concurred in by Mr. Justice Holmes, the question of tolerances in excess is gone into in great detail, and many references are cited to show the reasonableness and necessity for tolerances in excess and for the limiting of these tolerances. This dissenting opinion is a masterpiece well worthy of your study. The following excerpts will be of special interest:

With the wisdom of the legislation we have, of course, no concern. But, under the due process clause as construed, we must determine whether the prohibition of excess weights can reasonably be deemed necessary; whether the prohibition can reasonably be deemed an appropriate means of preventing short weights and incidental unfair practices; and whether compliance with the limitation prescribed can reasonably be deemed practicable. * * * Sometimes, if we would guide by the light of reason, we must let our minds be bold. But, in this case, we have merely to acquaint ourselves with the art of breadmaking and the usages of the trade; with the devices by which

buyers of bread are imposed upon and honest bakers or dealers are subjected by their dishonest fellows to unfair competition; with the problems which have confronted public officials charged with the enforcement of the laws prohibiting short weights, and with the experience in administering those laws.

First. Why did legislators, bent only on preventing short weights, prohibit, also, excessive weights? It was not from caprice or love of symmetry. It was because experience had taught consumers, honest dealers, and public officials charged with the duty of enforcing laws concerning weights and measures that, if short weights were to be prevented, the prohibition of excessive weights was an administrative necessity. Similar experiences had led to the enactment of a like prohibition of excess quantities in laws designed to prevent defrauding, by short measure, purchasers of many other articles.

* * *

In January, 1858, the late corporation of Washington adopted an ordinance fixing a standard-weight loaf and establishing an excess tolerance. The standard-weight bread ordinance adopted by Chicago in 1908 and sustained in the Schmidinger case is said to have been the first standard-weight bread law in the United States enacted in this century. Prior thereto many different kinds of legislation had been tried in the several States and cities with a view to preventing short weights. Experience had shown the inefficacy of those preventive measures. Experience under the Chicago ordinance indicated the value of introducing the standard-weight loaf; but it proved, also, that the absence of a provision prohibiting excess weights seriously impaired the efficacy of the ordinance. When in 1917 the United States Food Administration was established, pursuant to the Lever Act (August 10, 1917, ch. 53, 40 Stat. 276), the business of baking came under its supervision and control; and provision was made for licensing substantially all bakers. The protection of buyers of bread against the fraud of short weights was deemed essential. After an investigation which occupied three months, the Food Administration issued the regulations by which licenses were to be governed. No standard-weight bread statute had then been enacted in any State. The regulations adopted established standard-weight loaves; prohibited the sale of loaves other than of the standard weights; and limited the excess weight to not more than 1 ounce to the pound. This provision remained in force unchanged until the licensing system was abrogated on December 19, 1918 (after the armistice).

The efficacy of the prohibition of excess weights as a means of preventing short weights having been demonstrated by experience during the period of Food Administration control, a widespread demand arose for legislative action in the several States to continue the protection which had been thus afforded. Dissatisfaction with the old methods of regulation was expressed in a number of States. During the years 1919 to 1923 standard-weight bread laws, containing the prohibition of excess weights, were enacted in 12 States. Similar bills were introduced in others. Congress enacted such a law for the District of Columbia. Hawaii and Porto Rico did likewise. The national conference on weights and measures indorsed a similar provision. A bill embodying the same principles, applicable to sales of bread in interstate commerce, prepared by the Department of Agriculture and the Department of Commerce, was introduced in 1923 and is now pending. At the congressional hearings thereon it was shown that the provisions against excess weights are deemed necessary by a large majority of the bakers, as well as by consumers and by local public officials charged with the duty of preventing short weights. In Nebraska the demand for the legislation under review was general and persistent. It was enacted after a prolonged public discussion carried on throughout the State as well as in the legislature. Can it be said in view of these facts that the legislators had not reasonable cause to believe that prohibition of excess weights was necessary in order to protect buyers of bread from imposition and honest dealers from unfair competition?

Second. Is the prohibition of excess weights calculated to effectuate the purpose of the act? In other words, is it a provision which can reasonably be expected to aid in the enforcement of the prohibition of short weights? That it has proved elsewhere an important aid is shown by abundant evidence of the highest quality. It is shown by the fact that the demand for the legislation arose after observation of its efficacy during the period of Food Administration control. It is shown by the experience of the several communities in which the provision has been in operation—Chicago, California, Ohio, Indiana, and the District of Columbia. The value of the prohibition is shown, also, by the fact that after extensive application and trial it has been indorsed by the

national conference on weights and measures and is included in the proposed "Federal bread law." Can it be said, in view of these facts, that the legislature of Nebraska had no reason to believe that this provision is calculated to effectuate the purpose of the standard-weight bread legislation. * * *

I have not reported in full the dissenting opinion on the bread law. You have no doubt read that and are familiar with it; also, I have not attempted to touch upon all the points that might be mentioned to show that tolerances in excess and the limitation of these tolerances in excess are necessary for the proper enforcement of weights and measures legislation. You can doubtless think of many other examples along the same line to show that tolerances in excess may be as necessary as tolerances in deficiency.

The ACTING CHAIRMAN. The next subject is on methods of sale of ice cream. A number of papers are to be given on this subject, and I think it advisable that discussion be deferred until all the papers have been given.

SHALL ICE CREAM BE SOLD BY WEIGHT?

THE VIEWPOINT OF THE WEIGHTS AND MEASURES OFFICIAL¹⁹

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

In our consideration of the ice-cream question we are dealing with a commodity that is as popular as it is nutritious—a commodity which at first was classified as a refreshing luxury but which has long since taken an important place in our list of staple foods. Ice-cream making had its origin in Italy during the sixteenth century. From there it spread to France and England, and from England to her colonies in America early in the eighteenth century. It is known that ice cream was popular in colonial days, and it is said that Martha Washington served it on her table.

That retailing of the product began shortly after its introduction in America is evidenced by an advertisement appearing in the *Post Boy* in 1786, which indicated that Joseph Crow, in New York, was a retail dealer in ice cream. There is a tradition, however, that the first American ice cream seller was a man named Hall, who had a shop in Park Row when it was called Chatham Street, New York.

The wholesale manufacture of ice cream did not start until 1851, at which time Jacob Fussell, a milk dealer of Baltimore, who wanted to find an outlet for his surplus of sweet cream, started ice-cream making, and with such success that he soon gave up the milk business. He afterwards established factories in Washington, Boston, and New York. From these humble beginnings has come the vast enterprise which the ice-cream industry has become in this country to-day, where there is an annual output of 250,000,000 gallons in the wholesale establishments alone.

It is reasonable to assume that in the evolution of the industry efforts toward improvement in methods of manufacture have had for their purpose not only a better quality product, but increased profits for the manufacturer as well. This point would not be overlooked in the invention and adoption of scientific machinery for

¹⁹ This paper, prepared by Mr. Rogers, was read to the conference by A. W. Schwartz.

ice-cream making. It is quite generally agreed that ice cream as now produced is far superior in quality to that of former years. From a quantity standpoint, however, it is doubtful whether the public obtains proportionately as much for the money expended for this commodity as in the days before scientific machinery for manufacture came into vogue. High percentages of "overrun" or swell are now possible with the machinery used, and, in addition, there is a tendency to feel that air substitution by the insertion of carbon dioxide, scientifically known as CO_2 gas, adds to the possibility of fluffing the product.

"Overrun," the technical term used by manufacturers for swell, we have found to vary from 80 per cent to as high as 120 per cent. It is calculated on the basis of 100 per cent of actual liquid quantity of ingredients put into a freezer. Manufacturers state that at the present time the usual "overrun" employed is 100 per cent, which means that there is 100 per cent of air in commercial ice cream. From our investigations made in New Jersey we have definitely determined that this percentage of overrun has been greatly exceeded in some cases. Not in all cases is it true, for there are manufacturers who are willing to keep the amount of swell down to reasonable limits, but there are those who will take undue advantage of the lack of adequate quantity regulation in order to enhance their profits, and we have had many instances where this has been clearly indicated.

Professor Fiske, an authority on ice cream, in his book dealing with the subject, states that ice cream with an overrun of more than 110 per cent is usually not a satisfactory product, for the reason that the commodity contains too much puff when this percentage is exceeded. It is not difficult to understand what effect this air content has on those who must subsequently measure out ice cream to their customers. The prevailing custom is to sell ice cream by liquid measure, and that someone loses by this method of sale can best be realized when it is considered that ice cream when manufactured is poured from the freezer in a soft state, afterwards being placed in storage vaults of low temperature where it is frozen to a hard consistency. No packing process is employed by the manufacturer in filling his cans, with the result that when the commodity reaches the dealer it is full of air cells which subsequently disappear when shrinkage takes place either through adverse temperature changes or when ice cream is dipped or spooned into containers for sale to the retail trade.

Manufacturers themselves claim that there is at least 20 per cent shrinkage in ice cream from the time it leaves their hands until it reaches the consumer. The dealer is consequently confronted with loss due to the fact that he is really paying for the air content which he squeezes out when dispensing the commodity.

The question arises as to whether this is not a form of adulteration—if excessive air in a commodity can be termed adulteration. In New Jersey alone last year approximately 10,000,000 gallons, or 40,000,000 quarts, of ice cream were sold. Calculating this on the basis of 33 cents per quart, the prevailing wholesale price, gives us the sum of \$13,200,000 which dealers paid to manufacturers for their supplies during the period mentioned. If we could calculate this

quantity on the basis of an average retail price of 55 cents per quart, which is quite general in our State, we would have a total of \$22,000,000 which consumers pay annually for the ice cream eaten in New Jersey. However, we can not take this latter figure as the true amount expended for this toothsome foodstuff, but must deduct the shrinkage of 20 per cent which manufacturers themselves claim, which reduces our total of 40,000,000 quarts to 32,000,000 quarts at 55 cents, or \$17,600,000 which is the amount actually paid by the consumer. So we note a difference of 8,000,000 quarts, and the question arises as to what has become of them. The only conclusion that can be arrived at is that this represents the air content which was squeezed out when the commodity was dispensed in bulk quantity to the trade.

Then, who pays for the air? Based on the wholesale price of 33 cents per quart, it amounts to \$2,640,000. Does the manufacturer lose this? Decidedly not. He has already been paid for the full content of his cans, air and all.

I just give you these few figures which we of the weights and measures department of our State deem significant, in the belief that you will see the necessity and wisdom of adopting legislation to regulate the ice-cream industry for the benefit of the public at large.

Without making a very close analysis the natural tendency is to feel that the effect of such legislation might be exclusively in the interest of the retail dealers, and the thought may arise as to what benefits will accrue to the purchasing public through the adoption of such legislation. It is simply this. There is at present no regulation for ice cream that permits of definite, satisfactory quantity determination of the sale of this commodity, and it is extremely difficult to develop cases for short measure.

The character of the product, involving the factor of air content, makes it practically impossible for dealers to honestly measure out ice cream with the assurance that a fair return will be realized from the money invested and the work entailed in handling the commodity. That retail dealers make little, if any, profit on bulk sales of ice cream is unquestioned. However, many who have not made a study or a check-up on their profits do not seem to be aware of the existing conditions. We estimate that only about 30 per cent of those engaged in the trade know that the margin of profit on bulk sale of ice cream is extremely small; the remaining 70 per cent, however, is learning rapidly, and as those engaged in the retail sale of ice cream are not philanthropists it is reasonable to assume that they will endeavor to establish a satisfactory profit by some means or other.

It is reasonable to assume, therefore, that this condition in numerous instances reacts against the consumer, where dealers with dishonest tendencies short measure or short fill packages when selling in bulk quantities to the purchasing public; and it is our belief that methods or practices that result in the ultimate consumer actually getting less than the quantity represented should be subject to regulation.

After a study of the subject from all angles we favor the establishment of a weight basis of sale for ice cream, as we believe this

will permit of proper and adequate supervision of all branches of the industry.

At the present time strained relations exist between the dealers and the manufacturers on account of the former realizing that they are practically working for nothing when selling ice cream by bulk. This condition has given rise to controversy and numerous complaints. The great shrinkage in the commodity is, of course, responsible, and some one has estimated that this is the direct cause of at least 80 per cent of the failures in the ice-cream business. Under the present method of sale by liquid measure customers claim that they are entitled to 32 ounces to the quart, and it is quite evident that the manufacturers do not deliver this weight to their dealers, so the latter are faced with a problem which usually culminates in loss of profits.

It is claimed on good authority, and borne out by the statement of manufacturers themselves, that it is impossible for a dealer to dip more than 16 quarts of ice cream from a 20-quart can. Is this fair?

In making an investigation of the weights of cans of ice cream as coming from the manufacturer we found a great variation in quantities. On the basis of sale by liquid measure it might be presumed that a 20-quart can should weigh 40 pounds and a 12-quart can 24 pounds. An indication that even the 20 per cent shrinkage claimed by the manufacturers is exceeded in many instances is definitely portrayed by the figures we compiled at the time of our investigation. We found the net contents of 20-quart cans to range from 21 pounds 12 ounces to 28 pounds 9 ounces, and the net contents of 12-quart cans from 13 pounds 14 ounces to 17 pounds, so that on a 20-quart can a dealer receives from 11 pounds 7 ounces to 18 pounds 4 ounces less in weight than customers expect him to deliver, and on a 12-quart can he receives from 7 pounds to 10 pounds 1½ ounces less than he is expected to sell.

To further substantiate our claim of existing discrepancies, I might say that in a prosecution involving three ice-cream manufacturers who were brought to trial merely as test cases it developed on direct testimony and evidence that from a 12-quart can of ice cream obtained from one of these manufacturers a dealer was able to dip only 7 quarts. The 20 per cent shrinkage stressed so much by the manufacturers was, therefore, exceeded by 2.60 quarts. So there you have figures both from the standpoint of weight and measure which clearly indicate the possibilities of this intangible element of "over-run" or air content when excessively employed by manufacturers. When dispensing ice cream to the trade, we have found that hardly two persons will dip ice cream alike, and owing to the nature of the commodity it brings about a condition similar to that which exists when certain dry commodities are sold by measure, constituting one of the reasons why we in New Jersey adopted the sale-by-weight act, which eliminated the dry measure as a medium of purchase and sale.

It is undoubtedly a fact that ice-cream manufacturers have not worked with the dealers as they should to bring about a satisfactory state of affairs. Some manufacturers have even gone so far as to fix retail prices in their advertisements, which was a further detriment to retailers of the commodity.

Our belief that the present practices in the ice-cream industry and the methods of sale of the commodity are decidedly detrimental to the interests of the dealer and consumer prompted us in our attempt last winter to have legislation adopted in our State that would remedy the situation. The bill which we had introduced had for its purpose the establishment of an absolutely net weight basis of sale for ice cream. This we believed would eliminate all controversy arising from the question of overrun, as it would make no difference whether a manufacturer made a heavy or light weight ice cream, and everyone would get just what he paid for. Quality and price would regulate competition, and the labor charges would not be excessive for the extra work entailed in weighing and marking, as manufacturers would soon determine the weights of the various flavors, in which, by the way, there is some variation, and could readily apply them.

In the bill submitted we made no attempt to regulate quality phases of ice-cream making, such as those involving purity and sanitation, as these are already amply covered by health laws, at least so far as New Jersey is concerned; and this fact strongly influences our belief that if for physical reasons quality regulation has been found necessary, quantity regulation for economic reasons is no less important.

The sole purpose of the proposed legislation was to eliminate fraud, unfairness, and controversy. Exemptions were prescribed for ice cream sold in small quantities; for example, where it is dispensed in plates, cones, fancy forms, etc., at ice-cream parlors, hotels, or soda fountains. In fact we made every effort to remove all possible objections to this much-needed quantity regulation, and all in all we felt that the act would establish a method of sale that would be absolutely fair to everyone from the quantity standpoint, as the avoirdupois weight is decidedly more accurate for the determination of quantity than is the liquid measure when used in dispensing a commodity like ice cream.

Our bill was given a public hearing, which was attended by representatives of practically every ice-cream manufacturer in our district, as well as by members of the State department. It is rather to be regretted that the retail dealers did not take sufficient interest in the measure to be represented at the hearing in question. The matter was argued pro and con at considerable length, but for some reason or other the committee did not see fit to release the bill, and it did not come to vote on the floor of the house. This committee heartily agreed, however, from the facts presented that something should be done to remedy conditions in the trade, but they did not feel that the weight basis of sale as prescribed was the answer.

So the question then arises as to what character of quantity regulation would serve the purpose. In deference to the wishes of the manufacturers at the time we were drafting our bill we made no attempt to prescribe a standard weight per gallon for the commodity, as they had declared themselves strongly against a step, claiming that it would have a detrimental effect on the quality of ice cream. The manufacturers, however, did not consistently maintain this attitude which we believe was at first only assumed as an evasion of the issue, as they later stated that they would not be

adverse to a bill prescribing a standard weight per gallon for the commodity, but this change of policy came only after it was quite definitely manifested that the issue of ice cream regulation was a live one and was attracting more attention and interest than they had anticipated. So we submitted a committee substitute for our original bill, which had for its purpose a specified weight per gallon, and for this we used the figures ascertained by the Government in their experiments, viz, $4\frac{3}{4}$ pounds per gallon, and which was indicated as representing a fair standard weight.

Our committee substitute met the same fate as the original bill without, however, being given a public hearing, which would seem to be rather significant of the efforts put forth by the manufacturers in killing this legislation, and while our efforts in this respect were unavailing, we feel they had a good moral effect, and that those manufacturers who had a tendency toward excessive overrun are now keeping this down to what is considered a fair average. It is not to be assumed, however, that conditions are what they should be, for this is decidedly not the case, and the fact that no legislation at present exists to adequately regulate an industry which has grown by leaps and bounds is no argument that there is not a crying need for such regulation. Conditions in the ice-cream industry have changed materially, and to-day a very urgent necessity exists for proper and adequate supervision.

A number of objections were, of course, raised by the manufacturers, at the time of the hearing on our ice cream bill, and I believe certain of them are sufficiently interesting to mention here, together with a synopsis of our replies to them:

First. *Weight has no relation to value.*—It is our opinion that weight has a decided relation to value, otherwise why are weights used in determination of quantities of other commodities? The same condition surely exists in ice cream as in any other foodstuff. We pay for a pound of butter and we get 16 ounces; if we pay for a pound and only receive 15 ounces, would not a question of value be concerned?

Second. *Containers vary in weight.*—It is realized by the drafters of the bill that there is a variation in the weight of cans. However, this variation should not be considerable in the weight of cans secured from one manufacturer, and the only material variation would possibly be where cans are secured from a number of manufacturers or when they are retinned. To cover this variation in both the weight of cans and the weight of various flavors of ice cream, the State superintendent in New Jersey is empowered to prescribe tolerances which would be in accord with good commercial practice. This, we believe, would take care of this objection.

Third. *Inventorying stock.*—There is no reason why manufacturers should not inventory their stock the same as usual, taking the can as a unit instead of the weight of the individual package, reference, of course, being made to the size, whether of 20 quarts, 12 quarts, or other capacity. Flavors could be kept separately, which is undoubtedly the practice of the manufacturers now, and in billing the weight could be noted and their drivers charged accordingly.

Fourth. *Ordering ice cream.*—While it is true that dealers order their ice cream at night, there would not necessarily have to be any

change in the present practices. They could order ice cream by the individual unit, specifying the size of can desired; the only difference would be that they would pay on a weight basis instead of on the basis of measure.

Fifth. *Accounting*.—The act necessarily would affect bookkeeping in the various manufacturing concerns, but this would not necessarily entail greatly increased labor and time in carrying on the work. It would be our suggestion that this accounting work necessitated by the proposed statute could be taken care of by prescribing weights in even pounds without reference to the fractions of pounds. For instance, a can weighing $25\frac{1}{2}$ pounds would be charged for at the rate of 26 pounds, a can weighing $25\frac{1}{4}$ pounds would be charged for at the rate of 25 pounds. In other words, the half pound would be used as the determining factor of the even pound, anything below the half pound being charged for at the pound below and anything above the half pound being charged for at the pound above. The variations of the various cans would, we believe, just about equalize this matter from a give-and-take standpoint.

Sixth. *Increased cost*.—While the additional labor entailed in weighing and marking might to an extent increase the cost of ice cream, this would be more than balanced by the good the act would do in assuring full quantity in all sales.

Seventh. *Embossing of cans*.—No attempt was made in the ice-cream bill which we presented that cans should be marked or embossed. The marking could be taken care of by a tag affixed to containers, which practice is at present followed by manufacturers in dispensing their cream by liquid measure.

Eighth. *Ignoring the consumer*.—It was the idea of manufacturers that our bill had a tendency to ignore the consumer. It would seem that rather the reverse is the case, for the reason that the law will absolutely assure the consuming public receiving full represented quantity. We know positively that at the present time short measuring practices are being pursued by dealers who realize that their profits on bulk ice cream do not come up to their expectations, and on this question of profits a representative of the industry specified that a 35 per cent margin is realized on the sale of ice cream. It is our opinion that this specified profit is mythical, and the gentleman who made the statement evidently secured his figures from some place besides the store of an ice-cream dealer. If his calculations were based on bulk ice cream exclusively, it can be reiterated without any fear of contradiction that his figures are in error. If, however, the calculations cover small quantities sold by the plate, cone, brick, etc., there is a possibility of the figures being accurate; but the fact remains that all dealers have not the facilities for serving their customers on the premises, with the result that many of the ice-cream agencies are what might be termed merely bulk distribution points.

With these facts before us it is not difficult to realize that some regulation of the ice-cream industry should be instituted. People in our State had frequently asked us what we were going to do about it, and our answer to them was our bill presented in the last session of the legislature. While we endeavored to treat the matter from all angles and to be as fair to one as to the other, the proposition we had in mind may not be the answer, but we believe that if all

parties concerned will conscientiously and seriously attempt to bring about a more satisfactory state of affairs in the commercialization of ice cream some solution of the problem will be obtained and we of the weights and measures department of New Jersey will be only too glad to get behind any movement having this for its purpose.

THE VIEWPOINT OF THE MANUFACTURER

REMARKS OF FRED RASMUSSEN, EXECUTIVE SECRETARY, NATIONAL ASSOCIATION OF ICE CREAM MANUFACTURERS

The manufacture of ice cream is an old art dating back to the year 1600. As a commercial industry ice-cream making is comparatively new. The first commercial ice cream to be sold wholesale was made in this country in 1851 in the city of Baltimore by Jacob Fussell. Ice cream, from being a dessert at special stated occasions, passed to the state of a home industry and has recently been commercialized to the extent that individual factories are making several million gallons annually with a total production in 1924 of 286,000,000 gallons, valued approximately at \$350,000,000. Ice cream, on account of being palatable, refreshing, and cool, as well as a wholesome health-giving food, has become during the last 20 years one of the most popular foods in the home, the restaurant, the hotel, and at the soda fountain. New methods in the manufacture and new machinery have followed in rapid succession. In fact, changes have come so fast that the industry has hardly been able to adjust itself to the new discoveries and new inventions.

During the last few years, great changes and great progress have been made in the industry by more accurate methods of figuring the proportion of the mix by the use of model mixing vats with control thermometers, by the more universal use of homogenizers, by the inventions of equipment for testing ice cream for the different solids. In fact, the laboratory with its many different tests to control the manufacture and test ingredients which enter into ice cream is rapidly becoming the most important department of the ice-cream plant. The ice-cream manufacturer has also just learned that it is possible to pasteurize the entire mix before freezing, thereby assuring greater safety to the finished product. New and better freezers have recently been put on the market which will shorten the time it takes to freeze the product. Improved storage and hardening facilities in the factory and the electric, mechanical, refrigerated cabinet, and soda fountain are enabling the manufacturer to sell and the dealer to serve a more uniform product. Nearly all of these important changes have come about during the last five years and have not been as yet universally introduced in the industry.

At one time in the history of the milling industry new equipment and new machinery were invented and manufactured so rapidly that many mills put equipment on the scrap heap which had never been used, because before it could be delivered and installed something new and better had been invented. During that period flour was not a uniform product from year to year in the same mill, nor was flour from different mills uniform in composition. We are at present in a corresponding period in the ice-cream industry, and although

great progress is being made, the practices and methods in the manufacture of ice cream have not yet become sufficiently standardized, nor have we as yet developed all the machinery for the ice-cream industry to make a uniform product.

It is only during the last few years that the practice in the manufacture of butter has been standardized and equipment has been so worked out that the composition of butter can be controlled within narrow limits. Butter consists of only four important constituents—butter fat, water, casein, and salt. Ice cream is a far more complicated product than butter. The composition of ice cream varies widely with the kind of flavoring used, whether nuts, fruits, chocolate, etc., and the sources from which the butter fat and milk solids are obtained. The equipment available for its manufacture also plays an important part in its composition.

The making of a uniform article of any product which is made up of many ingredients depends, aside from the skill and technique of the maker and the development of the machinery, upon the knowledge of the research and experimentation done in the industry. The research and experimental work done in the ice-cream industry is just in its beginning. As professor of dairying in several agricultural colleges, it was my privilege for a number of years to teach ice-cream making. About 12 years ago there were no bulletins on ice-cream making from any experiment station and no textbooks on the subject. The only public information on the subject of ice cream was gleaned from cookbooks and trade journals. I remember distinctly the first bulletin published by the Vermont Experiment Station on the making of ice cream and what a godsend its meager contents was to the teacher. A number of experiment stations during the last few years have published experimental data on the manufacture of ice cream. A great deal of this must be considered preliminary, and its greatest value is, perhaps, the fact that it will lay the foundation for more fundamental work in the future. Comparatively speaking, we do not have any authentic research and experimental work to guide the making of a uniform product as is found, for instance, in the cheese and butter industry.

The manufacturer of ice cream during the last few years has been so absorbed in improving his product and adjusting his business to new conditions that he has not given the thought and attention to the manner in which his product was dispensed that this important subject deserves. In the ice-cream industry the practice is in most instances for the manufacturer to furnish the dealer with storage cabinets and provide refrigeration which until very recently has been produced by ice and salt. It is interesting to note, for instance, that although mechanical refrigeration has been used for a number of years in the manufacture and storing of ice cream it was not until about two years ago that mechanically refrigerated storage cabinets came first into use. During the last year many thousands of refrigerated cabinets, costing millions of dollars, have been installed with the dealers by the ice-cream manufacturer. About a year ago also appeared the electric mechanically refrigerated soda fountain, which is the last progressive step for improving the conditions under which ice cream is sold. The refrigerated cabinet and the soda fountain will enable the dealer to dispense the product

in the same condition as received from the manufacturer, thus serving a better and more uniform product. The mechanically refrigerated cabinet and soda fountain mark a great step forward in dispensing ice cream, because by this method ice cream can be kept at a uniform temperature and consistency which it was very difficult to do with the ice and salt method of refrigeration. To be able to keep ice cream at a uniform temperature will help to overcome the greatest difficulty which the dealer has had, that of shrinkage, which is primarily caused by letting the ice cream become soft in the cabinet.

Another subject in the retailing of ice cream which has received very little study and attention is the equipment and manner for dipping the ice cream. On account of the nature of ice cream, the question of dipping, whether it be in individual dishes or to be packed in pints or quarts, presents an interesting problem. For years the same old dipper has been used in the same old way. Recently, new dippers have come on the market, and tests are under-way to study their comparative value in dispensing ice cream.

Owing to the fact that ice cream varies in its character, composition, and methods of manufacture, and due to the fact that the product is subject to changes after it is manufactured, certain difficulties arise in the dispensing of ice cream which are responsible for the recent agitation in regard to selling ice cream by weight. In all instances which have come to our attention where agitation has started in regard to selling ice cream by weight it has originated with the dealers or public officials and not with the public. A few dealers claim they are unable to make a profit because they can not dish out as many quarts retail as they buy wholesale. Ice cream is not the only product where similar conditions exist. Most of our surplus butter is put in cold storage in tubs; later it is taken out and sold at retail where it is weighed directly out of the tubs or first put into pound prints. There is considerable shrinkage because water is dispelled in the handling and some butter adheres to the equipment used. The retailer of butter recognizes this loss and adjusts his retail price accordingly.

Ice cream is a mechanical mixture the same as is butter. One of the constituents of ice cream is air. Air is an essential component of ice cream. It is an important constituent because it gives to ice cream a desirable texture, it gives palatability, and makes it possible to eat ice cream without discomfort. In fact, we could have no ice cream, as we know it, without air. Few people who eat ice cream have not had the experience at one time or other of a sudden pain above the eyes. This is generally caused by eating ice cream which has become soft in the dealer's cabinet and refrozen. Instead of being light and velvety, such ice cream is heavy and icy. Some of the air has been lost in the softening and rehardening which normally acts as an insulator in the mouth and prevents the intense cold which causes the physical pain referred to.

In analyzing the question of selling ice cream by weight and judging from the experience of those who have attempted such an experiment there appear numerous disadvantages to manufacturers, retailers, and the consumers.

Disadvantages to the manufacturer.—The selling of ice cream by weight will greatly increase the labor in the handling of ice cream in the factory and consequently increase the cost. Ice cream is sold at wholesale in cans, bricks, and special packages. Eighty per cent of the ice cream is handled during the summer months. In the flush of the season thousands of packages leave the factories daily. In selling ice cream by weight all empty cans must be weighed and marked and, when filled, marked again with the net weight. This may seem a simple operation, but it is a fact that it is almost impossible to mark tin cans. Paint, crayon, and pencil can not be used. Tags are impractical because they are difficult to attach and frequently get lost in the hardening room and on the trucks. The weighing of the cans, with the difficulty of marking at the time they are filled, is not the only additional work, but the weight of each can going from the hardening room must be recorded and checked on the trucks. The weights on the cans which are returned from the routes must be checked before again placed in the hardening room. All records in and out of the hardening room and the checking in and out of the driver's load at present are kept by the number of cans or packages. In the busy season the work can be handled under this plan more rapidly and at less cost than when obliged to check each can by weight.

Brick ice cream is made from slabs of ice cream cut by machine. It is impossible to make them all uniform in weight. Bricks are wrapped in paraffined packages, and it is practically impossible to mark the weight on paraffined paper. Bricks of ice cream decrease in weight during storage, which will further complicate the problem.

There are numerous cups and packages which are now machine filled and which it is not possible to fill with such machine to exactly the same weight. Hence, each package, if required to be sold by net weight, must be weighed individually, the expense of which would make the sale of such packages impractical. It must be kept in mind that special packages can only be marketed at a reasonable price on the basis of quantity production.

Disadvantages to dealers.—The retail dealers in ice cream are legion. They number several hundred thousand throughout the country, no one knows how many. Record shows that there are 61,000 druggists and 43,000 confectioners of enough importance to be rated commercially. We not only find ice-cream dealers in the cities, towns, and hamlets but along every main traveled highway ice-cream stands appear at the top of many hills, in the groves and by the waysides, and in the farmers' apple orchards. On a hot summer evening in many cities the vendor with his bell will pass your door and bring the children hurrying from their play to extract from father or mother, with or without pain, the necessary coin for the evening's refreshment.

If you will try to visualize the thousands of places and the varying conditions under which ice cream is sold, it is not hard to picture the confusion and difficulties which would arise if a sudden change in the dispensing of ice cream by weight instead of by volume was required. Every retailer would have to purchase at least two sets of scales, one for retail sales and one to check his purchases, for unless the retailer is going to purchase scales and weigh all cans

received there will be an increased opportunity for drivers to be dishonest with the dealer, charge for more than delivered, and pocket the difference. Not only will there be an increased cost to dealers in purchasing scales, but the retailer knows that on account of the viscous character it will take longer to dispense ice cream by weight than by volume, and extra clerks will be needed during the rush hours. The public has always been purchasing ice cream by volume or, we might say, purchasing by the eye; in the house ice cream is served by the eye at an estimated number of dishes to the quart. Although ice creams of different flavors vary considerably in weight, in most places all standard flavors are sold at the same price per quart. In a large plant weights taken of 25 cans each, of different flavored ice cream, gave the following weights per gallon: Vanilla ice cream, 4.70 pounds; chocolate, 5.70 pounds; pineapple, 4.76 pounds; and nut caramel, 5.25 pounds. If a purchaser was to get the same volume of different kinds of ice cream, it would be necessary to figure out a weight scale by which this could be done; also, a difference in the condition of the cream when sold will cause a variation in volume for the same weight, and customers will object to getting a less volume for the same price at different times.

There is no doubt at all that every housewife, when purchasing ice cream, has in mind a certain volume necessary to properly serve a certain number of people. If ice cream were to be sold by weight, this housewife might, at times, get 2 quarts for 3 pounds, and the next time only get a quart and a half for the same weight. This would cause immediate dissatisfaction, for there is no possible doubt that the purchaser of ice cream always has and always will want a certain volume for a given price, regardless of weight. A constant variation in volume for a given price would cause endless dissatisfaction, which the retailer would not want. This condition would result in a demand by the retailer for the lightest ice cream possible, so that he might give the greatest volume for a certain weight. There would be constant strife to get the lightest ice cream possible from the manufacturer and probable refusal to accept a can of ice cream that did not meet the views of the retailer for lightness. There would be constant haggling over weights, resulting in loss of confidence and good will.

Selling ice cream by weight was considered in California, and was found after investigation to be impractical, as set forth in the following telegram from Charles G. Johnson, state treasurer of California and formerly superintendent of weights and measures, who wired to the secretary of the joint committee on definitions and standards in Washington the following:

Upon learning you will have a hearing on matter of defining proper butter fat and weight standard for ice cream and thinking my experience and investigations into question as former superintendent of weight and measures in California extending over considerable period might be of assistance, can assure your committee that after spending over one year making investigations with assistance of all prominent dairy and food officials in California we found that fixing a weight standard for ice cream entirely impracticable and abandoned any attempt of introducing regulations for such enforcement.

Upon inquiry of the California Southwestern States Ice Cream Manufacturers Association in regard to experiences of retailers selling by weight, the following telegram was received:

Only California retailers who tried selling by weight were druggists in Los Angeles and vicinity who abandoned idea three years ago. Too much trouble explaining to public why containers were not packed full. Several arrests for slack-filled packages. Idea not popular with public. Dealers convinced of impracticability as demonstrated in tests by officials State department of agriculture and dairy division, University of California.

Disadvantages to the public.—The selling of ice cream by weight will increase the cost to the public, as enumerated under disadvantages to the manufacturers and dealers. The public will pay not only the increased cost to the manufacturers and dealers, but also an additional profit to the dealers, which is contemplated by the change to selling by weight. It is estimated that this increased cost will be from 5 to 7 cents per quart. There is no advantage to the public in selling by weight, as weight has no relation to quality and food value. Ices which have the least food value are the heaviest for given volume. The food value of ice cream depends upon the amount and proportion of different solids present, as practically all food value is contained in the solids. The weight of a gallon of ice cream may vary considerably, and yet the total solids or food value in each gallon may be the same.

General summary.—Since the beginning of the industry ice cream has been dealt with in terms of volume. Irrespective of any laws which may be passed requiring ice cream to be sold by weight, it will still be sold in the same containers, and the quantity sold will be judged on the basis of volume rather than weight.

Because of the fact that the public purchases largely by the eye, and because of the fact that weight is not a measure of value or quality, and because of the lesser expense involved, volumetric measure in the sale of ice cream is a more desirable method of dispensing than selling by weight. The impossibility of standardizing bulk for a given weight would result in continuous arguments between manufacturer and dealer and consumer, tending to demoralize the business and destroy good will.

Any retailer is privileged to sell ice cream by weight if he prefers, and whether the manufacturer sells by weight or volume, the total cost to the retailer of his week's supply will be the same. If, therefore, a retailer buying ice cream by volume desires to sell by weight, all that it would be necessary for him to do would be to determine the average weight of ice cream purchased, and from this establish a selling price per pound, which would net him a reasonable profit. The majority of ice-cream dealers and manufacturers do not want to sell by weight.

Different retailers frequently sell ice cream at prices varying from 40 to 70 cents per quart, and it is a well-known fact that some dealers who are not making a profit are trying to gain trade by underselling their competitors.

In analyzing the losses of which the dealer is complaining it is found that in many cases he is giving the customer an excess measure in order to please him and outdo his competitor, and it is also due to his insistence on keeping the ice cream too soft, for ease in dipping. Investigation conducted by Prof. H. A. Ruche, of the University of Illinois, shows that 80 per cent of the shrinkage loss of retailers is due to dispensing too soft ice cream.

Ice cream supplies are generally purchased in the spring for the season, and undoubtedly there are large quantities of package supplies contracted for by manufacturers and dealers which would not be practical for distributing ice cream by weight and which, therefore, would be a total loss if regulations or laws were passed making the selling of ice cream by weight compulsory. No State in the Union has a law requiring ice cream to be sold by weight, and such a radical change should not be put into effect and made compulsory without a thorough investigation of its practicability.

It is not possible in a short time to give a complete picture of the added cost to the industry and the disturbance it would cause to change the well-established custom of selling ice cream by volume. The statements and facts presented are given with the hope that those who are interested in selling ice cream by weight instead of by volume will appreciate that this change is not as simple as it may appear on the surface; also, let us keep clearly in mind that because a few retailers under the present method of dispensing ice cream complain of too much shrinkage and lack of profit, it does not mean that selling ice cream by weight is the best solution to these difficulties. The whole question is one which deserves the most careful study by manufacturers, retailers, and research workers. It is not good business nor is it fair to legislate or regulate an industry until data are collected and facts established to make intelligent legislation.

The dairy industry, like many other industries, has at different times suffered from hasty legislation. Not so many years ago several of the New England States had a law which provided that milk, to be sold legally, from October to April should contain 3.7 per cent fat and from April to October 3 per cent fat; in other words, the farmer who on the last day of September legally sold milk from a herd might on the first day of October when the law changed to 3.7 per cent, become liable to prosecution in criminal court. The law was an injustice to the farmer and caused a great deal of financial loss. The United States pure food law of 1906 provided that butter, to be sold legally, should contain 82½ per cent butterfat. Through a storm of protest from the butter industry of the country this law was never enforced, yet the law remained on the statute books and many well-meaning State officials, for years believing it was in force, tried to have similar laws passed in their respective States. Last year Congress passed a law establishing 80 per cent fat as a minimum standard for salted butter. This law after 19 years corrects the mistake made.

About the same time a standard was established for ice cream of 14 per cent fat when flavoring substances were used and 12 per cent fat when fruits and nuts were added. This standard is not enforced, and efforts are now being made to establish a more suitable standard for the industry. It is interesting to note, however, that although the national standards have not been enforced, similar standards were passed in several of the States. From 1913 to 1923, 20 States in the Union, which had established a 14 per cent butterfat standard have rendered by legislative action the 14 per cent standard. In 1923 only 11 States had a 14 per cent butterfat standard for ice cream, and since then several States have reduced this requirement.

Congress at its last session passed a law establishing an 8 per cent fat standard for the District of Columbia. Those who were instrumental in having these laws or standards enacted were not enemies of the dairy industries nor did they have any intention of doing anything except what in their judgment was right. The only difficulty was that they did not have sufficient knowledge at the time, of the industry they were trying to regulate.

For 20 years I have been identified with the dairy industry and agriculture. During that time I have at a number of times appeared before legislative bodies, both for and against legislation. For four years it was my privilege to serve as secretary of agriculture of Pennsylvania, having in this capacity the general supervision of the enforcement of all agricultural and food laws. Only since March 1 have I been identified with the ice-cream industry. As an interpreter of this industry to the public, my attitude in regard to the policy of legislation for industries is the same as it has always been, only strengthened by the experience gained as a public official. As a public official I have followed two general policies in regard to legislation, first, not to commit myself one way or the other until I felt sure that I had all the facts both for and against a piece of proposed legislation, and, secondly, never to urge any legislation until a conference had been held with the representatives of the industries affected by the proposed legislation. It was my experience that the best people in any industry desired to cooperate with public officials in establishing regulations which will protect the public and regulate the industry against unfair competition.

The ice-cream manufacturers give expression to the same fundamental principles through their national association. We expect to build this industry on public confidence. We stand ready to furnish all available information in regard to the industry and ready to cooperate with public officials to the end that the public may have a wholesome product and receive value for their money. All we ask is to have the question of legislation based upon facts and sound principles as they relate to our industry.

REMARKS OF V. F. HOVEY, PRESIDENT, NATIONAL ASSOCIATION OF ICE-CREAM MANUFACTURERS

Mr. Chairman, ladies, and gentlemen, I appreciate the privilege of being heard. In the ice-cream industry we have manufacturers making from probably not more than an average of 10,000 gallons to probably 7,000,000 gallons a year. I happen to be operating a plant with a capacity and an output of about 1,000,000 gallons a year.

I think, after having listened to the gentleman from New Jersey, that it is quite evident that there is a lack of information on the part of those with whom he was associated. Through our contact with regulatory officials we have come to have a very great confidence in the conscientious sincerity of those gentlemen and their desire to be fair.

In our dealings with the joint committee on definitions and standards, of which Mr. Skinner is chairman, we have found a very earnest desire on their part to get all the facts, and when they have all

the facts we feel pretty sure that we will only be too willing to abide by their conclusions and wishes.

I do want to say only a few words without duplicating the remarks of Secretary Rasmussen. The direct statement has not been made to you gentlemen that it is impossible for the manufacturer of ice cream to determine in advance the weight of his finished product. Possibly you gentlemen do not know that. The gentleman from New Jersey made the statement that the manufacturer could easily ascertain the weight of different flavors and thereby determine the weight of each finished product—so many cans of vanilla of such a weight and other cans of strawberry of such a weight per can. That is not in accordance with the facts. An investigation has been made by Doctor Skinner, who knows that to-day we have not the machinery which will determine in advance the weight of our finished product. It is a deplorable situation, but it is a fact that we can not tell what the weight of the finished product will be. We have made progress, but it is a comparatively young industry.

We have to-day what we call "overrun testers" that are in use in most of the plants. The "overrun testers" will indicate the weight of the finished product at the time the test is taken. In making ice cream the usual freezing time is probably 9 to 12 minutes. In making a test with an "overrun tester" I presume 30 or 40 seconds are involved. You may draw off some of the freezing mixture and it may indicate an overrun of 60 per cent; a minute later you may get 75 per cent. By the time you have drawn one can probably 30 seconds has expired. The freezer only half full is whipping faster, and consequently the second 5-gallon can will weigh less, and to-day we have no way to remedy that condition. So please accept the fact that we can not put out a can of a particular weight. Consequently I am sure that the gentlemen from New Jersey lack information or they would not have made the recommendation that they did.

Gentlemen, factory records upon a definite basis are necessary if we are to avoid theft and unaccountable losses in our plant. I could tell you of one plant in New York State where, because they did not wish to go to the trouble of taking frequent inventories, they found themselves short 25,000 gallons, which was a very substantial loss to that plant. That came about in this way. They had as superintendent of their delivery a high-class but dishonest fellow. In checking the drivers out he would let them take two or three extra cans which were sold and they divided what they got for the extra cans. It happened that I knew one of those drivers—he was dishonest and he made \$5,000 to \$6,000 that summer. That loss was the result of their not taking frequent inventories.

We can not get men who are dependably honest, so we must be sure that our records are correct. We must have an exact manufacturing report every night—we must have our inventory at the close of the business day. We must add to the inventory the amount manufactured the next day; we must take away the sales of our drivers; and the balance always must check with our inventory the next night. If we did not do that, we would not know what had been taken out.

Gentlemen, we can check the number of full and empty cans every night and have a complete inventory, but we can not make a record other than that.

If we should follow the method that has been suggested, it would mean that we would have to tabulate in pounds and ounces the weight of every can filled. I tell you, gentlemen, it is a physical impossibility to take inventory of ice cream on a weight basis.

Gentlemen, I do not know of any way in which we could mark our packages when full. It is practically impossible to mark tin cans; paint, crayon, and pencil can not be used because the ice and salt water wash it off immediately; tags are impractical because they are difficult to attach and frequently get lost in the hardening room and on the trucks. In any event it would require an enormous amount of extra labor with added expense.

I would like to say a little about the problem of the retailers in regard to the methods of distributing ice cream. It is a real problem, and I believe the better men in the ice-cream industry want to meet the problems and solve them in the best way possible. Some one in wishing to make a point against the ice-cream man will say he is selling air. That is not an argument founded in good faith, because ice cream is whipped cream; you do not have ice cream until you have air in it. The air gives it texture. To-day the attempt is not made by 1 in 100 to get excessive air in it; the great thing to-day is to control it and make a uniform product. It may surprise you that you can take samples and put them before the public for a test, one with 60 per cent overrun, another with 80 per cent overrun, and a third with 100 per cent overrun, and the public will invariably pick out the lightest as the best ice cream. The greater the air content the smoother it is. You get a softness that you do not get with the low-air content. At my plant I am attempting to run 80 per cent overrun, which is 5 pounds to the gallon.

The statement was made by the gentleman from New Jersey that it was rather ridiculous to say that weight and value are not related, but there is not necessarily a relation between weight and value, for this reason: You can take ice cream weighing 5 pounds per gallon that has 8 per cent butter fat and 32 per cent total solids and it may not have the food value of ice cream weighing $4\frac{1}{2}$ pounds to the gallon with 12 per cent butter fat and 38 per cent solids. Because of the higher fat content the second may have more nutritive value than the first, so that the statement that there was no relation between weight and volume was a statement well made. I believe that many of the men who are seriously investigating it realize that there must be some way to tie up solids with weight; otherwise it would be illogical. But the ice-cream industry does not oppose a minimum weight standard that is a fair standard—fair to the consuming public and fair to the manufacturer. We do not want anything but a fair deal, and while we say a weight standard is illogical we think it may be the best thing for the industry, and we will go along and abide by the opinion of the members of the joint committee on definitions and standards.

The gentleman referred to the usual assumption that ice cream should weigh 2 pounds per quart. Why that assumption should

be made I do not know. A quart of 20 per cent cream, unwhipped, weighs 33 ounces. It is ridiculous for a man to sell 32, 33, or 34 ounces of ice cream for a quart; but there is competition in the retail field, and they are squeezing ice cream into containers, and in many cases are giving 20 to 30 per cent in excess of a quart by volume. That is something the retailer ought not to do.

We believe that the public is interested in buying ice cream only by volume. You have so many people to serve; you want to have enough to serve all. They have in mind the volume of a quart. I think if on a weight basis they got only four-fifths of a quart they would not feel very good about it. It would be a constant source of argument, and I think the retailer is the one who would curse the weight measure. If ice cream is going to be sold by weight, the retailer is going to want the lightest ice cream he can get. Why? Because he will want to give the consumer the biggest volume he can give for a certain weight. That means the retailer would refuse to accept from the manufacturer anything but the lightest ice cream he can make. Now, if you think that is good from an economic standpoint I do not know. We would be building up executive and distribution costs on air content.

I realize that the whole problem of shrinkage and weight is a serious one, and last November, at New Orleans, at the ice-cream convention I advocated limiting the air content at that point which would make the product most pleasing to the public. That is my statement to the ice-cream industry and to you. It does not mean cream without air; it does not mean with the overrun as low as 60 per cent. In my judgment it is probably ice cream with about 80 per cent overrun in the case of ice cream with 8 per cent fat and 32 per cent total solids, such ice cream containing about 45 per cent air.

One of the things that you must understand, too, if you are to consider the thing intelligently is what causes shrinkage.

Formerly I assumed that shrinkage was about in proportion to overrun. To demonstrate this I had an investigation made. Much to my amazement we found shrinkage was not in proportion to overrun. In fact, overrun apparently did not account for more than 20 per cent of the shrinkage. The condition of the ice cream when it was dipped was responsible for 80 per cent of the shrinkage. If the ice cream was soft and out of condition shrinkage was enormous.

Condition is the real problem. Therefore I am prepared to say to you that the ice-cream manufacturer who is equipping ice-cream cabinets for the retailers with mechanical refrigeration is doing more to-day to solve the retailers' problem than anything you can do regarding weight, for keeping the ice cream at a uniform temperature helps to overcome the shrinkage which is mainly due to the ice cream becoming soft.

The gentleman also mentioned that we might ignore fractions of pounds. I would dislike to do it in view of the fact that the value of a pound runs from 36 to 40 cents. I would hate to give the fraction to him, and I do not think I would get it from him.

In listening to this discussion the question occurs to me, "What have you in mind? Have you in mind that you will obtain more for the consumer for a dollar? Why your very great interest? Is it because you think the retailer is not getting enough?"

If it is assumed that the consumer is not getting enough for his money, you are assuming either that the retailer is making too much or that the manufacturer is making too much. I do not assume that the retailer is making too much, and I also happen to know that the manufacturer is not making too much. I believe that the average profit of the manufacturer is not over $2\frac{1}{2}$ or 3 cents a quart. Possibly it is a poor statement to publish, but, gentlemen, it is a fact.

My personal opinion of this subject and a possible solution of the whole problem is that an effort should be made to equip the retailer with mechanically-refrigerated cabinets, so that he can deliver to the consumer ice cream as nearly as possible in the same condition that he receives it from the manufacturer. Through different ways of dishing ice cream you can give ice cream to the consumer the way it is delivered by the manufacturer, and in my opinion it would be very much more satisfactory to the retailer and very much more satisfactory to the consumer. I believe there is no good reason why it can not be made possible to dip ice cream without compressing the air out of it. If you can get ice cream like that you will have satisfied customers. It would be the same stable commodity that the retailer buys from the manufacturer that he sells to the consumer, it would be the same weight per quart, about 20 ounces.

We think that the very best of our public officials do not believe in too much governmental regulation. I believe the majority of our people feel we should have regulation only after all other means have been tried and after we know what is fair regulation. I will agree with one statement of the gentleman from New Jersey, and that is that the retailer and the manufacturer have not been working together. I want to promote an effort to bring closer cooperation between the retailer and the manufacturer. We are in the same line of business, we have common interests, and the real solution and fair solution and economic solution can be worked out by the retailers and manufacturers themselves. That is one request that we make, that we be permitted to work this problem out within the industry between the manufacturers and the retailers, who are the parties directly concerned.

In conclusion, I wish again to state to you that, although illogical, the ice-cream industry thinks that a minimum weight standard would be much more practical than the sale of ice cream by weight.

THE VIEWPOINT OF THE RETAILER

By E. A. G. INTEMANN, Jr., *representing the New Jersey Retail Ice Cream and Candy Manufacturers' Association*

Mr. Chairman and gentlemen, I want to say at the beginning that the gentlemen who represent the manufacturers are very dear friends of mine. In my capacity as an officer in the retail association it has been necessary at times for me to attend meetings with the manufacturers regarding different matters, but I am very sorry to say that we have never had a conference on the subject that we are discussing now.

In New Jersey I believe that many retailers first started to find out some facts about their sales of ice cream when taxes were levied on this product and it became necessary to report their taxes. It

was a very difficult matter to instruct every retailer to keep his taxes separate from his receipts, and it was necessary for the revenue men to check the number of plates of ice cream sold and what was sold in bulk. One man said, "I get 36 quarts out of a 10-gallon freezer." The revenue man said, "Very well; that is a funny thing, because in New York they get only 28 quarts, but if you get 36 we want more in taxes." To find out the correct figure, he packed a box of ice cream just as he did for a customer and then weighed it. It weighed 2 pounds. He knew then that he got from 26 to 28 quarts to a 10-gallon freezer. The unfortunate thing is that many dealers do not yet know the facts. They are given the cans and they fill the boxes and do not calculate the shrinkage. It is the fault of the retailer if he gives too much.

Some new wholesale manufacturers have been working the over-run to the limit and it is a shame. Mr. Holwell, of New York, called me on the telephone about three weeks ago and asked me how much a pint of ice cream should weigh. He said he got a pint in a certain place, in a box, and weighed it and found it weighed 8 ounces. After he let it stand in the ice box for two hours the box was only half full. If I were the wholesale manufacturer I would be in the same position, but we object to putting a pound in a box and selling it for a quart and having the people say we are highway robbers. Such a "quart" can be had for 40 cents when the retail candy man is putting 2 pounds in a quart and charging you 60 to 70 cents. The retail candy man is giving you more for your money, but the customer thinks he is paying more.

The industry must be regulated somewhere to meet the problems of these manufacturers who have not got regular customers and are putting out this soft, blown-up stuff we have talked about and hand the public a pound for a quart for 30 or 40 cents. I know for a fact that in some cases where the public think they are getting ice cream cheap they are in reality paying 90 cents for the same amount of solid matter that is elsewhere sold for a quart. It is a fact that the honest retailer who is selling first-class cream for 60 cents a quart is actually getting 42 cents a quart when the shrinkage during the retailing of the product is considered, while the man charging 70 cents is getting 49 cents.

Since there is a difference of opinion on the matter of sales by weight, I can not think of anything better than following Mr. Hovey's suggestion and having the manufacturers and the retailers come together.

Now, gentlemen, I do not condemn any manufacturer. The conditions are such that he can not help himself; but at the same time we had an experience in Jersey where a man bought \$72 worth of ice cream on a hot day and after he had dispensed that in box trade and had 2 gallons left, he had taken in \$79. Three men worked hard from morning to night for a net profit of \$7. I also know of a case where a family of five worked and had a net profit of \$8.79 after the season was over.

These conditions exist, but I hope before we have any legislation that the problem can be worked out. I think something must be done, particularly to check those who are trying to make you believe they are giving you a full quart when they are giving only a

pint. In New Jersey they had so many complaints about ice cream that the commissioner of New Jersey investigated the matter. The commissioner of New York City, Mr. Holwell, has also sent men to me and I have told them what you have already heard, that when I dip ice cream and fill quart boxes I get 28 quarts to a 40-quart can, and then the can is empty. The outcome in New Jersey, as you all know, has been the passage of the regulation requiring all containers for the sale of ice cream and like products used in that State to be of legal standard capacities. In addition to this, however, the weight must be marked on the box if the public is to know whether they are getting a radio brick or a full brick—a radio brick is where you are getting the air.

THE WORK IN RELATION TO ICE CREAM OF THE JOINT COMMITTEE ON DEFINITIONS AND FOOD STANDARDS

By W. W. SKINNER, *Chairman*

I doubt if I shall be able to contribute much of value to this discussion, as I think I have been brought into it perhaps through misapprehension regarding the functions of the committee on definitions and food standards. Appreciating that there exists in the trade an erroneous impression regarding the food standards committee, and believing that perhaps similar ideas may exist in the minds of some of those here, I have thought it advisable to tell you briefly of the committee and how it operates.

When, along in the eighties and nineties, certain chemists, dietitians, and sanitarians became actively interested in the so-called pure-food propaganda, it was realized that any intelligent control of food sophistication and adulteration must rest upon a comprehensive and fairly exact knowledge of the composition of food products. Much work was undertaken at that time by chemists in the analysis of natural and manufactured food products to determine their normal and legitimate composition. The Association of Official Agricultural Chemists took a leading part in the work and leaders of the association of the time to which I refer, such men as Doctor Jenkins of Connecticut; Doctor Frear of Pennsylvania; Doctor Webber of Ohio; Dr. Wiley of the Bureau of Chemistry; Doctor Schoville of Kentucky; and others realized the importance of organizing a board or body of men to act as a court to formulate definitions and to determine standards which should be effective in determining the legal composition of food products. Out of this effort in 1898 came the first food standards committee, a committee representing solely the Association of Official Agricultural Chemists. Later, it was enlarged by consolidation with a similar committee representing the organized State food officials, and the enlarged committee was appointed by the Secretary of Agriculture to officially advise him in applying the provisions of the food and drugs act which had been passed by Congress and assigned to the Department of Agriculture for enforcement.

Among the first types of food to be considered by the standards committee were dairy products, which included, of course, cream and ice cream. After much correspondence, study, and discussion, the conclusion was reached that a normal cream should contain about

18 per cent of butter fat, and this was fixed as the legal limit. Right here I should like to call your attention to a matter which is most frequently misunderstood about the work of the standards committee. The 18 per cent butter fat limit fixed for cream does not mean that such a product is the best cream; it does not mean it is the most desirable product; and if the word "standard" is used here, as it sometimes is, to connote a desirable mark of excellence, then it is a misnomer. Standards as formulated by the food standards committee are not standards of excellence, but rather legal limits, below which desirable constituents should not fall and above which undesirable constituents should not be permitted.

Following the definition for cream there was formulated in 1906 a definition and standard for ice cream. The evidence before the committee at that time seemed to clearly indicate that the generic term "ice cream" should apply to a frozen product composed of cream, sugar, and flavoring. Allowing for a reduction in the butter fat, due to the sugar and flavor, and permitting a certain tolerance, the butter-fat content of plain ice cream was fixed by the committee at 14 per cent. This has remained until the present time the Federal standard for ice cream. It would take me too far afield to attempt any discussion of this standard, which would include of necessity a discussion of the butter-fat standards for ice cream which have been promulgated by many of the States and which are not in harmony with the Federal standard. I have only briefly outlined the butter-fat standard to serve as the background for a statement about the overrun in the manufacture of ice cream, the abuse of which, I take it, is the reason for the discussion this afternoon as to whether it is more equitable to the consumer to sell ice cream by weight rather than by measure.

The standards committee has no direct interest in the manner of dispensing ice cream; but, where a limit such as the butter-fat content of a product is fixed, it is done for the purpose of assuring the consumer that he may receive what he expects to get, and what he pays for. When a purchaser buys a pint of standard 18 per cent cream he receives for his money a definite weight of butter fat and other milk solids, but when he buys a pint of ice cream the butter fat may vary considerably, although the percentage of fat in the original mix may be definitely fixed by a legal standard. For instance, ice cream made in the old-fashioned way by a boy on the back porch turning a freezer will have a normal overrun or swell of about 60 to 65 per cent. I remember we used to put in 5 pints and expected to get out a gallon, which is an overrun of 60 per cent. With a mix containing 14 per cent butter fat the consumer would get from such a product about 1.6 ounces of butter fat in each pint of ice cream; but with the same mix, using the new types of ice cream machines, an overrun of as much as 120 per cent is easily possible; and, therefore, each pint of ice cream would have only about 1.1 ounces of butter fat and correspondingly less of the other solids.

Manifestly, therefore, a butter-fat standard alone means nothing unless the actual quantity of food material is fairly definitely fixed. The swell or overrun may be controlled quite definitely within certain limits, due to the perfecting of the new types of machinery and due to the employment of certain added ingredients, the use of which

is of doubtful propriety. There has been much evidence presented to the standards committee, which indicates that the overrun in the manufacture of ice cream has been very greatly abused, and the possible disastrous effect in debasing the product is viewed with grave concern, if not actual alarm, by some far-sighted producers of the product. While there is some conflict of opinion about the possibilities of accurate control of the overrun, we have considerable evidence that within reasonable limits it is practicable to do so.

With this information the standards committee has proposed a weight standard for plain ice cream of $4\frac{3}{4}$ pounds per gallon, which permits of an overrun of from 85 to 90 per cent, which the evidence before the committee from practical ice-cream makers seems to indicate is quite liberal. In lieu of a weight per gallon standard it has been suggested to our committee that the overrun may be effectively controlled by requiring that the volume of a given quantity of melted ice cream shall be one-half of the volume of the original frozen product, thus allowing an overrun of approximately 100 per cent. This was considered by the committee, and it is the method which has been adopted in the State of Wisconsin, the results of which I hope we may hear from the following paper by Mr. Klueter. While the matter has not yet been definitely settled, I am violating no confidence when I say that the standards committee is inclined to favor a weight-per-gallon requirement.

PRESENT REGULATION OF SALE OF ICE CREAM IN WISCONSIN²⁰

By HARRY KLUETER, *Assistant Dairy and Food Commissioner, State of Wisconsin*

Following on the program, as this paper does, a presentation of the subject "Shall ice cream be sold by weight?" it is deemed fitting to adhere very closely to the subject assigned, "Present regulation of sale of ice cream in Wisconsin."

At the outset it seems pertinent to point out that regulation of sale of food in Wisconsin is by duly enacted laws. The laws may be State or municipal, but if the latter they must not be in conflict with State laws, and State laws always take precedence over municipal laws. Further, it may be of interest to point out what the United States Supreme Court has said concerning the matter of sale at retail. In a case (*Weigle v. Curtice Bros. Co.*, 248 U. S. 285) involving the jurisdiction of sale at retail as between State and Federal laws, the Supreme Court said:

The food and drugs act indicates its intent to respect the recognized line of distinction between domestic and interstate commerce too clearly to need argument or an examination of its language. It naturally would, as the distinction is constitutional. The fact that a food or drug might be condemned by Congress if it passed from State to State does not carry an immunity of foods or drugs making the same passage that it does not condemn. Neither the silence of Congress nor the decision of officers of the United States have any authority beyond the domain established by the Constitution. When objects of commerce get within the sphere of State legislation, the State may exercise its independent judgment and prohibit what Congress did not see fit to forbid. When they get within the sphere is determined, as we have said, by the old, long-established criteria. The food and drugs act does not interfere with State regulation of selling at retail. Such regulation is not an

²⁰ This paper, prepared by Mr. Klueter, was read to the conference by George Warner.

attempt to supplement the action of Congress in interstate commerce, but the exercise of an authority outside of that commerce that always has remained in the States.

Clearly, therefore, national legislation relating to articles of food ceases, as the court has said, when such articles of food get within the sphere of State legislation. This fact illustrates very forcefully the necessity of State food laws and provisions for their enforcement. Ice cream being a food, all of the State food laws of Wisconsin apply to its sale. So also do all of the State laws relating to or regulating the quantity sold, by establishing of standards of weight and measure and penalizing the selling of less than the quantity represented. The subject of the sale of ice cream may very well be treated under two general headings: The laws affecting the quality of the product, as its purity, wholesomeness, composition, and sanitary distribution, and the laws affecting the conditions as to weight or measure by which the product is sold.

Considering the subject, first, from the standpoint of composition, it may be pointed out that all of the laws relating to the sanitary production of milk and its products have a bearing on the production and sale of ice cream in this State. Section 4607b of the Wisconsin statutes penalizes the manufacture for sale of any article of food for man from any insanitary milk or from any insanitary cream. Insanitary milk and insanitary cream are defined as follows:

Insanitary milk.—Milk which shall be drawn from cows that are kept in barns or stables which are not reasonably well lighted and ventilated, or that are kept in barns or stables that are filthy from an accumulation of animal feces and excreta, or from any other cause; or milk which shall be drawn from cows which are themselves in a filthy condition; or milk kept or transported in dirty, rusty, or open-seamed cans or other utensils; or milk that is stale, putrescent, or putrid; or milk to which has been added any unclean or unwholesome foreign substance; or milk which has been kept exposed to foul or noxious air or gases in barns occupied by animals, or kept exposed in dirty, foul, or unclean places or conditions is hereby declared to be insanitary milk.

Insanitary cream.—Cream produced from any such aforesaid insanitary milk; or cream produced by the use of a cream separator, which separator had not been thoroughly washed, cleansed, and scalded after previous use in the separation of cream from milk; or cream produced by the use of a cream separator placed or stationed in any unclean or filthy room or place or in any building containing a stable wherein are kept cattle or other animals, unless such cream separator is so separated and shielded by partition from the stable portion of such building as to be free from all foul or noxious air or gases which issue or may issue from such place or stable; or cream that is stale, putrescent, or putrid; or cream that is kept or transported in dirty, rusty, or open-seamed cans or other utensils; or cream which has been kept exposed to foul or noxious air or gases in barns occupied by animals, or in dirty, foul, or unclean places or conditions, is hereby declared to be insanitary cream.

Wisconsin, in addition to its several dairy laws, has two general laws dealing with the sale of food, namely, the general food law and the misbranding law. The provisions of our general food laws are similar in many respects to the national food and drugs act dealing with adulterated and misbranded articles of food. An added advantage in food-control work in Wisconsin is in the enactment into law of definitions and standards for various foods. These standards having been enacted into law are binding on the courts just as much as are the provisions of our food law and our misbranding law. The natural course to be pursued, therefore, in regu-

lating the sale of ice cream was to define and standardize the various kinds of ice cream, which was done in 1921, except in the case of custard or New York ice cream, which was done this session of the legislature. The plan adopted for fixing these standards was first to define and standardize an ice cream, permitting the use of a natural flavor as vanilla, and fixing a minimum milk fat requirement high enough so that it could be used as a base for the other varieties or flavors, and then defining and standardizing fruit, nut, chocolate, orange, maple, and New York or custard ice cream, fixing a slightly lower milk fat content in such cases where the additional flavoring ingredients are in sufficient quantity to materially reduce the milk fat content. The adoption of this method of standardizing we believe is fitting from the fact that the great bulk of ice cream manufactured and sold is vanilla and that much smaller quantities of the other flavors are produced. If a separate mix were required for each of the different varieties, the manufacturing cost would necessarily be increased, which cost would eventually, of course, be borne by the consumer. Having adopted this plan, ice cream was defined and standardized as follows:

Ice cream is a frozen product made from cream, or milk and cream, and sugar, and may contain added milk solids, added milk fat, eggs, natural flavoring, edible gelatin or harmless vegetable gum; and shall contain not less than 12 per cent of milk fat nor more than one-half of 1 per cent of the said gelatin or gum, or a mixture of the said gelatin and gum. The volume of ice cream after being melted shall be not less than one-half the volume of the ice cream as manufactured and sold.

A minimum fat requirement was fixed at 12 per cent, whereas in all of the other varieties, with the exception of orange, lemon, wintergreen, and custard, a minimum fat requirement of 10 per cent was fixed. The ingredients included in the definition of ice cream are well-recognized food products which are in themselves subject to all of the food laws, just as the finished product, ice cream, is. It will be noted from the definition and standard here given that no minimum requirement of milk solids was fixed. Our theory in fixing a standard was that if a minimum requirement were fixed for the most expensive ingredient—namely, milk fat—the matter of competition between manufacturers would take care of the less expensive constituents, such as skim milk solids, in the same manner in which competition takes care of the quantity of sugar and flavoring used.

An added feature, however, which we deemed necessary in the control of ice cream was the fixing of a limit of the expansion or overrun. The expansion or swell, sometimes called overrun, is an inevitable result in the process of manufacture and affects materially the quality of the product in body, texture, and appearance. The matter of expansion or overrun is subject to abuse if the manufacturer is willing to sacrifice quality, so that unless this factor is controlled and ice cream sold by volume it is obvious that ice cream made from a standard mix would contain more or less milk fat per gallon, depending upon the expansion or swell.

A fair average weight of 1 pint of mix is 18 ounces. Under the former fat standard of 14 per cent for ice cream in Wisconsin, 1 pint of mix, therefore, would contain 14 per cent of 18 ounces, or 2.5 ounces of milk fat. Under the former standard this mix could

be manufactured into ice cream and expanded to double its volume, giving a 100 per cent swell, or it could be expanded to a swell of 135 per cent. If expanded to a 100 per cent swell, 1 pint of ice cream would weigh 9 ounces. Then a pint of ice cream would contain 14 per cent of 9 ounces, or 1.25 ounces of milk fat. If expanded to a 135 per cent swell, 1 pint of ice cream would contain 0.928 ounce of milk fat.

Under the present definitions and standards, fixing a minimum milk-fat requirement of 12 per cent and a maximum expansion to double the volume of the mix or a swell of 100 per cent, we have the following facts: One pint of mix, as stated above, will weigh 18 ounces, and the fat content will, therefore, be 12 per cent of 18 ounces, or 2.16 ounces. This mix frozen into ice cream and expanded to the maximum volume permissible under the present definitions and standards gives us the following weights and facts: One pint of ice cream will weigh 9 ounces and the fat content will be 12 per cent of 9 ounces, or 1.08 ounces, as compared to 0.928 ounce of fat per pint under the former definitions and fat standard of 14 per cent, with no limit fixed for the expansion or swell. In other words, the present definitions and standards for ice cream actually give the consumer more milk fat per pint of ice cream than did the old definitions and standards fixing a higher milk-fat content of 14 per cent. It will therefore be seen that while the fat content of ice cream in Wisconsin was lowered from 14 per cent to 12 per cent for ice cream other than fruit, nut, chocolate, and maple, the actual quantity of milk fat obtained by the purchaser or consumer in a given volume was not reduced. The matter of controlling the expansion or swell of ice cream was very thoroughly gone into with members of the Wisconsin Association of Ice Cream Manufacturers, considering carefully the effect of controlling the expansion or overrun on the product. It was contended by all that the quality of the product as affected by expansion or swell was at its best when 1 gallon of the mix in the process of freezing was expanded to a volume of 2 gallons of the finished product, yielding an overrun of 100 per cent. It was also agreed that with modern equipment at hand the manufacturer was able to control the expansion by frequent tests of his product during the process of manufacture.

The method of determining the overrun or swell consists of comparing the weight of equal volumes of the mix and the finished product. A simple and accurate method employed by us to determine the overrun or swell is to measure out accurately 50 cubic centimeters, or any other definite volume of ice cream—25 cubic centimeters will answer just as well as 50 for the determination. The measuring is done in a cylinder open at both ends. The ice cream is then transferred to a 100 cubic centimeter measuring flask by means of a funnel with the aid of water, measuring accurately the amount of water required to fill the flask to the mark.

The difference between the volume of ice cream used and the number of cubic centimeters of water required to fill the volumetric flask to the mark will give the number of cubic centimeters occupied by the air in the ice cream. The percentage of overrun will then be obtained by dividing the volume of air by the volume of ice cream used minus the air and multiplying the result by 100. The

measurement by use of the 100 cubic centimeter volumetric flask is made at a temperature of from 65 to 70° F. We find that this method can be applied by our men in the field, and with a moderate amount of experience the determination can be satisfactorily and rapidly made.

The matter of expansion or swell can, of course, be controlled by establishing a minimum weight per gallon. The weight per gallon is, however, influenced materially by the use of excessive percentages of skim-milk solids, which might lead to the production of a heavy, almost sticky, slow-melting product. Such a product might stand more abuse in handling by the retailer but could scarcely be expected to appeal to the palate of the consumer.

Taking into consideration the ability of the manufacturer to accurately control his overrun, the ability of the retailer to give accurate measure, and the matter of convenience in sale, the conclusion was reached that the consumer under the present definitions and standards for ice cream would be assured of receiving at all times fair and just treatment in the matter of quantity as well as quality.

Turning now to the other phase of the subject, namely, the quantity dispensed, several thoughts present themselves as to what is good commercial practice. Stated in simple terms, good commercial practice may be said to be a fair bargain between purchaser and seller, and in every fair bargain both parties gain. The seller's gain is a legitimate profit, while the purchaser's gain lies in value received. The seller's profit will not depend entirely on a single factor, such as the purchase of 10 gallons of ice cream and his ability to resell 10 gallons in units of pints and quarts, but rather on the fixing of a fair margin of profit, taking into consideration a natural shrinkage and the care used in dispensing and keeping his product. Good commercial practice in dispensing does not call for nor permit heap measure in place of stricken measure. It does not permit carelessness in the keeping of his product, as allowing it to become soft and rehardening. It does not permit the use of inaccurate measures nor the practice of using a paper bucket without bottom or side supports, but to the contrary calls for care and accuracy in every detail. The question may well be asked, "Are shortages, if any, due to the method of sale by volume, or to the abuses of the method?"

Advantages we believe resulting to the dealer from the method of selling by volume rather than by weight are convenience and rapidity. While the sale by weight of ice cream from manufacturer to retail dealer which takes place in large units, such as 2½ and 5-gallon containers, and even the resale by the dealer in quantities of quarts and pints, may be practicable—it appears that the sale in smaller units by weight would be entirely impractical—so that it would be necessary to introduce a double standard for determining the quantity of ice cream sold; that is, a basis of weight between dealers and a volume basis between retail dealer and consumer, for surely it is impractical to sell dishes of ice cream, cones, and sandwiches by weight, and double standards are always objectionable.

It is true that the amount of ice cream in a cone or dish may vary greatly, and perhaps the time has come when some regulation should be made concerning the size of the scoops or dippers now used in dispensing the product. At the present time these scoops or dippers

vary in size, so that the smaller deliver 28 to the quart and the large deliver 10 to 12. It would seem possible to establish standards for two, or at the most three, sizes of these dippers, such dippers being designated as cone dippers and dish dippers. This suggestion is merely made with the thought that it may be possible to fix accurate volumes for the sale of ice cream, even when it is sold in the smallest units. I think it will be conceded by nearly all that if the practice of selling ice cream by weight is adopted it will not be practical to extend that practice to the smaller units above referred to. Perhaps one of the most commendable changes in custom in the retail sale of a common article of food is that of the sale of bananas by weight rather than by numerical count, and I dare say that the abuses through shortage in the measuring of pints and quarts of ice cream when resold by the retailer is negligible when compared to the differences in weight of a dozen of large bananas as compared to the weight of a dozen of small bananas; but even though bananas are sold by weight the cost of the edible portion of the fruit in the smaller fruit is somewhat higher than the cost of the edible portion in the large fruit, due to the ratio of the edible portion to the peel. So even by this change absolute equality has not been established.

It is true that from the standpoint of ease of control by weights and measures officials a straight weight basis for ice cream would perhaps be desirable, but regulation must not always be for the convenience of officials. The demand for regulation should, of course, always be based on the existence of an evil to be corrected, and any change in present regulations or trade customs, unless the evil is impossible of correction by existing regulation, should not be disturbed, so that if fraud in measurements can be as easily discerned and definitely determined as can fraud in weight there would not seem to be sufficient ground to justify any radical change which might disturb well-established trade practices and customs. In Wisconsin we have been fortunate, indeed, in having the cooperation of the Wisconsin Association of Ice Cream Manufacturers, and the character of that State organization, together with the importance of the ice-cream industry to the State, can perhaps best be set forth by quoting from an article by J. Q. Emery, dairy and food commissioner of Wisconsin, entitled "The wonderful story of Wisconsin's dairy industry," published in the *Ice Cream Review and Milk Dealer* and as a reprint in booklet form by the Olsen Publishing Co.

The Wisconsin ice-cream industry, which in recent years has developed into such magnificent proportions, if not, indeed, a distinct branch of the dairy industry, is certainly an ally. Over 6,000,000 gallons of ice cream were produced in Wisconsin in the year 1923, valued at more than \$6,250,000. This means an enlarged market for the dairymen's produce. The Wisconsin Association of Ice Cream Manufacturers is of recent origin and is timely. In its personnel it furnishes a leadership that appears to have a vision and an appreciation of the opportunities within the grasp of such a State organization and such an industry. Its members have the wisdom to discern and the experience to confirm that the production of genuine ice cream of high quality is as a business proposition and practice greatly to their own interest, as well as to that of the consuming public. It was this organization that at the session of the legislature in 1921 took the initiative in the enactment of standards for ice cream in Wisconsin unexcelled if not unequaled by any other State. The members of this organization seem to be allied not only with the present Wisconsin dairy industry but with the spirit of the pioneers of that industry who sought to build upon the solid foundation of high quality and integrity.

The ACTING CHAIRMAN. In view of the fact that it is very late we will defer the discussion of those papers on ice cream until to-morrow morning.

We have with us Dr. H. E. Barnard, director of the American Institute of Baking. Dr. Barnard leaves the city to-night and we will have no opportunity to hear him except at this time, so with your permission we will hear him regarding bread tolerances, which will be a subject under discussion at the sessions to-morrow.

REMARKS OF H. E. BARNARD, DIRECTOR, AMERICAN INSTITUTE OF BAKING, ON PROPOSED TOLERANCES FOR LOAVES OF BREAD

Mr. President and gentlemen, I did not intend to have anything to say in this conference except that I hoped to participate in the discussion of the report of the committee on bread. I did not have an opportunity to sit in with the committee nor to read, until just now, the report on tolerances which will be discussed to-morrow. I think I might take this opportunity to congratulate the committee for the great deal of work they must have done before drafting the proposed tolerances.

Speaking for the baking industry, I think on the whole we can look upon the proposals as certainly well intentioned and as probably well adapted for the needs of the commissioners of weights and measures who are following the old and accepted methods of enforcing the law. As you know, I personally feel that the time has come when the departments of weights and measures should attempt to build their work upon a more scientific basis than they now employ, and I personally feel we will never reach that point until, in the case of hygroscopic commodities, we determine, instead of the actual weight over the scales, the actual weight of the moisture-free material which is being investigated.

As was pointed out last year, and will be pointed out again, the possibility of determining the moisture-free materials is a matter for the consideration of chemists, and our departments are not yet ready to collect the money required from the taxpayers. Nevertheless, I shall insist that undoubtedly we shall some time reach the point where we shall want to use a scientific method in determining the weights of loaves of bread as we do in determining the accuracy of instruments of precision.

Since I shall be unable to hear any discussion of the proposed tolerances, may I say again that I think the baking industry will be glad to accept such proposed tolerances as those which your committee has recommended; but before I do that, on behalf of the industry, may I call your attention to one or two items which might better be referred to the committee than to you, but which I think should be brought up before the subject is finally closed to the baking industry.

May I suggest that it is possible that some slightly unfair conditions may arise if provisions (1) and (2) in the tolerances are not very liberally interpreted. For instance, in the establishment of the period of time during which the bread may be weighed, under (1) it is provided that it may be weighed "at any time up to and including the time of delivery to the retailer in respect to such bread as is sold or to be sold by a baker to such retailer for resale." Assume, if you

please, that in one case bread fresh from the oven, or at least not more than one hour from the oven, is delivered to a grocer living in the same square in which the bakery is operated; also assume that a batch of bread is sent by express to a retailer operating 300 miles from the bakery. Under the provisions for tolerance here set out the bread left with the grocer 300 miles away would have to weigh practically the same as the bread left with the grocer in the same square in which the bakery operates. Surely that must be taken into account by the inspector doing his work both on behalf of the consumer of the bread and the baker himself.

Provision (2) reads: "At any time up to six hours after the time of removal of the bread from the oven in respect to such bread as is to be sold at retail by the baker thereof." In that case it is assumed that the bread is sold over the counter. Then it says: "The average weights of the loaves are to be determined from the weighing of at least five loaves of the same nominal weight and of the same manufacturer or of all such loaves when the supply available at the time and place of the weighing exceeds five such loaves and is not more than 10 such loaves. * * * Whenever the number of such loaves available exceeds the number of loaves so to be weighed, the loaves weighed shall be taken at random." There would be a great difference in the weight of loaves depending on the conditions under which they are handled, conditions which are recognized definitely in the last paragraph of the tolerances, but which under the tolerances as proposed can not be applied to bread up to six hours after it has been taken from the oven.

If, for instance, that bread is thrown into an open case and the room is hot, the loss of moisture will be very rapid, and at the expiration of the 6-hour period the loaf may have lost more than 1 ounce. If, however, that bread is wrapped by the baker, a condition which does not ordinarily obtain as is the case with the wholesale baker, and if that bread is kept in a tightly closed case, there will be almost no loss by evaporation and the loaf will be a legal loaf. If, however, the bread is unwrapped and not carefully protected, the same loaf may have become an illegal loaf. Of course, these conditions are conditions that probably would be taken into consideration by the inspector who is doing the work; nevertheless a strict interpretation of provisions (1) and (2) would lead to difficulties and probably ultimate penalizing of the baking industry because conditions which were perfectly satisfactory in the case of bread sold within the town by the baker, or, if from retail shops, when it was covered under conditions which prevented evaporation, certainly would not obtain where the bread was sold 300 miles away, as is the case in western States, and from retail shops during the seasons when the air is dry and intensely hot with resulting excessive loss of moisture.

I think, too, I should point out that the baking industry feels that there should be tolerances below as well as above the nominal weight. In this suggestion there are no minimum weights. That matter, of course, has been taken into consideration by the court, but it will be received with some dissatisfaction on the part of the baking industry. If, however, the industry realizes the importance of the last paragraph of the tolerances as I do, I think that it will

find that it has been protected by the establishment of the tolerances.

I wish again to congratulate the committee for all its work which I know has taken them a great deal of time and study. I wish I might have the opportunity to discuss it more fully with you, but that is not possible. I am glad of this opportunity to be here with my old friends.

(At this point it was moved and seconded that the conference adjourn; the question was taken, and the motion was agreed to.)

(Thereupon, at 5.25 o'clock p. m., the conference adjourned to meet at 9.30 o'clock a. m. Thursday, May 28, 1925.)

**SIXTH SESSION (MORNING OF THURSDAY, MAY 28,
1925)**

The conference reassembled at 9.30 o'clock a. m. at the Raleigh Hotel, I. L. Miller, first vice president, in the chair.

Mr. HOLBROOK. Mr. Chairman, in order to do my part in regard to expediting the program I request permission to take up and dispose of two or three matters at this point.

**THE WORK OF THE TECHNICAL COMMITTEE ON COMMERCIAL
WEIGHING AND MEASURING DEVICES OF THE FEDERAL SPECI-
FICATIONS BOARD**

Mr. HOLBROOK. The Federal Specifications Board is a body of men representing the departments and independent establishments of the United States Government, who are concerned with the development of specifications for use in the purchase of Government supplies. Whenever a material or article is purchased by two or more Government departments, uniform specifications to govern its purchase will be promulgated by the Federal Specifications Board. These specifications are adopted only after consultation with all interests concerned. The specifications are drawn up by a technical committee which is informed on the subject in question, the committee being made up of representatives nominated by the various departments.

I happen to be the chairman of the committee on commercial weighing and measuring devices, and I may report that this committee is using as a basis the specifications and tolerances of the annual conference. Thus far there has been promulgated one specification, the specification for railroad track scales, which is identical with "Specifications for the manufacture and installation of railroad track scales" drawn up by a group composed of representatives of the American Railroad Association, the American Railway Engineering Association, the Railroad and Warehouse Commission of Minnesota, the National Scale Men's Association, the Scale Manufacturers' Association, and the Bureau of Standards, and which have been adopted by these organizations. These are the specifications printed as Bureau of Standards Circular No. 83.

The committee has now tentatively decided to accept the specifications for liquid-measuring devices adopted by the conference on weights and measures with a few modifications, one of which is that the second paragraph of specification No. 7, which is now "tentative" in the conference specifications, will be put into force and effect in the Federal specification, inasmuch as it is impossible to purchase supplies upon a tentative specification. Work is constantly being done toward the development of additional specifications, and I thought it would be of interest to the conference to know that their specifications were being used as a basis in this work by the Federal Specifications Board in every case.

**POLICY OF THE BUREAU OF STANDARDS IN RELATION TO THE
"APPROVAL" OF COMMERCIAL WEIGHING AND MEASURING
DEVICES**

Mr. HOLBROOK. I may say in discussing this subject very briefly that this is not a new policy of the Bureau of Standards. It has been in force and effect in the bureau as long as I can remember, and my memory is reasonably good. It has been widely circulated, and yet we find some manufacturers of weighing and measuring devices and some officials who still do not seem to understand what our policy is in relation to approval of types of commercial weighing and measuring devices.

Briefly stated, the policy is that the Bureau of Standards will not approve or disapprove of any commercial weighing or measuring device. We have included this information for a number of years in our reports on devices, we have advised many people to this effect by letter, and we have stated this policy in the annual report of the director; yet we still receive letters from manufacturers in which they state that they are manufacturing a commercial weighing or measuring device and desire to know the steps necessary in order to obtain the approval of the Bureau of Standards, and it is necessary to write back in every case and say that the approval of the Bureau of Standards on any commercial weighing or measuring device can not be obtained.

We also have letters from officials—not many of them—who write and say that they have a great many devices of such and such a nature in their city and will the bureau kindly forward a list of the devices of this character which have been approved by the Bureau of Standards. Of course, we must follow the same policy and reply that the bureau does not approve any weighing or measuring devices.

The Bureau of Standards objects very strenuously to having any manufacturer of weighing or measuring devices of the commercial type advertise that he makes a device that is approved by the Bureau of Standards, but this is occasionally done—through misunderstanding, I think, in practically all cases. In such cases we call the attention of manufacturers to our policy in detail, and thus far such advertising has always been withdrawn. It is regrettable that it ever occurs, however, because while it may be withdrawn, often the damage, whatever damage there may be, is done, because necessarily it is impossible to follow up and withdraw the impression created by an advertisement of that character.

This policy of the bureau is due to a number of reasons, chief among which may be mentioned that under our system of laws the determination as to whether or not a weighing or measuring device is proper to be used in a commercial transaction is left by Congress for determination, to the States or to the various subdivisions of the States, and under these conditions the bureau has no desire to influence or question the judgment of any State or local official as to whether he will or will not allow any devices in use.

The bureau does investigate the types and performance of commercial weighing and measuring devices whenever possible. I will

read from a former report of the director of the bureau in this connection:

The studies made incident to this investigation comprise detailed examinations, inspections, and tests upon different types of commercial weighing and measuring devices or of the product of different manufacturers, conducted from the standpoints of construction and performance, with a view to establishing the general service which may be expected from any individual samples of the particular group or manufacturer in question. The work serves to demonstrate whether the device is such as to be accurate, reasonably permanent in its indications and adjustment and not conducive to the perpetration of fraud. Defects in design or construction are disclosed, and the manufacturer is often thus enabled to perfect his device so that it will meet official requirements and will render better service in use. These devices are submitted by the manufacturer on his own initiative or at the instance of a State weights and measures official, who may in some cases request a report from the bureau in order to assist him in reaching a conclusion as to whether the device in question should be allowed in commercial use in his jurisdiction.

Whenever possible; upon request, we will give a State or local official a confidential copy of a report of this character, but the report does not state either that the bureau approves or disapproves. The State weights and measures official or the local official takes such action as seems proper to him under the circumstances in question.

The director's report then gives information in regard to the facilities and personnel available for this character of work, which are very limited as you know, and concludes by stating the reason that the reports can not be allowed to be used for advertising purposes:

By reason of the fact that the number of these devices which can be accepted for examination is strictly limited, the bureau finds it necessary strictly to limit the use which may be made of the reports issued thereon. It will be obvious that it would be unfair to permit a manufacturer who happened to have had one of his devices tested to make whatever use he pleased of the report, when another manufacturer having, perhaps, just as satisfactory a device could not have his device examined simply because the bureau had not the funds to carry on the test. It is therefore necessary to make the reports confidential * * *.

In order to accomplish this there is included in all of these reports the following paragraph:

Use of report.—The Bureau of Standards neither approves nor disapproves of commercial weighing and measuring apparatus, and in making tests and reports such as this one does so for the sole purpose of assisting the manufacturer to a knowledge of the performance of his products and of accumulating data for the information of the bureau. In no case is the recipient of this report to make any copies or abstracts thereof, and the use of this report or of any portion of the subject matter or wording thereof in the selling of the product or for any advertising or promotion purpose whatsoever is hereby specifically forbidden. Acceptance of these conditions is always made a condition precedent to a test of this character, and this statement of these conditions is here included to make them a matter of record.

Mr. DALZIEL. I believe a moment ago you said the Bureau of Standards did not approve or disapprove?

Mr. HOLBROOK. We do not. If the Bureau of Standards issued an approval of any device the manufacturers of all other devices would at once submit all their devices for similar approval and we would be swamped. On the other hand, if we disapproved a device and that fact was published we would, under present conditions, be doing a grave injustice to the manufacturer. Now, that is one

viewpoint, and there is another equally important one. Suppose it were to be broadcast that the Bureau of Standards had approved of a device and one of you gentlemen disagreed entirely with the decision of the bureau. It would cause you embarrassment if you refused to permit its use in your State when the manufacturers and users cited the fact that it was approved by the Bureau of Standards. It is just those conditions from which we want to keep away. We do not want to force your hand or dictate to you in any way, because under our present system of law you are the final authority in your various jurisdictions.

Mr. DALZIEL. We have a law in Oregon based on the rulings or advice of the Bureau of Standards. Any change that they might make would directly affect our laws, and I would like to ask this question: If a controversy should come up in a State over some kind of a weighing or measuring device, whom in the world do we look to for some ruling if not the Bureau of Standards? We have a case in Oregon to-day where there are two different instruments used in testing gasoline and there is a difference in their indications. Now, whom should we look to to determine which is the correct instrument if not to the Bureau of Standards?

Mr. HOLBROOK. If I have made it appear to you from my remarks that the bureau has not in the past or will not in the future be ready to extend any possible aid or assistance to the State and local sealers of weights and measures, I have failed lamentably to express my thought on the matter. We are very pleased, indeed, to give advice and counsel to the best of our ability when it is called for, and as I have mentioned we furnish reports whenever we can. We make tests of devices submitted and we issue reports to the officials and to the manufacturers. We issue a report primarily to the manufacturer with the reservation that such a report can be furnished by us to sealers of weights and measurers upon request. We will advise but we will not dictate. In some cases in our report we will be able to say whether or not, in our opinion, a device conforms to the specifications and tolerances adopted, but you are perfectly free to use your own judgment as to whether or not you will allow the device to be used commercially in your jurisdiction.

Mr. SCHWARTZ. Following up Mr. Holbrook's report on the policy of the Bureau of Standards in relation to the approval of commercial weighing and measuring devices, I may say that we have found in our State recently a condition that probably will confront those of you officials who are here representing various States of the Union, and that is the matter of serialization. The matter of serialization is one that I think may be considered, in a sense, good. On the other hand, it is one that should not be abused, since it can be made rather burdensome on the producer of the package or piece of apparatus.

In our State we have had a number of requests for serialization. I desire now to refer particularly to ice-cream containers. We had in the first place the introduction of undersized containers. Some of them were marked rather peculiarly as "20/32 quart." Some were marked, "6 $\frac{1}{16}$ ounces." Another was marked "7 ounces net." They wanted the State department to O. K. these undersized packages. We could not see our way clear to do so, because we believe

the contents should be marked in full standard units only. Then we were asked to pass the regular standard boxes, and whether we would desire to have marked on them a number or symbol whereby they could be used in our State. Our answer to that was, after looking over some of the boxes handed to us, that we did not see why it would be necessary to have more fancy lettering and other literature placed on a small container like this [indicating small container] or even on the quart size. On the container that I am holding now there are four serialization marks already, for the States of Minnesota, New York, Pennsylvania, and Massachusetts. If every State in the Union adopted serialization it would compel the manufacturer of the box to cover his box with symbols designating that they were approved and passed and serialized in the various States in which they were used. There would be no room for the man's advertising and no room for a mark showing the contents. So we promulgated a regulation that we would not require a special symbol; that all we needed for means of identification was the name and address of the manufacturer of the box and an indication of the contents. I am bringing this up to show the extremes that may be reached by over-serialization. It is not that serialization is not good, but in time it may be overdone and you may simply cover the box with all sorts of symbols of serialization marks and designs. You are not gaining any more than we are gaining by having the name and address of the manufacturer of the box printed thereon as a certain means of identification. The regulation of which I speak is No. 9 and is as follows:

REGULATION NO. 9

On and after April 15, 1925, all containers such as cartons, pails, boxes, etc., composed of cardboard, paper, or other similar material, of every type and description whatsoever, used in the State of New Jersey for the sale of ice cream, ices, or kindred frozen products, or for liquid or semiliquid commodities customarily sold or offered for sale by liquid measure, shall be of legal standard capacities of 1 gallon, a multiple of the gallon, or a binary sub-multiple of the gallon; that is, a measure obtained by dividing the gallon by the number 2 or by a power of the number 2: *Provided, however*, That nothing in this regulation shall be construed to prevent the use of containers for ice cream exclusively in 5-pint and 3-pint sizes.

Containers of the following standard capacities only may, therefore, be employed, viz, 1 gallon, 2½ quarts, 2 quarts, 1½ quarts, 1 quart, 1 pint, ½ pint, and 1 gill; and all such containers shall have conspicuously stamped, printed, or indelibly expressed on the outside thereof, the capacity, in terms of liquid measure only, together with the name and address of the manufacturer.

(Signed) J. HARRY FOLEY,
State Superintendent.

The above regulation was promulgated under the provisions of section 18, article 4, of the New Jersey laws relating to weights and measures, part of which reads as follows: "The State superintendent may also make rules and regulations which shall govern the sale of commodities."

The penalty for violation of this regulation is prescribed in section 36, chapter 201, P. L. N. J. 1911.

Mr. NEALE. I think Mr. Schwartz's suggestion is a very good one. It would be well to make a close study along the lines he has suggested.

Mr. CRAIG. Mr. Chairman, Mr. Schwartz has just shown certain measures of capacity smaller than those customarily used. We have had presented to us recently in Pennsylvania a scale which the inventors claim meets the ice-cream situation and assists the retailer. It is a scale which weighs in units called "Kil-Ams."

Now we have a serialization act in Pennsylvania, and Mr. McGrady having died this matter came up to me, and upon an examination of the scale I decided that it should not be approved, and by the direction of the secretary of internal affairs we prepared a statement of the case and sent it to the attorney general for a decision. The statement is brief and I will read it, as it will give the facts:

APRIL 21, 1925.

HON. GEORGE W. WOODRUFF,

Attorney General of Pennsylvania, Harrisburg, Pa.

MY DEAR GENERAL: I hereby request a legal opinion from you upon the following statement of facts:

James H. Meehan and Joseph Mooney, of Philadelphia, have presented to me as secretary of internal affairs, for the purpose of having awarded a serial number as provided for by the act of May 5, 1921 (P. L. 389), a certain type of scale designed for selling ice cream at retail. It is a combined spring and lever fan-shaped computing scale. The unit of measure is what the inventors call a "Kil-Am" and the scale registers $\frac{1}{2}$, 1, $1\frac{1}{2}$ and 2 Kil-Ams. A Kil-Am equals $23\frac{1}{4}$ ounces avoirdupois, but there is nothing about the scale to show this fact, nor any other designation about the scale excepting the word "Kil-Am" under the figure 1 in the center of the fan-shaped dial.

The word "Kil-Am" is without meaning excepting as a trade-mark, and the purchaser of the commodity measured by the scale must depend entirely upon the vendor's statement or explanation as to what constitutes a "Kil-Am."

By the act of April 15, 1834 (P. L. 524), and amendments thereto, standard measures are adopted for the State of Pennsylvania. They are standard of linear measures, standard of measures of capacity, standard of weights, tables of lengths, square measure, liquid measure, dry measure, troy weight, and avoirdupois weight.

The several acts of assembly attach penalties for the use of false weights and other violations of law, among other penalties being that of the right to confiscate false weighing or measuring devices or those which are defective or do not comply with the law.

I understand the customary method of selling ice cream by retail in this State is by the gallon and the subdivisions of the gallon, without regard to weight. This customary method would be replaced by all retail dealers who would adopt the proposed scale by substituting therefor a new unit of measure designated a "Kil-Am."

By paragraph 2, act of May 5, 1921. (P. L. 389), "The bureau of standards of the department of internal affairs is authorized to pass upon each type of weight and measure and weighing and measuring device manufactured, offered, or exposed for sale or sold or given away, for the use in trade or commerce, or used in trade or commerce, in the Commonwealth of Pennsylvania, and to approve or disapprove of said type. The said bureau shall approve each type of weight and measure and weighing and measuring device, submitted to it for approval by any person, if such type is so designed and constructed that it conforms to, or gives correct results in terms of, standard weights or measures or in terms of values derived therefrom, and is reasonably permanent in its indication and adjustment, and does not facilitate the perpetration of fraud; otherwise the bureau shall disapprove the same."

After the device is approved the bureau awards a serial number, which is placed by the manufacturer upon every instrument or device manufactured. If the device is disapproved finally by the secretary of internal affairs, the applicant may appeal to the court of common pleas of his home county.

Questions.—1. Has the bureau of standards authority to approve any weighing or measuring device which does not give "correct results in terms of standard weights or measures"? In other words, can the said bureau, by its approval

of a weighing or measuring device, create a new unit of weight or measure unknown to the law?

2. Is the "Kil-Am," although designated as equaling $23\frac{1}{4}$ ounces avoirdupois, an illegal unit of weight, and is the proposed scale a false and illegal weighing device when it shows nothing upon its face to express its relation to ounces or other legal terms of standard weights?

3. If you should determine the "Kil-Am" to be illegal and the scale false and illegal, would the defect be remedied by the addition of " $23\frac{1}{4}$ ounces avoirdupois" under the word "Kil-Am" on the face of the register?

As the applicants are prepared to do business and are eager to begin operations, a prompt decision will be greatly appreciated.

Respectfully submitted.

SPECIAL REPORT OF THE COMMITTEE ON SPECIFICATIONS AND TOLERANCES IN RELATION TO CERTAIN AMENDMENTS IN THE MODEL LAW ON THE SUBJECT OF WEIGHTS AND MEASURES, PRESENTED BY F. S. HOLBROOK, CHAIRMAN

In pursuance of the motion adopted at the afternoon session of Wednesday, May 27, directing the committee on specifications and tolerances to report amendments to the model State law adopted by the conference, of such a nature as to include within the purview of the law apparatus used in the sale of service and personal weighing machines operated for a fee or charge, your committee has to suggest the following amendments:

In section 8 of the text of Form 2 of the model law, after the words "used or employed," strike out the words "by any proprietor, agent, lessee, or employee." After the words "purchased or offered or submitted," strike out the words "by such person or persons." After the words "offered or submitted by such person or persons for sale, hire, or award," insert the words "or in computing any charge for services rendered on the basis of weight or measure or in determining weight or measure when a charge is made for such determination." The amended section would then read as follows:

SEC. 8. When not otherwise provided by law the State superintendent (commissioner) shall have the power, and it shall be his duty in those parts of the State in which a city or county sealer is not required to be appointed by the provisions of this act, to inspect, test, try, and ascertain if they are correct all weights, measures, and weighing or measuring devices kept, offered, or exposed for sale, sold, or used or employed in proving the size, quantity, extent, area, or measurement of quantities, things, produce, or articles for distribution or consumption purchased or offered or submitted for sale, hire, or award, or in computing any charge for services rendered on the basis of weight or measure, or in determining weight or measure when a charge is made for such determination; and he shall have the power to and shall from time to time weigh or measure and inspect packages or amounts of commodities of whatsoever kind kept for the purpose of sale, offered or exposed for sale, or sold or in the process of delivery, in order to determine whether the same contain the amounts represented, and whether they be offered for sale or sold in a manner in accordance with law. He shall at least twice each year and as much oftener as he may deem necessary see that all weights, measures, and weighing or measuring devices used are correct. He may for the purpose above mentioned, and in the general performance of his official duties, enter and go into or upon, and without formal warrant, any stand, place, building, or premises, or stop any vendor, peddler, junk dealer, coal wagon, ice wagon, delivery wagon, or any person whatsoever, and require him, if necessary, to proceed to some place which the State superintendent (commissioner) may specify, for the purpose of making the proper tests. Whenever the State superintendent (commissioner) finds a violation of the statutes relating to weights and measures, he shall cause the violator to be prosecuted.

In section 31 of the text of form No. 2 of the model law, after the words "shall use the same in the buying of any commodity or thing, or for hire or award," insert the words: "or in the computation of any charge for services rendered on the basis of weight or measure, or in the determination of weight or measure when a charge is made for such determination." After the words "less than the quantity he represents" insert the words "of any commodity, thing, or service." After the words "by means of which the amount of" strike out the word "commodity" and insert in lieu thereof the words "any commodity, thing, or service." The amended section would then read as follows:

SEC. 31. Any person who, by himself or by his servant or agent, or as the servant or agent of another person, shall offer or expose for sale, sell, use in the buying or selling of any commodity or thing or for hire or award, or in the computation of any charge for services rendered on the basis of weight or measure, or in the determination of weight or measure when a charge is made for such determination, or retain in his possession a false weight or measure or weighing or measuring device or any weight or measure or weighing or measuring device which has not been sealed by the State superintendent (commissioner), or his deputy, or inspectors, or by a sealer or deputy sealer of weights and measures within one year, or shall dispose of any condemned weight, measure, or weighing or measuring device contrary to law, or remove any tag placed thereon by the State superintendent (commissioner), or his deputy, or inspectors, or by a sealer or deputy sealer of weights and measures; or who shall sell or offer or expose for sale less than the quantity he represents of any commodity, thing, or service, or shall take or attempt to take more than the quantity he represents, when, as the buyer, he furnishes the weight, measure, or weighing or measuring device by means of which the amount of any commodity, thing, or service is determined; or who shall keep for the purpose of sale, offer or expose for sale, or sell any commodity in a manner contrary to law; or who shall violate any provision of this act for which a specific penalty has not been provided; or who shall sell or offer for sale, or use or have in his possession for the purpose of selling or using any device or instrument to be used to or calculated to falsify any weight or measure, shall be guilty of a misdemeanor, and shall be punished by a fine of not less than \$20 or more than \$200, or by imprisonment for not more than three months, or by both such fine and imprisonment, upon a first conviction in any court of competent jurisdiction; and upon a second or subsequent conviction in any court of competent jurisdiction he shall be punished by a fine of not less than \$50 or more than \$500, or by imprisonment in the county jail for not more than one year, or by both such fine and imprisonment.

In a similar manner section 7 and section 23 of the text of form No. 1 and section 7 and section 21 of form No. 3, which are the sections corresponding to those to which amendments are suggested above, should be modified.

Your committee is of the opinion that the amendments above proposed will accomplish the purposes desired by the conference as evidenced by the debate had when this subject was proposed yesterday.

Respectfully,

(Signed)

F. S. HOLBROOK, *Chairman*,
WM. F. CLUETT,
A. W. SCHWARTZ,

Committee on Specifications and Tolerances.

DISCUSSION OF ABOVE REPORT

Mr. WARNER. Mr. Chairman, I would like to ask the secretary in regard to the wording of the penalty amendment. Is it the sense of

it to allow anyone to use any kind of a scale so long as they do not charge for it?

Mr. HOLBROOK. This broadens the section as it is at present written. It is already an offense to use a false or unsealed device in the buying or selling of a commodity or thing or for hire or award. These amendments would make it an offense to employ such a device in the computation of any charge for services rendered on a basis of weight or measure or in determining weight or measure when a charge is made for such a determination.

Mr. CLUETT. I move the adoption of the amendments proposed.

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

Mr. HOLBROOK. May I state at this time that Doctor Burgess regretted very much that imperative engagements out of town made it necessary for him to leave the city Tuesday evening. He had intended himself to express his regrets to you on Tuesday afternoon, but the adjournment of the session made it impossible for him to do so, and therefore he asked me to tell you that he was very sorry that he was not able to be with you the last two days by reason of the fact that it seemed necessary for him personally to attend meetings of two associations being held at this time.

I may say also that we sent a cordial invitation to our former president, now our honorary president, Dr. S. W. Stratton, to attend our sessions. He at first intended to be here, but finally wrote that he regretted that imperative engagements in New York and Boston made it impossible for him to come. I am sure that he would have come if it were at all possible, because he always takes a great interest in the conference.

DISCUSSION ON PRACTICABILITY OF PROPOSED SALE OF COMMODITIES ON BASIS OF MOISTURE-FREE INGREDIENTS²¹

By F. S. HOLBROOK, *Bureau of Standards*

At a conference of the weights and measures officials of the State of Indiana held something more than a year ago, Dr. H. E. Barnard, director of the American Institute of Baking, proposed a new basis for the sale of bread and certain other products. He requested an expression of opinion as to whether it might not be a more scientific method of sale, in the case of certain products which lose or gain moisture according to the humidity of the atmosphere in which they are kept, to sell them upon the basis of the weight of the moisture-free substance in the commodity, rather than upon the basis of the actual weight of the commodity, and discussed the feasibility and advisability of this proposal.

Following this address the meeting adopted the following resolution:

Whereas it has been alleged that in the enforcement of weights and measures legislation the only scientific method of arriving at the actual weight of certain products with recognized properties of gaining and losing moisture is by determining the weight of the water-free substance and with basic data so obtained to calculate the original weight at time of production by adding thereto the legal or recognized moisture content: Therefore be it

²¹ Read by title at conference and ordered to be printed in the report.

Resolved, That this conference of State, county, and city inspectors of weights and measures requests of the Bureau of Standards of the United States Department of Commerce certain data bearing on this subject, as follows:

1. Is the method of calculating the weight of bread at the time of manufacture, or flour at the time of packing, by determining the weight of moisture-free substance and adding the legal or allowed moisture content scientifically correct?

2. Is it practical to suggest to weights and measures departments that present methods of law enforcement be improved by providing that the actual weight of products at time of manufacture or packing may be calculated by adding to the moisture-free content of the substance in question the legal or allowed moisture content?

3. Is it possible to devise methods for determining the moisture-free content of bread, flour, or other substances which may be used, by inspectors of weights and measures?

4. Is it advisable to work to the end that inspectors of weights and measures be equipped with instruments of precision and with laboratories and departments in which they may be properly employed to the end that weights and measures legislation may be based and enforced on true scientific principles?

Since we believed that Doctor Barnard was entitled to present his proposal to as large and representative an audience of weights and measures men as possible, he was invited to participate in the program of the Seventeenth Annual Conference held last year and elaborate upon the theme of the sale of commodities, including bread, on the basis stated above. This assignment he accepted, and doubtless you are all familiar with the very interesting paper which he presented at that time, either through your attendance at the last conference or through reading it in the report of the conference or both. We request that the discussion here presented be considered as a reply to the queries contained in the resolution quoted above, as well as a discussion of Doctor Barnard's proposal.

The underlying reason why Doctor Barnard feels that various commodities should be sold in the manner he suggests seems to be summed up, in his own words, as follows:

Can we longer ignore the obvious fact that the real value of food commodities is not determined by measure or weight but by the number of food units sold? The moisture or water in the commodity in question increases the weight and usually the bulk, but it does not in the slightest degree add to the nutritive value.

While Doctor Barnard by no means confined his recommendation to the sale of bread—corn, hay, coke, raisins, dried apples and other dry fruits, butter, flour, wheat, and shelled corn are among those also mentioned—nevertheless, both because he is director of the American Institute of Baking and because he elaborated especially in relation to bread, we may presume that the subject of bread was foremost in his mind. Therefore in our analysis of the subject we will largely confine ourselves to this commodity. It is the intention in this discussion to treat both the theoretical and the practical aspects of this question, and thus considerations of both characters will be mentioned as they occur to be of interest.

The first thing which strikes us in connection with the proposal under discussion is its novelty. To sell bread on a basis of moisture-free content plus a recognized moisture content is an innovation. This occurs to us as the case from our general experience with the manner in which we know commodities are sold. We are confirmed in our impression because nowhere in the paper under discussion do we find that mention is made of the sale of specific com-

modities in exactly this way, and it surely seems that were any commodities now sold in this way Doctor Barnard would have cited them. Perhaps the sale of cream upon the basis of its butter-fat content is the closest analogy which we have, but this method, of course, is confined to wholesale sales only and does not touch the ultimate consumer directly. But because a proposal is a novel one is surely no reason why we should fail to investigate all its possibilities. Progress consists in the embracing of new ideas superior to those which we have had before. However, we take it that it is desirable in the case of innovations, especially when they are proposals for the enactment of penal laws, carefully to analyze them from all points of view so that we may be certain that they actually will result in improving present unsatisfactory conditions. Legislative innovations of this kind require campaigns of education both before and after passage, they are necessarily disturbing to business, and they cost money. Therefore, we must proceed upon the premise that if, on the one hand, when all its elements are taken into consideration, a proposal does not represent a distinct step in advance, or, on the other, if the prevailing condition be a reasonably satisfactory one, it may seem unwise to attempt to put the proposed innovation into effect.

Of course, Doctor Barnard's contention that bread changes in weight continually from the time of removal from the oven up to the time that it becomes a commodity that is no longer regularly salable as human food is readily admitted. The rate of shrinkage and the total change in weight under normal conditions within a stated period of time have been, and are, matters of debate—the fact of shrinkage, never. Obviously, it is also not a matter for argument that the ingredient that escapes from the bread is water, and that the solids constituting the nutritive elements remain. Weight and palatability are affected by shrinkage—nutritive value is not.

The proposal, as we understand it, in relation to bread is as follows: Eliminate from the equation the actual moisture content of the bread by determining the weight of the moisture-free ingredients by the method best adapted to the purpose; to the weight thus determined add an amount constituting an agreed-upon percentage of water; and sell the loaf as of the weight of the sum thus arrived at.

For the sake of illustration let us apply the proposal to the present pound loaf of commerce as it exists in those jurisdictions where the standard-weight type of bread law is in force. Under this present method of regulation the loaf as sold, within definite limits of time, is required to weigh about a pound; that is, a pound within the established tolerances. Under the proposal, suppose that 38 per cent were fixed as the agreed-upon moisture content of bread one hour after baking. The weight of the moisture-free ingredients would be required to be about 62 per cent of the pound, or about 9.9 ounces; that is, 9.9 ounces within the tolerances which it would be necessary to establish on the weight of the moisture-free ingredients. Suppose the average weight of moisture-free ingredients in a number of loaves to be correct in a given case. The actual average weight of the loaves one hour after baking would be 16 ounces if the bread in question contained 38 per cent of moisture, 17.4 ounces if the bread contained 42 per cent of moisture, and 15 ounces if the bread contained

34 per cent of moisture. All of this bread one hour after baking, varying in average weight from 15 ounces to 17.4 ounces, would be of the legal standard "pound" size. Actually the range in average weights would be increased by the amounts by which the baker failed to obtain the average weight of moisture-free ingredients aimed at, and the range in the weight of individual loaves would, of course, be still greater since these individual loaves would necessarily depart in both directions from the average weights stated above. Finally, as the bread shrunk the range would slowly increase still more. So much for the illustration of the proposal.

Now, what are the advantages claimed for the proposal? We have quoted the words which Doctor Barnard used after he had explained the proposition:

Can we longer ignore the obvious fact that the real value of food commodities is not determined by measure or weight but by the number of food units sold?

These words seemed to us to mean that if we adopted the method of sale which he suggested we would be buying our bread on a basis of the food value in the loaf, but Doctor Barnard has advised us that he had no such idea in mind. He was merely pointing out that in the case of any loaf of bread one purchases certain solids having food value plus an amount of water, and that in this loaf the whole food value remains even after part of the water has evaporated. As to the food values of various breads, suppose we were to purchase a number of so-called "pound" loaves made by various manufacturers in accordance with differing formulas, each of which, however, contained 9.9 ounces of moisture-free ingredients. Are we receiving equal food values in these loaves? It may be said without any question that we are not. For when the food value of an article of food is spoken of either one of two things may be meant. One of these is the "fuel value" of the food, the amount of energy released when the article of food is consumed, which is measured in calories. The other is its "nutritive value," in arriving at which we must consider "the amounts and forms of nitrogen, phosphorus, iron, and various other essential elements furnished by the food."

When the number of calories in loaves of bread made according to different formulas, but containing equal amounts of moisture-free ingredients (9.9 ounces, for instance) are computed, wide discrepancies between the results are found. For instance, we have computed various formulas published in *Baking Technology*, the journal of the American Institute of Baking, and find values differing by more than 10 per cent. Thus, in buying loaves containing equal weights of moisture-free ingredients we do not receive the same "fuel value."

While it is realized that the fuel value of a food is not a complete measure of its nutritive value, nevertheless in respect to this latter value we think that the various breads produced by differing formulas vary even more than would be indicated when calories alone are considered. The results of feeding experiments conducted by the American Institute of Baking seem to indicate, for instance, that milk bread is much more than 10 per cent superior to water bread in so far as its "nutritive value" is concerned. If this be the case, then again the weight of the moisture-free ingredients is far from being a measure of food value obtained.

Thus, the proposal would not result in our buying our bread on the basis of the food value in the loaf. Nor, as we have said, did Doctor Barnard intend to convey this impression. But because the words quoted seem to be susceptible of this interpretation we have considered it worth while to go into this subject very briefly to clear the matter up in the minds of any who may have obtained this same impression.

It may be urged, and with much reason, that much of the above concerning the ingredients in bread is a question of quality. So it is. But why is not the question as to the water in the loaf similarly a quality consideration? Our Federal food and drugs act surely so considers it. Section 7 of this act provides:

That for the purposes of the act an article shall be deemed to be adulterated: * * *. In the case of food: First. If any substance has been mixed or packed with it so as to reduce or lower or injuriously affect its quality or strength. Second. If any substance has been substituted wholly or in part for the article.

One of the most important of these added or substituted substances is water, as has been demonstrated by many rulings, and by many decisions of the courts. The subject of the water in bread should certainly be given careful attention, but not, we believe, in the manner contemplated in the present proposal. We will have a word or two to say in this relation at the conclusion of this discussion.

But to return to the advantages of the proposal. While we think that the method would not result in our obtaining a standard food value in a standard loaf, we would obtain the elimination of one variable factor from a somewhat complicated equation; also, in dealing with moisture-free ingredients we would be dealing with something that does not change in weight from the time the dough is scaled until the bread becomes so stale that it is no longer sold in the general course of business as food for human consumption. Again, while we can not agree that the actual weight of products at the time of manufacture or packing may be calculated by adding to the moisture-free content of the substance in question the legal or allowed moisture content, we could, of course, by this method arrive at a more or less arbitrary figure representing what the total weight of the commodity in question would be if and when it contained the full amount of water allowed by law or regulation. We refer to this weight as a "more or less arbitrary figure," since it would necessarily only be the actual weight of the commodity at the time of manufacture or packing, when at such time the commodity in question did actually contain the amount of water specified. Finally, it is urged that this method of procedure will improve present methods of law enforcement.

Concerning these claimed advantages we are of the opinion that it would be preferable to deal with commodities of constant weight, and could we do so conveniently methods of law enforcement would be improved thereby. However, whether the plan proposed is such that it will enable us conveniently to deal with the commodities in question, and whether a more satisfactory law enforcement would follow the adoption of the proposal, are questions which are extremely serious ones. To assist in the solution let us consider those factors which are conceived to be disadvantages inherent in the plan and

examine the evidence presented by those who are not in sympathy with it.

First, then, we would have a law which would be, it seems to many, very much more difficult to enforce.

Under the present method of regulation many retailers and consumers check the weight of the bread and assist in the enforcement of the law by calling the attention of the officials to infractions of its provisions so discovered. Under the terms of the proposal it appears that neither the retailer of the bread nor the consumer would be able to ascertain whether the bread was or was not of the legal standard weight. Obviously, when so-called "pound" loaves, equally fresh, might weigh from 15 to 17.4 ounces and yet still might all conform exactly to the legal standard, the layman endeavoring to check the loaves would be entirely at sea, and his cooperation could no longer be relied upon by the official. In losing this assistance now furnished by the retailer and the consumer in the enforcement of the law, the weights and measures official would lose the help of valued allies, and his own position would be made very much more difficult as a result.

The present type of law can be and is to-day enforced by the simple weighing of loaves of bread. The loaf is not injured in any way during the process. In the enforcement of the proposed type of law it would be essential that a chemical analysis of at least one loaf of each brand being sold in a jurisdiction be made, and it would be necessary to repeat this operation at frequent intervals, since it would be required each time it was desired to ascertain whether or not the bread being sold was in accordance with the law. The analysis mentioned would be a long and difficult task, and each loaf so analyzed would be destroyed as human food. Yet the plea of an important class of the baking industry is for simpler laws rather than for more complicated ones. Mr. Kremer, representing the Retail Bakers' Association of America, in his paper given before the Sixteenth Annual Conference, especially stressed this point, and it is believed that he feels that the proposal is in the nature of a further complication of law. Further evidence that the baking industry is by no means a unit in believing that the method of standardization proposed is a better one than that which we have at present or is even a proper one, is furnished by the fact that at the last conference just after Doctor Barnard had presented his paper, a letter was introduced from Jos. Poehlmann, president of the Retail Bakers' Association of America, to the following effect:

SEVENTEENTH ANNUAL CONFERENCE ON WEIGHTS AND MEASURES,

Bureau of Standards, Washington, D. C.

GENTLEMEN: As president of the Retail Bakers' Association of America, it has come to my attention that a proposal may be made to you to base bread-weight laws upon a basis of the dry substance found in loaves plus 38 per cent moisture. In the name of the association I earnestly protest against this proposal, as it puts the bread produced in the retail bakeries in the country in a false light.

The proposition is founded upon the assumption that, in the sale of bread, we offer the public a combination of the maximum quantity of water and the minimum quantity of nutritive matter allowed by law, and that in dealing with the weight of bread we insist upon our right to produce and sell every loaf upon the basis of the maximum quantity of water permissible.

Our efforts have been directed toward incorporating the maximum amount of nutritive matter into our bread. We have told the American people bread

is your best and cheapest food; if loaded down with 38 per cent water, bread is not the best and cheapest food, and we are not willing that our bread be judged upon the basis that it contains that percentage of water.

We want the American people to know the truth about bread, and that is that the water content of bread varies according to the type or kind of bread purchased, and seldom if ever reaches the fixed maximum of 38 per cent. We also want them to know that the bread we sell contains more than 10 ounces of nutritive matter in a pound.

We are on record as favoring the principle of standard weights for bread, and feel that legislation along the lines discussed would bring confusion and complications rather than standard loaves.

Respectfully submitted.

(Signed) JOS. POEHLMANN.

It is apparent that this important group of the baking industry is decidedly not in favor of the proposed method. If the law will be more difficult to enforce, it follows that it will either be more expensive to enforce or it will not be properly enforced. A word or two on this subject may not be amiss. Certainly compliance could not be determined without the services of a chemist, and some sort of a laboratory for the chemist would be essential; also, it is believed that the time consumed in determining whether or not the bread complied with the law would be much greater than that expended to-day. The need for chemists and laboratories is stated by Doctor Barnard in his conclusion in the words:

We shall dignify the service * * * and place it in the hands of scientifically trained inspectors, adequately equipped with laboratory facilities for the accurate application of the laws of physics and chemistry to the regulation of commerce.

But to procure the services of chemists and to provide laboratory facilities would cost additional money; and yet, at the present time, few of our departments are so liberally treated that they are enabled to procure the equipment and personnel vitally necessary to administer those laws with the enforcement of which they are already charged.

Appropriations in this era when governmental economy is a watchword are not easily procurable. We should certainly hesitate long, and weigh carefully the merits and demerits of a proposal involving any additional governmental expenditures whatever. Especially should we proceed cautiously before taking a step which would commit us to the attempt to raise money for such a notable expansion as is contemplated in the present instance.

If you have agreed at all with the views set forth in the foregoing, you must admit that the system proposed is by no means a panacea. It probably has certain advantages, but it also seems to be subject to many defects. Our premise was to the effect that it would probably be unwise to attempt to make such a radical change as this, first, if the proposal did not represent a distinct step in advance, or, second, if the condition prevailing was a reasonably satisfactory one. Thus far we have largely directed our attention to the first consideration, the new method proposed. A few words are now necessary in reference to the second consideration.

It is true that the present method of regulation is by no means a perfect one. Many theoretical objections have been advanced in relation to it. Were it not possible so to adjust the tolerances that no baker attempting to comply with the law and using reasonably good methods will be placed in the position of violating it, then,

indeed, we would say that a better method of regulation should be sought; but is it, in fact, impossible to attain this end under present conditions?

Our belief is that it is not only entirely possible to accomplish this, but that it has already been accomplished in many jurisdictions. Consider the situation in the States of Indiana, Ohio, Wisconsin, in the city of Chicago, and elsewhere. Their laws require that standard-weight loaves only be made and sold, and tolerances are established under them. All the testimony is to the effect that these laws are working out in a manner entirely satisfactory to the baker, the consumer, and the weights and measures official. While the bakers were at first fearful of what the effect of such laws would be, experience with such laws seems to have convinced them that their apprehensions were groundless. This is proved by the fact that several States and city associations of bakers have officially gone on record as being in favor of standard-weight legislation after operating for some time under laws of this character. Standard-weight loaves have been produced and sold for years, and they are being produced and sold to-day, without disturbance to the baking industry, without unjust prosecutions of bakers, without general friction or protest, and with proper protection to all classes of our citizens. Theoretical objections surely must fall before very practical demonstrations such as these. Our conclusion, upon the evidence, in relation to the second condition of the premise, must be that the method of regulation at present adopted is by no means not a reasonably satisfactory one.

That concludes our argument in regard to the proposal that bread be sold upon a basis of the moisture-free ingredients in the loaf. We are by no means convinced that the proposal is one which need ever be adopted. In any event we are very strongly of the opinion that the present is not the proper time to attempt to put it into effect.

While not essential to the discussion it may be of value to consider the question of tolerances in relation to the proposal. Should it be possible to eliminate tolerances or to reduce them to negligible amounts on account of the stability of the weight of the moisture-free solids, this would be a cogent argument in favor of the proposal. But it will, we think, be apparent that the moisture-free ingredients would necessarily be granted a tolerance. Commodities are regularly granted tolerances, without regard to whether or not a change in weight is to be expected after the weighing operation is concluded, as when the weighing operation is conducted immediately at the time of sale. Excluding shrinkage, the size of the tolerance is determined by considerations such as the value of the commodity, the character of apparatus by means of which its weight is determined, etc. Again, it is obvious that we could not take definite weighed amounts of dry substance and deal with these throughout the processes of manufacture. The weights would still be determined with the bread in the form of dough.

It can not be presumed that the means employed for determining the weights of the lumps of dough would differ from those in use to-day. The large baker would still continue to use the "divider," determining his weights by a measurement of volume of dough and checking some of them by scaling. The dough would be changing in

weight per unit of volume during the period of the dividing process due to the continuing fermentation of the dough, the varying pressure upon the dough being pushed into the dividing chambers, etc. The smaller baker would also use his present method, consisting in the cutting off from the main batch of dough an amount estimated to be of the proper weight, checking it on the scale, and changing the weight if the original estimate was too much in error.

In short, the variations in the weights of the lumps of dough would be the same as at present. If there were an equal amount of water by weight in each lump, then the variations in the weights of the moisture-free ingredients would be the same as the variation in the weights of the lumps of dough. Inasmuch as there are, almost certainly, differing weights of water in the lumps, it seems that the range of variations in the weights of the moisture-free ingredients would, in general, be somewhat greater than the range of variations in the weights of the lumps of dough.

Obviously neither of the above processes of arriving at the weights is one which is susceptible of very great accuracy. Therefore liberal tolerances on the weight of the moisture-free ingredients would inevitably be required, unless the baker were to be expected to work very much closer to accuracy than at present is the case.

We have necessarily had occasion to say much concerning the amount of water in a loaf of bread. This subject is an important one. Certainly the quality of the "staff of life" should not be lowered. If there is any tendency on the part of the bakers to add an undue proportion of water to their product, this evil should be checked, but the subject, we conceive, should be handled as a matter of quality rather than of quantity. Already steps have been taken along these lines. Food inspection decision 188 of the United States Department of Agriculture contains definitions and standards for breads adopted by the joint committee on definitions and standards and approved by the Association of American Dairy, Food, and Drug Officials and by the Association of Official Agricultural Chemists. In considering the definition of wheat bread, white bread, we find that—

Wheat bread dough, white bread dough, is the dough consisting of a leavened and kneaded mixture of flour, potable water, edible fat or oil, sugar and/or other fermentable carbohydrate substance, salt, and yeast, with or without the addition of milk or a milk product, of diastatic and/or proteolytic ferments, and of such limited amounts of unobjectionable salts as serve solely as yeast nutrients, and with or without the replacement of not more than three per cent of the flour ingredient by some other edible farinaceous substance.

Wheat bread, white bread, is the bread obtained by baking wheat bread dough in the form of a loaf or of rolls or other units smaller than a loaf. It contains, one hour or more after baking, not more than 38 per cent of moisture, as determined upon the entire loaf or other unit.

If the above regulation is a proper one, then so far as moisture content is concerned, bread containing not more than 38 per cent is a proper commercial product not adulterated by having non-nutritious water substituted for nutritious material, and such bread may be fairly and freely sold. Bread containing more than this per cent of moisture is adulterated and should be eliminated from the market. Enforce some such provision as this and difficulties along the lines of an improper content of water in bread should no longer vex us.

But who should enforce this regulation? It is apparent that that portion of the text of the decision quoted, not involving the moisture content, can not properly be construed otherwise than as strictly a matter of quality, and as such is properly to be enforced by food officials who have personnel and facilities ready at hand for such work. As we have mentioned heretofore, in our opinion the quantity of moisture in bread is likewise a question of quality, and this factor should be determined along with the others.

The question of the weight of the loaf sold falls in a different category, however, and this is the concern of the weights and measures official. With the food officials doing their part in relation to quality, bread will be bought on the basis of the standard loaf or in such other way as the particular weights and measures law in effect directs. Those persons who like moist bread will consider bread containing, perhaps, about 38 per cent of water superior from the standpoint of quality and will purchase such bread on that account. Persons who like drier bread will consider the varieties containing a lesser per cent of water superior in quality and will accordingly purchase such varieties. The weights and measures official will check the weights of the loaves produced and see to it that they comply with the standard weights within reasonable tolerances adopted. If and when he is inclined to believe that excessive amounts of water are being incorporated in the loaves, or that other regulations in regard to quality are not being complied with, he will enlist the cooperation of the food officials to whom is entrusted the enforcement of laws in relation to the quality of foods. Then analyses will be made, and if these indicate that the bread is not properly compounded in any respect action will be taken as the circumstances warrant. In this manner it is our belief that efficiency will be promoted, economy will be effected, and the whole matter will adequately be regulated.

REPORT OF THE COMMITTEE ON SPECIFICATIONS AND TOLERANCES ON TOLERANCES FOR BREAD, PRESENTED BY F. S. HOLBROOK, CHAIRMAN

Your committee on specifications and tolerances several years ago brought in a report on tolerances for bread which, in its opinion, was a very reasonable one. The conference laid this report on the table on the general ground that the tolerances were too large. This action was taken before the United States Supreme Court decision in the case of the Nebraska bread law, which was discussed at length last year.

The Supreme Court was not in accord with the opinion of the conference in so far as tolerances in excess were concerned. The court held, as we understand the decision, that the only theory under which tolerances in excess could be sustained was the prevention of the manufacture and sale of a standard loaf of one size which was so much overweight that it simulated the next larger size standard loaf. This has made it necessary to provide for maximum weights of loaves very much larger than were contemplated formerly. Now that has caused the committee practically to discard all its former work, and there is now presented a completely new

report which we believe to be wholly compatible with the Supreme Court decision. Copies of these recommendations are now in your hands. They are as follows:

PROPOSED TOLERANCES FOR LOAVES OF BREAD

The average weight of loaves of bread of one of the nominal weights shown in the table given below shall not be greater or less, respectively, than the corresponding maximum and minimum weights specified in the table during the following periods of time: (1) At any time up to and including the time of delivery to the retailer in respect to such bread as is sold or to be sold by a baker to such retailer for resale; (2) at any time up to six hours after the time of removal of the bread from the oven in respect to such bread as is to be sold at retail by the baker thereof. The average weights of the loaves are to be determined from the weighing of at least 5 loaves of the same nominal weight and of the same manufacturer or of all such loaves when the supply available at the time and place of the weighing exceeds 5 such loaves and is not more than 10 such loaves. If more than 10 such loaves are available at least 10 shall be weighed in determining the average. Whenever the number of such loaves available exceeds the number of loaves so to be weighed, the loaves weighed shall be taken at random.

Nominal weight in pounds	Allowable weight	
	Maximum	Minimum
	Lbs. Ozs.	Lbs.
$\frac{1}{2}$	10 $\frac{1}{2}$	$\frac{1}{2}$
1.....	3 $\frac{1}{2}$	1
1 $\frac{1}{2}$	11 $\frac{1}{2}$	1 $\frac{1}{2}$
2.....	6	2
3.....	6	3

NOTE.—On loaves greater than 3 pounds in nominal weight the maximum weight allowable shall not be more than 7 ounces over the nominal weight and the minimum weight allowable shall not be less than the nominal weight.

From the expiration of one of the periods mentioned above up to the time that the bread is declared by the seller to be "stale" bread and sold as such, the average weight of the loaves of bread may be less than the nominal weight by the amount that the bread may reasonably be presumed to have shrunk in the time elapsing between the end of this period and the time of weighing, due consideration being given to the character of the bread and to the conditions under which it has been kept during that time.

(Signed) F. S. HOLBROOK, *Chairman*,
W. F. CLUETT,
A. W. SCHWARTZ,

Committee on Specifications and Tolerances.

DISCUSSION OF THE ABOVE REPORT ²²

Mr. HOLBROOK. I may say that the Supreme Court decision was to the effect that certainly no one could mistake a 10-ounce loaf for a pound loaf, and certainly no one could mistake an 18 $\frac{1}{2}$ or a 19-ounce loaf for a 1 $\frac{1}{2}$ -pound loaf. In other words, the values proposed above have been based on the Supreme Court decision and have been made just large enough to get outside of the specific situation referred to. In the case of a 1-pound loaf, for instance, the maximum weight recommended is 1 pound 3 $\frac{1}{2}$ ounces. Now, mind you, the committee is not of the opinion that these tolerances in excess, as they may be called, are necessary in order that the baker may bake

²² See also remarks of Dr. H. E. Barnard, p. 143.

a standard loaf, but it is of the opinion that they are absolutely necessary to insure the constitutionality of the laws which you may pass or of the regulations which you may adopt.

You will note that this recommendation requires the wholesale baker to put in the hands of the retail baker at the time of delivery loaves averaging the full nominal weight or more but not heavier than the maximum weights allowable. After the bread is placed in the hands of the retailer by the wholesaler, or from a time six hours after the bread is removed from the oven in the case of the baker who sells at retail—and I may say those times have been fixed in order to place as nearly as possible on the same basis the baker who sells at retail and the wholesale baker—a tolerance in deficiency is to be allowed, and the size of this is governed by the amount that the bread may reasonably be presumed to have shrunk in the time elapsing, due consideration being given to the character of the bread and to the conditions under which it has been kept during that time.

It seems that if we fix any definite tolerances in deficiency we will have to fix such a tolerance that the bread which shrinks the most rapidly over the longest period of time to be considered and under the most unfavorable conditions will still be within the tolerance in deficiency specified. In other words, in 99 cases out of 100 any tolerances fixed on such a basis would be too large. Therefore, we attempt to lay down the principle that the bread may be allowed to shrink that amount which it will naturally shrink, and that any shortage of more than this amount is a violation of the regulation.

In a paper given by Doctor Barnard he proposed that bread should be sold on the basis of the weight of the moisture-free ingredients in the loaf plus a certain standard percentage of moisture. It is the conclusion of a paper that I have prepared²³ on this subject that this is not the practical method of sale, at least at the present time. The committee concurs in this conclusion.

Mr. DAVIS. Do these tolerances apply to loaves of bread other than standard loaves? In Vermont all bread must be wrapped, and the weight of the loaf must be on the label. None of the bakers in Vermont, so far as I know, make a standard-weight loaf. They make loaves weighing 1 pound 4 ounces, 1 pound 5 ounces, 1 pound 6 ounces, for instance. If these tolerances can apply to any loaves of bread, then we can apply them in our State, otherwise this recommendation can not be enforced by us.

Mr. HOLBROOK. These tolerances have been written with the standard-weight bread law adopted by the conference in mind and are supposed to be used in connection with laws of this character. If there is enough demand for it, the committee could work out and make recommendations which would, in effect, apply these tolerances to nonstandard-weight loaves.

Mr. SWEENEY. Do I understand that after bread is baked six hours a tolerance is permitted?

Mr. HOLBROOK. A tolerance in deficiency; yes.

Mr. SWEENEY. We will say, for illustration, that a baker bakes bread at 3 o'clock in the morning. An inspector starts work usually about 9 in the morning. About 11 o'clock, or eight hours after the bread has been baked, he starts in to make an investigation in a

²³ See page 154.

bakery and he weighs various loaves of bread. He finds them all 2 or 3 ounces short. Who is going to determine what a reasonable tolerance is going to be on that bread? It will open up, in my opinion, an avenue for free discussion in the courts, as there is nothing definite. I think myself that if you are going to give tolerances something specific in the way of tolerances should be stated.

Mr. HOLBROOK. Suppose an official determines the average weight at 12 o'clock noon of loaves of bread of some well-known brand, made and packed in a well-known way, being sold by a retailer, and finds the average weight to be $15\frac{1}{2}$ ounces. He ascertains from the retailer at what time the bread was delivered to him, perhaps 8 o'clock in the morning, for instance. Then we have the shrinkage period fixed at four hours. The question then arises, "Is it reasonable to suppose that this bread, wrapped or unwrapped, as the case may be, and kept under certain conditions in this store, would shrink one-half ounce in four hours?" He thinks the shortage found is more than the bread can be reasonably thought to have shrunk in the time elapsed, but desires to check this impression. He may go to the same store the next morning and get a loaf of bread delivered fresh from the baker and weigh it at 8 o'clock and then weigh it again at 12 o'clock noon. Suppose he finds it to have shrunk only $\frac{1}{8}$ of an ounce. He may then institute a prosecution upon his original record of an average shortage of $\frac{1}{2}$ ounce. He may introduce evidence that a loaf of the same bread, baked in the same way and kept under the same conditions, shrunk $\frac{1}{8}$ ounce during the period in question. It seems to me this would be reasonably conclusive evidence to the effect that the average weight of the bread was in violation of the tolerances proposed.

That is one way of doing it. You might also proceed on general data. I have here a shrinkage chart on bread,²⁴ prepared by the Bureau of Standards. These data were taken in cooperation with the authorities of the District of Columbia, and the chart illustrates what happens to bread when it shrinks.

We will print this chart in the report in connection with this discussion, together with a short description of the manner in which the data were obtained and plotted. If you introduce a chart like that in your case, I think you will have no difficulty at all in indicating to the court how much bread may reasonably be presumed to have shrunk over various periods of time.

[The description referred to just above is given herewith:

Bureau representatives visited a baking plant and weighed 50 loaves each of two kinds of bread and 25 loaves of one other kind immediately after the bread was removed from the oven while it was still very hot. These loaves were then put upon the cooling racks, marked in such a manner that each loaf could be identified, and were allowed to cool in the ordinary way. Twenty-five loaves each of the first two varieties were wrapped at the usual time in the usual way. At periods varying from two to four hours after removal from the oven all the bread was weighed again, allowance being made for the weight of the wrappers in the case of the wrapped bread. All the bread was then placed in the ordinary wholesale delivery containers of the bakery and removed to a laboratory of the Bureau

²⁴ See fig. 13, p. 168.

of Standards and there it was reweighed every few hours throughout a period of about 90 hours after removal from the oven, at which time most of the bread was becoming moldy.

The chart may briefly be explained as follows: Distances along the horizontal line at the bottom of the chart represent the number of hours elapsing after bread was removed from the oven. Distances along the vertical line represent loss in weight of loaves based upon weight determined at the time of withdrawal from oven, given in ounces per pound and in per cent. The five lines of various characters sloping upward to the right show graphically how the average weight of 25 loaves of each of five different kinds of bread decreased over periods up to 100 hours after leaving the oven. The five kinds of bread are the ordinary 1-pound loaf, unwrapped (solid line) and wrapped (dot-and-dash line); the 1-pound lunch loaf, unwrapped, a long, square loaf baked in covered pans (dotted line); and the ordinary $1\frac{1}{2}$ -pound loaf, unwrapped (long-dash line) and wrapped (medium-dash line).

It will be seen that bread shrinks very rapidly while cooling in the first hour or two after removal from the oven, as is evidenced by the steepness of the slope of the various lines in this region; after that period the shrinkage is much more gradual, and consequently the various lines are very much more nearly horizontal. The wrapped bread shrinks at slightly less than half the rate of the unwrapped loaves.

To find the amount of shrinkage which has taken place in any kind of bread represented, a certain number of hours after its removal from the oven, run out along the horizontal line at the bottom of the chart until the desired number of hours is reached; then the shrinkage is represented by the vertical distance at this point between this horizontal line at the bottom of the chart and the sloping line representing the kind of bread in question.

For instance, it will be seen that in four hours after removal from the oven the various kinds of bread plotted on this chart have all shrunk, four kinds being lighter by somewhat more than three-eighths ounce per pound; the fifth variety, the bread baked in covered pans and which tends to retain a much larger percentage of moisture during baking, is about eleven-sixteenths ounce per pound lighter than upon removal from the oven. Suppose it is desired to determine the total shrinkage from the time of removal from the oven up to a time 72 hours after removal from the oven. In the case of the two kinds of wrapped bread it will be seen that these are about five-eighths ounce per pound light at the end of 72 hours. In other words, they have lost in weight only about one-fourth ounce per pound additional during a period of 70 hours, from 2 hours after baking until 72 hours after baking. In the case of the two ordinary unwrapped breads these are about $1\frac{1}{16}$ ounces lighter per pound 72 hours after baking. In these cases the shrinkage in the last 69 hours is about five-eighths ounce per pound. In the case of the special bread baked in covered pans these loaves average about $1\frac{3}{8}$ ounces light 72 hours after baking. It will be seen that after the more rapid shrinkage in the first four hours this kind of bread shrinks no more rapidly than other unwrapped bread, the

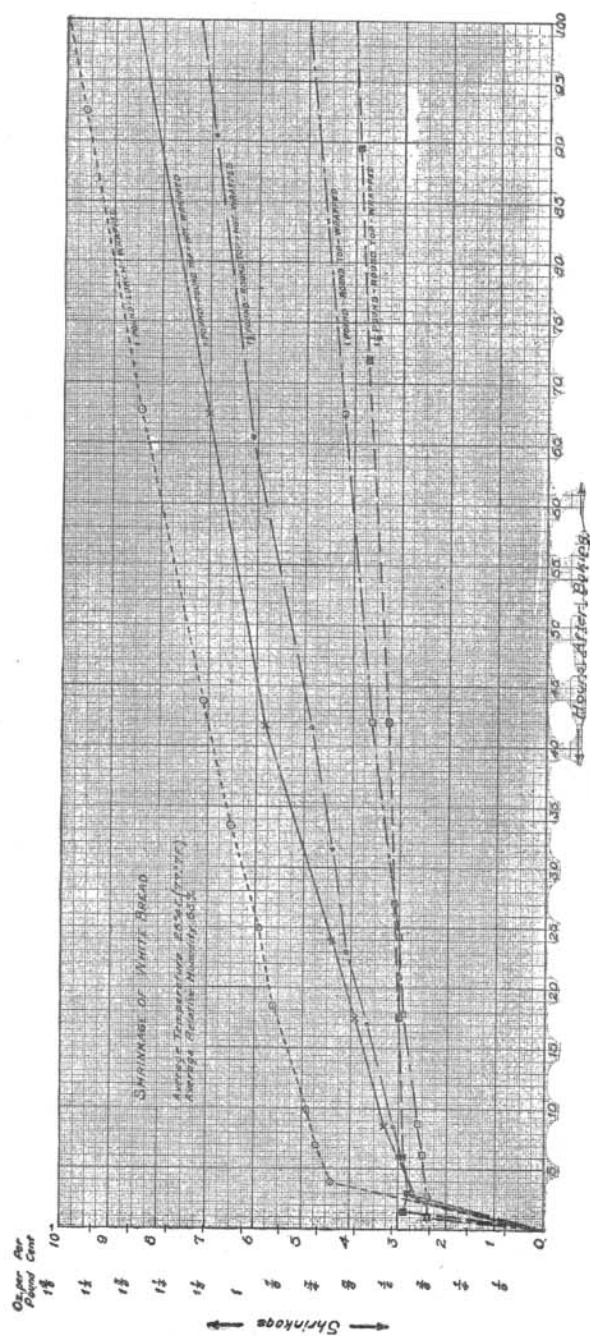


FIG. 13.—Chart showing shrinkage of loaves of bread due to moisture loss

shrinkage in a 68-hour period having been about the same, namely, five-eighths ounce per pound.

If it is desired to determine the shrinkage for a particular variety of bread during a period beginning some time after removal of the bread from the oven, proceed as follows: Find from the chart, in the manner just described, the shrinkage which has taken place during the interval up to the beginning of the period in question; similarly, find the shrinkage for the interval up to the end of the period in question; the difference between these results will be the shrinkage for the period in question. Mechanically, this method reduces itself to locating, on the sloping line representing the variety of bread in question, the two points vertically above the two points on the horizontal line at the bottom of the chart which correspond to the number of hours after baking of the beginning and end, respectively, of the period in question, and reading directly, in terms of shrinkage, the vertical distance between them.]

Mr. SHERMAN. Mr. Chairman, in New York State so-called fancy bread does not have to have the label on it at all. We find that they get away from the label on the bread by calling it a fancy bread or sandwich bread, which does not require the label. So you can see the avenues by which fraud can be perpetrated under the so-called fancy (or sandwich) bread exemption. We have not been able in New York State to get the standard bread law passed, but I hope the time will come when not only New York State but every State in the Union will have the standard loaf of bread.

Mr. HOLBROOK. That is a matter of law, Mr. Sherman, but the model law adopted by this conference does not exempt fancy bread from its provisions.

Mr. KELLY. Mr. Chairman, in reply to the remarks of the gentleman from Vermont that the committee make some changes to make the suggested tolerances conform to his law, it strikes me that at this conference extreme care should be taken that we do not provide any regulations in any way, shape, or manner that would deter us from pushing this model standard-weight bread law. We had prepared and passed in the Legislature of Connecticut a few years ago a fairly good law, yet action could not be taken because various city attorneys and States attorneys gave opinions which pulled all the teeth out of it. It rendered the local officials powerless. Let us stand behind this model law, and not pay any attention to any particular law that is in force anywhere. If we are going to accept these tolerances, I hope they will be adopted with reference to the model law. Let us prove that we believe in the standard-loaf law, and stand by it in all provisions.

Mr. EGAN. I had in mind that a chart of that kind as an exhibit in court where the short-weight bread is being considered would be of very great assistance to the weights and measures officials because it would have force and weight as coming from the Bureau of Standards and the tolerance committee.

Mr. ESTES. I move the adoption of the report.

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

**ANNOUNCEMENT CONCERNING MISCELLANEOUS PUBLICATION
NO. 64**

Mr. HOLBROOK. As you will remember, our late very greatly beloved secretary, Louis A. Fischer, prepared a history of the standard weights and measures of the United States which is an extremely able effort, and this has been available as Bureau of Standards Scientific Paper No. 17. The supply having been exhausted it becomes necessary to reprint it, and I am glad to say that the coming edition, which is now upon the press and which will be known as Miscellaneous Publication No. 64, will be somewhat of a memorial edition to Mr. Fischer, and that in the foreword to the paper a synopsis of his life's work will be printed. We think that probably many members of the conference will desire to have a copy of that edition, and they can obtain it upon request.

FLOWERS IN MEMORY OF LOUIS A. FISCHER

Mr. HOLBROOK. May I make a motion at this time that the conference, following its usual custom, place flowers upon the grave of Louis A. Fischer, in Arlington Cemetery on Memorial Day and authorize a proper expenditure for that purpose.

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

THE PERSONAL ELEMENT IN OUR WORK

By S. T. GRIFFITH, *Chief Inspector of Weights and Measures, City of Baltimore, Md.*

Mr. Chairman, delegates, ladies, and gentlemen, my presence on the program of this national conference is purely by accident and not by choice. When Mr. Holbrook, your secretary, wrote me a few weeks ago requesting that I prepare and read a paper before this body covering the inspection of heavy-capacity scales with modern equipment, I was compelled to write him that I regretted it would be impossible for me to do so for the reason that at the present time the city of Baltimore does not have a modern equipment, and consequently I could not speak on a topic with which I had had but little experience. Thinking to throw him off, however, I casually mentioned that if the subject was one of a general nature, such as "The personal element in our work"—on which anyone could talk—I might respond. Mind you, I did not say that I would; merely that I might. Nevertheless, I received a communication from Mr. Holbrook stating that this was my topic, so you can blame him for the imposition.

Thinking over what I might say to you on this very important phase of the work of weights and measures officials—for it is important—I am sure that most of you will agree with me that the attitude we assume toward our duty measures its success.

Briefly, the functions of an inspector of weights and measures consist principally of the use of proper activity in his work and the proper employment of his faculties and powers. The faculties are personal, but the powers of the inspector are legal and depend largely upon the phraseology of the laws giving him authority.

The best laws, however, are worthless unless proper activity and judgment are exercised by the officials lawfully charged with their enforcement. Upon the inspectors of weights and measures it is particularly incumbent that these laws be carefully studied and wisely acted upon, because on the good sense of our actions depends directly the future reputation of honest weights and measures, as we are yet only pioneers in this great work which is still at this time largely in its infancy.

If we undertake fads and fancies or expend time and money lavishly to correct mere technical errors, or if, unnecessarily, we are deaf to the urgent need for our efforts along a line not previously undertaken, we have carelessly committed a serious offense against our work, which eventually must suffer therefrom. We must bend every effort to the correct use of our authority over all weighing and measuring devices used in the purchase and sale of all commodities. This, I take it, is our main duty. We must also temper our justice with mercy, because I believe the most efficient inspector is not always the one showing the greatest number of prosecutions, but the one who assists in preventing the greatest number of infractions of the law.

One of the greatest factors in the success of our work, which is of a public nature, is in the creation and maintaining of the confidence of the people. While it is true that from Biblical injunction we learn than man may not serve two masters, yet weights and measures officials are serving three—the buying public, the selling public, and the municipal government—and in most cases they are doing it successfully. There is probably no feature of our daily life that reaches so far in its influence upon our living as does accurate weighing and measuring.

So, my friends, I would leave this thought with you, that you might take it back home and use it for what it is worth: Remember that the attitude of an inspector or official of weights and measures can either make or break his department, and his success will be largely measured by the personal element that he puts in his work. I thank you.

THE POST OFFICE DEPARTMENT PROGRAM FOR CHECKING AND MAINTAINING ACCURACY OF SCALES IN SERVICE

By A. R. CHEYNEY, Mechanical Engineer, Post Office Department

It has been suggested from time to time that it might be a practicable proposition to have United States Post Office scales periodically tested by the State sealers of weights and measures, if such service could be arranged for without expense to the department and if the State sealers were willing. Under date of May 21, 1924, Postmaster General Harry S. New in a letter to Doctor Burgess, Director of the Bureau of Standards and president of the Seventeenth Annual Conference on Weights and Measures then assembled in Washington, submitted the suggestion of cooperative action, adding that if the idea seemed feasible there might be worked out some policy covering details of administration. In answer to the above suggestion the following resolution was adopted by the con-

ference. The expression of willingness to cooperate was received with appreciation by the Post Office Department.

Whereas this Seventeenth Annual Conference on Weights and Measures of the United States has received a request from Hon. Harry S. New, Postmaster General of the United States, that it give consideration to and express its attitude upon the advisability of its members, in their capacity as weights and measures officials, undertaking the testing of post-office scales throughout the United States: Therefore be it

Resolved, That this conference goes on record as being heartily in favor of this proposal, and desires hereby to tender to the United States Post Office Department its full cooperation in any plans which may be matured in order to accomplish the desired end.

In the meanwhile 100 sets of standard test weights which had been previously ordered for scale testing were received from manufacturer, and checked by the Bureau of Standards; and, with the addition of 40 original sets, offered immediate opportunity for inaugurating a prearranged program of testing of scales within the department. The plan of this proposed test is outlined herewith. If successful, outside testing on a large scale may be unnecessary for a while at least. If the present scheme should prove impracticable, additional steps will have to be taken. The test is practically under way at the present time.

Outside of letter mail, by far the larger portion of which passes without weighing, practically all of the revenues of the Post Office Department are determined through the use of scales. Owing to the nature of post-office service these scales are not ordinarily used continuously, as is a machine in a factory, but, being placed at receiving windows and at other convenient places, are used more or less intermittently as mail matter is presented. Owing to the large number of scales in use in the department and the relatively low-load factor brought about by this condition of use, and also due to the fact that a large number of weighing operations are performed each with a small financial return, the type of scale adopted has assumed certain characteristics of the service. The scales must primarily be precise and must maintain reasonable accuracy over long periods of time without attention. They must also be of reasonable cost. The scales described below are those most frequently used in the department and each has found its place through meeting and fulfilling special service requirements, frequently those brought about through legislative enactment, gradually increasing weight limits.

(a) *Nine-ounce letter scale, beam type.*—Until recently this scale permitted weighing to $\frac{1}{2}$ -ounce divisions. The latest type of beam is divided into ounces only. The allowable error in new scales as purchased is one sixty-fourth ounce, plus or minus, throughout the range. This scale is sensitive, is very reliable, and has the additional merit that it is low in cost. There are approximately 87,500 of this type of scale now in use, every post office from the smallest to the largest having one or more. As the scale is used primarily for letter mail, the poise is usually kept in the 1-ounce position, thus affording a very rapid answer to whether a letter is within the 2-cent limit.

(b) *Four-pound beam scale.*—Until recently this scale also had the beam divided into $\frac{1}{2}$ -ounce subdivisions. The present minimum subdivision is 1 ounce. This scale also is sensitive, accurate, rugged, and cheap. Manufacturers' tolerance, plus or minus, must not exceed one thirty-second ounce at 1-ounce load and one-sixteenth ounce at full load. Postmasters frequently use this scale for letter mail. Its use for this purpose is discouraged, although the department has not yet decided to omit the first, second, and third ounce

graduations, which would effectively insure the use of the 8 and 9-ounce scale for this purpose. There are approximately 25,000 of these scales in service.

(c) *Twenty-pound beam scale.*—This is of the double beam equal arm type. It is being withdrawn from service as worn out. One beam weighs to 15 pounds in 5-pound increments and the other beam to 5 pounds by 1-ounce increments. There still remain in service about 7,000 of these scales.

(d) *Twenty-pound automatic scales.*—Eleven pounds by single ounces on chart; tare beam, one position only, 10 pounds. These scales are also being withdrawn from service as fast as worn out. There are approximately 800 scales of this type in service.

(e) *Fifty-pound automatic scale.*—This scale weighs 50 pounds by 4-ounce divisions. As worn out, it also is being replaced by larger scales of the same type or is rebuilt.

(f) *Seventy-pound automatic scale.*—This scale has come to be the standard parcel-post heavy-duty counter scale, particularly in large offices. It weighs up to 70 pounds by 4-ounce divisions. There are now outstanding about 4,500 of the 50 and 70 pound automatic scales.

(g) *One hundred-pound beam scales.*—These scales are used in parcel-post service in practically every post office in the country, large and small. The scale has a single beam with two poises and two sets of subdivisions on beam, one reading by ounces to 1 pound, the other by pounds to 20 pounds. In addition, the scale is provided with a counterpoise hanger representing 20 pounds, together with three disk counterpoise weights each representing 20 pounds. The total capacity of this scale is 100 pounds, with the possibility of reading 101 pounds through the use of the fractional poise. This scale has the merit of combined accuracy and cheapness. There are about 75,000 of these scales in service.

(h) The use of automatic scales in smaller sizes, such as the 2, the 4, and the 8 pound, has frequently been recommended, mainly on the ground of time saving. Greater accuracy has occasionally been claimed. Experiments have been made along these lines. The scale is necessarily expensive and up to the present time has not been adopted.

At the present time we have a total of 51,113 post offices, comprising 15,114 presidential offices, or those of the first, second, and third classes, and 35,999 fourth-class post offices. These offices have in regular service approximately 200,000 scales. The number and type of scale in each post office varies with the size of the office. In contrast to the fourth-class offices, each of which carries a 9-ounce scale and most of which also have a 100-pound scale, the New York City post office uses approximately 2,200 scales of all types.

The following table will illustrate the number of scales of each type installed in various post offices. All figures are approximate only. This in itself will give an approximate idea of the problem involved in maintaining accuracy and in carrying out a uniform periodic check test, equally applicable to every office throughout the country.

Post office, by class	Number	Gross revenue	Scales in use				
			9-ounce	4-pound	20-pound	50-70 pound auto-matic	100-pound beam
First.....	945	\$7,000,000-\$40,000.....	20,000	1,800	1,500	1,500	26,000
Second.....	3,100	\$40,000-\$8,000.....	9,300	3,100	2,500	3,000	5,500
Third.....	11,069	\$8,000-\$1,500.....	22,150	11,070	1,650	-----	16,000
Fourth.....	35,999	Less than \$1,500.....	36,000	9,000	1,500	-----	27,000
Total.....	51,113	-----	87,450	24,970	7,150	4,500	74,500

Postal revenue is made directly dependent upon weight divisions. In addition, revenue from fourth class mail matter is also made directly proportional to the distance traveled. Thus, a letter weighing 1 ounce or under comes in one weight and postage classification; one weighing over 1 ounce and not over 2 ounces comes in a separate classification. The same applies to parcel post with the addition that a parcel—for instance, one weighing exactly 10 pounds—delivered in the local zone for a postage of 12 cents will cost \$1.22 for postage when delivered to the eighth zone, which includes any destination over 1,800 miles from point of origin. Second and third class matter is also charged for by weight divisions. Thus, in all post-office weighing the scale has to weigh to the line, and a slight error in any scale will result in charging of postage, perhaps, materially in excess or deficiency on all parcels which weigh exactly on either limit of a prescribed weight division. This possible error in revenue is perhaps specially noticeable in parcel-post service. For instance, a very slight scale error on a package weighing 10 pounds exactly and shipped within the local zone may throw it into the 11-pound class. If the same parcel is shipped to the eighth zone, the postage collected may vary from \$1.22 to \$1.34, these figures representing the respective postal charges for a 10 and an 11 pound parcel. The correct charge is \$1.22, the possible error in this case being 10 per cent.

In 1924 cost-asertainment data it is reported that there were transported by United States mail during the year approximately 1,000,000,000 parcels. Each parcel had first to be weighed, mentally assigned to a zone, and then to have proper postage affixed. The greater part of these parcels were cared for in the various post offices of the country. To facilitate rapid movement, the larger mail-order houses of the country are permitted to provide themselves with postage scales and affix precanceled stamps under postal supervision, delivering parcels to post offices for direct shipment. A large number of parcels is handled in this manner. The magnitude of the weighing problem covering not only the above fourth-class mail, but also first, second, and third classes, is impressive.

During the years 1913 to 1922 there was carried out a scale test within the department along the lines quite similar to those laid down for the test now being inaugurated. The test covered all scales in the following States: Arizona, California, Idaho, Indiana, Michigan, Montana, New Mexico, New York, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, Virginia, and Utah. In this test the central accounting postmasters were made responsible for the conduct of the test, kept a record of the movement of all test weights, and submitted all reports to the department. When scales were found defective they were forwarded to the central accounting office by local postmasters, where they were retained pending receipt of instructions from the department covering shipping instructions governing repair. The greatest difficulty in this test appeared to be that of keeping the standard test weights moving promptly. Further, no official tolerances were used, the decision as to whether or not a scale was defective being left to the judgment of the postmasters. Test results were never tabulated, and no accurate figures are available as to the findings in any particular post office, the num-

ber of scales tested, or the number found defective; also there was kept no record of the conditions of scales as found and as left.

All of the above omissions, it is hoped, will be filled by the present test. In starting this new test we have available 140 sets of standard test weights suitably boxed for continuous shipment. One group of weights is first being sent throughout the 50 largest cities of the country, which have been divided into groups, each group arranged in proper sequence to facilitate rapid movement. The other group of weights will be sent first to a selected group of States, a chosen number of test weights per State. In the State itineraries one set of test weights is sent to a county-seat postmaster, who is instructed to test his own scales and then route the box of weights throughout the post offices in his county, arranging for the weights to be returned to himself. He then routes the weights to the second county-seat postmaster on the department itinerary, pasted in the top of the inner box, right-hand side. When the weights have completed the prescribed department itinerary, they are automatically returned to the supply division, Washington, for reissue, a special treatment differing from the above in the last particular being accorded the testing equipment in the far distant States.

In this test it is the purpose to concentrate the equipment as it is being used and to endeavor to reduce correspondingly the time during which the equipment stays in any city or State. By this concentration information will promptly be made available as to adequacy of equipment or method, and perhaps any points of weakness may be eliminated in the early part of the test while it is strictly localized. The itineraries by both cities and States are intended to be flexible.

As in the original test, present scale testing is intended to be carried out by the postmasters themselves or by their subordinates. All boxes of test weights will be shipped by registered mail. A preliminary letter and later complete instructions for testing and a full set of blank report forms will be forwarded. For convenience detailed instruction governing the testing of each type of scale will be printed on the reverse side of the report forms. On the reports will be entered the exact weights used in effecting balance or bringing pointer to line, all calculations of deviation from accuracy being made at test headquarters in the department. The printing of both instructions and report forms has now progressed to the point of the preliminary proof sheets.

The tolerances which it is proposed to use, for the present at least, will not be furnished with the instructions but will be retained at headquarters. They have been prepared with the assistance of the Bureau of Standards and are considered as reasonable limits to accuracy for the equipment to be tested. As the test becomes a periodic procedure possibly the tolerances may be drawn more tightly.

In the initial stage of the present test and possibly until the country has been covered it is intended to omit from the test the scales in fourth-class post offices. After the test has run a sufficient length of time to permit it to be considered in perspective the determination of the repeat cycle will be made. This time also the fourth-class offices will probably be included.

DISCUSSION OF ABOVE PAPER

Mr. KELLY. Mr. Chairman, I had occasion a very short while ago to go into one of the substations in the city of Bridgeport on a sort of complaint to investigate a scale. It was in a terrible condition. I was confronted with the proposition that every sealer is confronted with, as I understand it, that the average weights and measures official has very little authority over the scales used in the post offices.

I called up the post-office authorities, and found that the matter would have to be reported through various channels before they could get any action, as it would involve the expenditure of a certain amount of money. We are helpless in the matter. I think that the public is entitled to the same consideration as Uncle Sam demands from the ordinary merchant.

Mr. CHEYNEY. We realize that it is not as simple as it appears. Every postmaster is instructed to keep his scales at zero, and if any scale is found in bad condition to notify Washington, and a new scale will be shipped to him. All he need do is to ask for a new scale and he gets it. I am glad to see the interest in postal scales.

Mr. BULSON. I was called to inspect the scales in a post office in a town of 300 population. I told the postmaster that his scale was inaccurate, and put a condemned tag on it, and inside of 10 days they had a new scale there. That is the way we solved it.

Mr. DALZIEL. I would like to say for the benefit of the gentleman from the Post Office Department that, if in Oregon we receive instructions from the Post Office Department asking us to cooperate with them, we will be pleased to make the test of their scales free of charge, and give them the same consideration as the rest.

Mr. THEILMANN. Mr. Chairman, I would also like to state that Arizona was one of the first States that has favored State inspection, and has taken the liberty of volunteering to inspect any post-office scales free of charge.

Mr. KELLY. Mr. Chairman, I move you that it be the intent and sense of this meeting that a protest be sent to the Post Office Department concerning this condition, and that the secretary be instructed to write them, as representing the sense of this convention that those things be taken care of.

Mr. HOLBROOK. It seems that Mr. Cheyney's paper has shown that the Post Office Department is starting to clean house along these lines, to get their scales tested, to replace scales that are not satisfactory. It seems that it might not be advisable to protest when you know that steps are already being taken to correct conditions which at the present time may be unsatisfactory.

The ACTING CHAIRMAN. I believe the motion is lost in the absence of a second.

TEST CAR ACCURACY

By C. L. RICHARD, *Bureau of Standards*

In offering you these remarks I shall be very brief. I appreciate that discussion of a subject connected with the work of testing railroad track scales is not of practical interest to the majority of you,

for it is in only a few communities that railroad track scales come under the jurisdiction of the local sealer of weights and measures. It is offered you as an outline of conditions that exist in a field of work similar to your own and as one phase of the bureau's activity in its program of improving freight-weighing conditions.

The principal involved in testing railroad track scales is substantially the same as is followed in testing other weighing machinery; that it, applying to the load-supporting member of the scale test loads of known values and observing the discrepancies between the values of the loads and the values indicated by the scale.

Practical accomplishment of this requires that the test load be of such character that it can be imposed upon the scale without undue disturbance to the members of the scale. Because of the multiple-section construction of track scales it is desirable to concentrate the loading over the individual sections separately. To determine the degree of accuracy with which the scale functions under actual service conditions, it is necessary that the test load be of great weight and approximate the loading imposed by loaded freight-car trucks. Hence, a suitable test unit must be compact, heavy, and mobile.

Early practice in testing track scales was to use ordinary 50-pound test weights in numbers of two or three hundred. The weights were transported from one scale to another in a freight car and had to be unloaded at each scale and reloaded following each test. Sectional tests were made by piling the weights over each section in turn. To duplicate service conditions, a loaded freight car was placed on the scale as a strain load and the test repeated under those conditions. It can be appreciated that in those days the business of testing a track scale consumed a great deal of time and involved the expenditure of considerable muscular effort. Doubtless it was attended with much profanity and the loss of some cutaneous tissue from the fingers of inspectors. Aside from the practical difficulty of having to move large numbers of test weights by hand repeatedly, there were inherent faults in the system employed. Disturbances to the scale parts caused by shifting the weights about introduced troublesome balance shifts. Moreover, it early became evident that subjecting the scale to a strain load and then applying a test load of small weight did not give a true indication of the scale's performance in weighing loaded freight cars.

Accordingly, in the minds of men charged with the testing and supervision of railroad track scales, ideas for better systems of test and better testing equipment were conceived. In seeking to overcome the faults of practice and equipment just stated, the idea was developed of incorporating the test weight with the strain load in one unit mounted on trucks to facilitate transit and movement over the scale for sectional tests. Thus, test cars were evolved. As a time and labor-saving appliance, a test car was a decided improvement. However, calibration of this new form of working standard and maintenance of it within close limits of accuracy was not as simple of attainment. It had been the practice under the old procedure to bring in the 50-pound standards at intervals and verify them. Since they were transported in a freight car, the effects of exposure and wear were not great. Indeed, it was possible to main-

tain the 50-pound standards within 50 grains or 0.014 per cent of their true value.

The solution of test-car calibration problems lay in the installation of master scales throughout the country. This has been partly accomplished. However, the practice of accurately maintaining test cars, although the method is simple enough, is not being followed by the majority of test-car owners, as I shall show presently. It should be apparent, of course, that maintaining at constant weight a working standard weighing, say, 80,000 pounds, which is continually exposed to the elements and subject to wear and to severe abuse in transit, presents some difficulties not encountered in the case of smaller standards.

Extreme care and vigilance in safeguarding the accuracy of testing equipment is of paramount importance. The test car constitutes the working standard of the railroad, and the value of all tests made rests upon the accuracy of the standard used. The harm which can be worked by use of an inaccurate test car is far-reaching. It extends further than the matter of inaccurate test results, for it is common practice on railroads to adjust the scales to agreement with the standard regardless of the time elapsed since verification of the standard. Most railroad scale inspectors are possessed of an abiding faith in the virtuous constancy and inviolable accuracy of their standard. This holds despite periodic disillusionment in the form of calibration. In consequence of this idiosyncrasy, when the test car is placed on a scale and the weight indicated by the scale does not correspond with the presumed weight of the car, the assumption is always that the scale is wrong and the car correct, and the inspector straightway proceeds to adjust the scale to agreement with the test car's nominal weight. Now contrary to general opinion, track-scale weights are not used as a basis for levying freight charges alone. Such valuable commodities as coal and sometimes even grain are sold and purchased in carload lots on the track-scale weight, and here especially the evil influence of inaccurately adjusted scales is likely to reach serious proportions.

In connection with its field program of testing commercial and master scales, the bureau is frequently called upon to verify the weights of test cars belonging to smaller railroads and industrial plants which do not have access to master scales. Study of the data obtained at the time of the calibrations indicates that on the smaller roads and among industries test cars are not maintained within proper limits of error. During the past two years 53 such cars were calibrated. Of these 27 were found to be improperly designed or constructed so that maintenance was virtually impossible. These conditions were reflected in their deviations from standard weight. Variations ranged from 20 to 400 pounds. The average error per car was 112 pounds. The average error per thousand pounds of weight was 1.34 pounds, or 0.13 per cent.

The other 26 cars were of an approved type of design and construction and were found to have reasonably small variations from standard. Of the 26 properly constructed test cars the errors ranged from zero to 55 pounds. The average error per car was only 28 pounds. The variation or error per thousand pounds was only one-half pound per thousand pounds, or 0.05 per cent.

Conclusions which may be drawn from the above data are that the first requisite for accuracy and permanency of test-car weights is correct design and construction. About 10 years ago one of our most prominent and progressive railroads undertook to develop a form of test car which would eliminate, in so far as possible, all sources of error and alteration in weight. To avoid loss of ballast material the main portion of the test cars was to consist of two large castings bolted and fitted together. All-metal construction was to be followed to prevent the absorption of moisture. The trucks were to be built simply and strong, to permit inspection and to eliminate change of weight incident to loss or breakage of parts. Roller bearings were substituted for the usual freight-car bearing for two important reasons: One was to allow movement of the heavy load over the scale without use of a switch engine and without involving the disturbance caused by switching; the other reason was that the roller bearings required lubrication at infrequent intervals, and thus the weight change resulting from the regular sponging and packing of journal boxes was avoided. In building the cars castings were finished smooth and well painted. No unnecessary ledges which might catch and hold dirt were allowed. The low center of gravity made transportation of a heavy short-wheel-base car on fast freight trains safe. All unnecessary parts, such as air brakes, were eliminated to prevent possibility of error from replaced parts or loss.

The Bureau of Standards purchased two test cars of this type in 1917, and they have been in continuous use since then. The experience of the bureau proves conclusively that with the correct form of test car a degree of accuracy can be maintained which is comparable to that required of small standards. These cars have been calibrated on master scales approximately every three months, and the average variation per car in that time has been the phenomenally small amount of 7 pounds per car, which is 0.06 pound per thousand pounds, or only 0.006 per cent. Corroborative data obtained from the two large railroads using this type of car bears out the bureau's experience. Errors in their test cars checked over the same period of time indicate a performance similar to that of the bureau cars.

As I have already stated, the principal sources of error in test cars are those resulting from poor design and building. Fabricated steel cars, which eventually develop openings and permit the absorption of water or leakage of ballast material are commonly found. Replacement of broken or defective parts without the knowledge of the scale inspector is a common source of trouble. It is a matter of common knowledge that test cars have been placed on the repair track, a pair of defective wheels removed and a new set of wheels installed which weighed 300 pounds more than the original pair, and the car continued in use without the inspector's knowing of the change. Use of improper ballast material is another cause of variation in weight. Scrap iron or pig iron, if used, will shift about and lose material which will sift through the floor.

All of the above troubles may be avoided by use of a test car of approved type. Maintenance within small limits of error will be possible and will require merely the practice of a few simple rules, as follows:

Calibration at as frequent intervals as is commensurate with practicability and necessity combined.

Elimination of all extra movement in trains by cutting out the test car from the train when switching in the yards is being done or the train is being made up.

Regular inspection of the running gear and other parts to prevent loss of parts or breakage of parts.

Posting of signs on the test car to prevent alterations or replacements being made by car repairmen without the knowledge of the inspector.

Identifying detachable parts by painting or otherwise marking, so that casual replacement of these parts may readily be detected.

In conclusion I wish again to state that the importance of safeguarding the accuracy of the test-car weight can not be too greatly emphasized. The bureau exercises extreme care in bringing the actual standard value of mass to the roads through the medium of master scales or by field substitution plan. Railroad-scale inspectors should never lose sight of the fact that calibration only gives them the correct weight of the test car on that particular day. Assurance that the weight of the car will be the same on a distant date at a remote point diminishes as the distance from the weighing point and the intervening time since calibration increase.

The way to improvement has been pointed out. It consists simply in procuring suitable equipment and exercising vigilance and common sense.

GENERAL CONSIDERATION OF SUBJECTS OF INTEREST BROUGHT UP FOR DISCUSSION BY DELEGATES

Mr. THEILMANN. In Arizona we have the copper industry. There is a great deal of weighing in this and many people are interested. I will mention one difficulty. The copper companies resent interference with their equipment. I wish to know what other States have to inspect scales for smelters and mines. Our law gives me no specific method of attending to these. I would like to have the benefit of the experience of those from other States.

Mr. CRAIG. Mr. Chairman, I think that is a question that every State meets. Two local sealers from Luzerne County called on me a month ago and offered the complaint that anthracite coal mine owners refused to let them on the premises to test the scales used by the miners and themselves. The operators claimed that the inspectors had no authority under the law to test those scales, inasmuch as the inspector was authorized to test all scales or instruments or devices used in the weighing of commodities sold or to be sold, and that this transaction between the operators and the union did not come within the language of the act.

If you can not get a law passed by your legislature authorizing you to test the scales under any conditions, of course, you will have trouble. You must get such a law. The trouble between your department and the smelters is just the same as with us. I instructed the two inspectors to go back and get their county commissioners to back them up. I told them that if they have not authority under the law then it is up to the union to go to the legislature and get a law.

Mr. THEILMANN. There is a clause in our law which says that the State inspector shall have and hold general supervision of all scales, etc., used, sold, etc., in the State. I took the position that no one can supervise anything unless he looks at it and inspects it, so while these people said "If you inspect it you do it over our protest," I reminded them of the fact that the protest was the beginning of interference and to step aside. Then after the scale was inspected the question came up as to whether they would pay the fee. I said "That is a matter of collection; I shall present you the bill and then the attorney for the State will collect it." Up to the present time we have collected all excepting a few. I think there are a few still pending.

Mr. BARR. In Ohio we have a number of coal and slate mines. Each district has a manager and he has the power to test the mine scales. He carries two 50-pound weights, and in my opinion two 50-pound weights on a 5,000-pound scale is a poor test.

I have another matter, Mr. Chairman, which I believe is of very great interest to every State in the Union. For the past five or six years I have taken it upon myself to reweigh flour in paper bags, and particularly bags of one-eighth-barrel capacity. I have found a shortage exceeding the tolerance allowed in many instances. In some cases the shortage has reached $1\frac{1}{2}$ pounds in a 24-pound bag. In our State the usual mode of procedure is that the retailer may be held responsible for selling that bag unless he can show a contract guaranteeing him the weight of his bags. Then, the mode of procedure is to notify the commissioner of the shortage and he gets in touch with the feed man, but time elapses from the time the shortage is discovered until the feed man gets around. It struck me as a matter of importance that the conference should consider at the next conference, and I wish each weights and measures man would take upon himself the matter of reweighing bags of flour and find if there is not some method of eliminating the evil. Flour is a commodity used by everyone; it is not a luxury.

The ACTING CHAIRMAN. It will be necessary now to postpone the program until after lunch, inasmuch as the delegates will be received by the President of the United States at 12.30 o'clock.

(At this point a motion to adjourn was made and seconded, the question was taken, and the motion was agreed to.)

(Thereupon, at 12 m., the conference took a recess to attend the reception by the President of the United States at the White House at 12.30 p. m. and to reconvene at 1.45 o'clock p. m.)

**SEVENTH SESSION (AFTERNOON OF THURSDAY, MAY
28, 1925)**

The conference reassembled at 1.50 o'clock p. m. at the Raleigh Hotel, I. L. Miller, first vice president, in the chair.

**REPORT OF COMMITTEE ON RESOLUTIONS, PRESENTED BY
GEORGE WARNER, CHAIRMAN**

The first resolution is as follows:

RESOLUTION OF APPRECIATION TO THE SECRETARY OF COMMERCE

Whereas the honorable Secretary of Commerce, Herbert Hoover, has given freely of his time and attention to the weights and measures cause and has by forceful and instructive addresses given added inspiration to the delegates, thereby assisting them to give their various States higher economic standards as well as higher public morals: Therefore be it

Resolved, That this conference express its thanks and appreciation to Secretary Hoover for his helpful address at this conference.

(The resolution was duly adopted.)

Mr. WARNER. The next resolution is as follows:

**RESOLUTION OF APPRECIATION TO THE DIRECTOR AND STAFF OF THE
BUREAU OF STANDARDS**

Whereas the great success of this conference has been mainly due to the able and consistent efforts of Director George K. Burgess and his assistants from the Bureau of Standards; and

Whereas these annual conferences furnish the most successful means whereby the full cooperation given by the Bureau of Standards to the various States can be obtained: Therefore be it

Resolved, That this conference extend to Director Burgess and his able assistants its appreciation and thanks for their services so generously given.

(The resolution was duly adopted.)

Mr. WARNER. The next resolution is as follows:

RESOLUTION OF APPRECIATION TO MANUFACTURERS, OFFICIALS, EXECUTIVES, AND OTHERS

Whereas various manufacturers, officials, executives, and others kindly prepared and delivered interesting papers and addresses on important and timely subjects to the conference: Therefore be it

Resolved, That the delegates and guests in conference assembled extend to each of these gentlemen sincere thanks and appreciation for the excellent presentation of the subjects assigned to them.

(The resolution was duly adopted.)

Mr. WARNER. The next resolution is as follows:

**RESOLUTION REQUESTING THE BUREAU OF STANDARDS TO CONSIDER THE
PRACTICABILITY OF A WEIGHTS AND MEASURES CORRESPONDENCE
COURSE**

Whereas the Eighteenth National Conference on Weights and Measures of the United States has received several requests relative to a correspondence

course of practical nature for the benefit of the State, county, and city officials: Therefore be it

Resolved, That this conference request the Bureau of Standards to consider the practicability of such a course and report to the next conference.

(A motion was made and seconded that the resolution be adopted.)

Mr. MARONEY. Mr. Chairman, would this course be in the nature of the courses of the Scranton school, starting in from the primary and continuing to the finished course, or would the official write the bureau only for information on some specified subject in which he was interested?

Mr. WARNER. I do not think there was any idea of having the bureau conduct a regular correspondence course.

Mr. MARONEY. I did not assume that that would be the case. What I was getting at is this: I believe this conference has grown too far away from the field men; we are getting too technical for perhaps 75 per cent of the attendants at this conference. In my opinion, what the field men need and want is mechanical instruction on different types of weighing and measuring devices, and I believe that will do more good both to the industrial concerns and scale manufacturers and the inspectors than the reading of technical papers in conference. However, it occurs to me that classes might be arranged to consider the mechanical end and then the conference annually could give consideration to the theoretical end.

Mr. WARNER. I think the committee had in mind that this resolution would give the Bureau of Standards an opportunity to study the question and determine how far they could go along the lines suggested.

(The resolution was duly adopted.)

Mr. WARNER. The next resolution is as follows:

RESOLUTION IN MEMORY OF HUGH J. HEALEY

Whereas the Almighty, in His wisdom and judgment, through the hand of death, has taken from our midst Deputy Sealer Hugh J. Healey, one of the most able and efficient weights and measures officials of the State of Massachusetts, whose lovable traits and splendid qualifications in general had endeared him to all with whom he came in contact; and

Whereas through his death his loving wife has lost a devoted husband and his children a loving and kind father and his many friends a true and devoted companion: Therefore be it

Resolved, That we, the weights and measures officials of the United States, in conference assembled at Washington, D. C., do hereby express our deepest sorrow and extend to his wife and family our heartfelt sympathy in this the hour of their sad bereavement; and be it further

Resolved, That a copy of these resolutions be suitably penned and forwarded to his widow.

(This resolution was duly adopted.)

Mr. WARNER. The next resolution is as follows:

RESOLUTION IN MEMORY OF HENRY A. PEABODY

Whereas in the death of Henry A. Peabody, of Littleton, N. H., in the fall of 1924, the State of New Hampshire lost a valuable servant who had been associated with the weights and measures department since its beginning, and who had attended several of the meetings of this conference and was greatly interested in the work of his department, and whose loss will be greatly felt by the State and all those with whom he was associated: Therefore be it

Resolved, That this conference express its sympathy to his widow and that a copy of these resolutions be suitably penned and forwarded to her.

(The resolution was duly adopted.)

Mr. WARNER. The next resolution is as follows:

RESOLUTION IN MEMORY OF WILLIAM B. M'GRADY

In view of the passing of William B. McGrady, of the bureau of standards of the Commonwealth of Pennsylvania and first vice president of the Seventeenth Annual Conference, the members of the Eighteenth National Conference assembled in Washington, D. C., May 25 to 28, 1925, desire to express their profound sorrow in the loss of a loyal and valuable associate in the cause of weights and measures.

Among the weights and measures officials of America there was no one more conscientious and faithful in the performance of his duties than William B. McGrady. In his home State he saw the vital need for protecting the interests of the buyer and seller in the purchase or sale of commodities by weight or measure, and, due principally to his interest and active work, the legislature of the Commonwealth of Pennsylvania enacted its serialization law, one of the most progressive steps in weights and measures work.

Coupled with a strong bent for his life's work, William B. McGrady possessed a most lovable character. He typified in his daily life those qualities so essential for the promotion of the happiness of mankind. He was interested in and loved his fellowman, and because of this wonderful trait in his character it was impossible for one to come in contact with William B. McGrady and not reciprocate that interest and love.

In his death we, his associates, have lost a loyal, valued friend and co-worker, the weights and measures world an invaluable worker, and his family a devoted husband and father: Therefore be it

Resolved, That in order that a permanent record be made of William B. McGrady's activities in promoting the cause of weights and measures and of our personal sorrow at his passing, this resolution be spread upon the minutes of this conference and a copy be sent to his bereaved family.

(The resolution was duly adopted.)

Mr. WARNER. The next resolution is as follows:

RESOLUTION IN MEMORY OF COL. JOHN W. RICHARDSON

Whereas the Great Master, who weighs and measures men and worlds alike, has seen fit to take from our midst our dear beloved friend and associate, Col. John W. Richardson, who probably was one of the oldest in service of the sealers of this country, having been appointed as State sealer of Virginia in 1897, which position he occupied until the time of his death December 18, 1924; and

Whereas the State of Virginia has lost a valuable and true servant, whose lovable disposition and friendly nature made him most highly esteemed by all who knew him: Therefore be it

Resolved, That we, the weights and measures officials of the United States, assembled in conference at Washington, D. C., do hereby express our deepest sorrow and extend to his family our heartfelt sympathy in this their sad bereavement; and be it further

Resolved, That a copy of these resolutions be sent to the Hon. E. Lee Trinkle, Governor of Virginia.

(The resolution was duly adopted.)

Mr. WARNER. The next resolution is as follows:

RESOLUTION IN RELATION TO METHODS OF SALE OF ICE CREAM

Resolved, That owing to the fact that there was but little discussion of the papers on the subject "Shall ice cream be sold by weight?" this subject be made a special order of business at the Nineteenth National Conference to be held in 1926; and be it further

Resolved, That a committee be appointed to gather data for the purpose of presenting same to the next conference as a possible solution of the subject

now confronting the weights and measures officials, manufacturers, and retailers; and be it further

Resolved, That this be one of the subjects recommended to be placed on the programs of State conferences during the coming year and to be discussed with industry and with the consumers of their respective communities, in accordance with the suggestion made by our president in his opening address to this conference.

(The resolution was duly adopted.)

REPORT OF TREASURER, GEORGE F. AUSTIN

MAY 28, 1925.

GENTLEMEN: I herewith submit my report as treasurer for the year ending May 24, 1925:

Receipts:

Balance on hand May 24, 1924.....	\$132. 67
Received through fees of delegates.....	94. 00
Received, account Doctor Stratton memorial.....	96. 00

Total receipts.....	322. 67
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Disbursements:

Ralph W. Smith, printing.....	\$5. 00
Page at conference.....	5. 00
United Cigar Co., cigars for stenographer.....	5. 00
Brownley's confectionery for typists.....	10. 00
F. S. Holbrook, secretary, for bills paid incidental to the Seventeenth Annual Conference.....	149. 72

Total disbursements.....	174. 72
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Balance on hand May 24, 1925.....	147. 95
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Respectfully submitted.

GEORGE F. AUSTIN, *Treasurer*.

The ACTING CHAIRMAN. Gentlemen, you have heard the report of the treasurer.

(A motion was made and seconded that the report of the treasurer be accepted, the question was taken, and the motion was agreed to.)

REPORT OF COMMITTEE ON NOMINATIONS, PRESENTED BY WILLIAM F. CLUETT, CHAIRMAN, AND ELECTION OF OFFICERS

Mr. Chairman, your committee on nominations respectfully recommends the following members of the conference to act as officers and members of the executive committee for the ensuing year:

President, George K. Burgess; first vice president, Thomas F. Egan; second vice president, George Warner; secretary, F. S. Holbrook; treasurer, George F. Austin; members of the executive committee, all of the officers ex officio, R. F. Barron, Fred Benjamin, W. F. Cluett, William A. Dalziel, P. R. Edler, J. H. Foley, William Foster, William F. Goodwin, J. J. Holwell, T. F. Mahoney, E. J. Maroney, I. L. Miller, G. B. Nebinger, W. A. Payne, G. M. Roberts, A. W. Schwartz, W. F. Steinel, L. P. Strong, W. F. Swoger, and H. A. Webster.

(Signed)

W. F. CLUETT, *Chairman*,
W. F. GOODWIN,
P. R. EDLER,
G. M. ROBERTS,
C. B. GRAHAM,
Committee on Nominations.

The ACTING CHAIRMAN. I believe it is customary in most organizations to call for nominations from the floor, if there are any for any of these offices.

(A motion was made and seconded that the nominations be closed and that the secretary be instructed to cast the ballot of the conference for all of these nominations; the question was taken, and the motion was agreed to.)

(Accordingly, the secretary cast the ballot of the conference for the officers and members of the executive committee, as nominated by the committee on nominations, and they were declared duly elected.)

The ACTING CHAIRMAN. Is there anything in the way of unfinished business to come up?

Mr. DALZIEL. Reverting to the discussion of this morning about paper sacks of flour and the leakage from them, I may say that in our country we use the cloth sack, and in our department we have a tolerance of $\frac{1}{2}$ pound on a 49-pound sack of flour. If found short more than $\frac{1}{2}$ pound, we make the miller fill up the sacks and we have found that is the quickest way to make it right. In one mill there were found 1,400 bags that were about $\frac{1}{2}$ pound short, and the inspector made them open them, fill them, and sew them up again. That is much better than making them pay a fine. We found that the $\frac{1}{2}$ -pound tolerance meets the approval of the manufacturers and consumers.

QUALITY OF COAL

Mr. ESTES. Mr. Chairman, I would like to know the experience of other sealers in the matter of complaints of the poor quality of coal and just how these cases were handled.

Mr. MARONEY. In the case of complaints as to the quality of coal I do not think the weights and measures officer has any authority to take action. The simplest way for the purchaser to avoid difficulties of this kind is to buy on specifications which prescribe the permissible amounts of slate, ash, etc., and the required number of British thermal units. This plan is feasible for the purchaser of large amounts, but could not, of course, be adopted by the ordinary householder.

Mr. MUTTER. Mr. Chairman, I would like to state that I took it upon myself to write to the Bureau of Mines, Washington, D. C., on this matter. My attitude was that the coal should be inspected at the source and not all over the country. I was advised in reply that my idea was impracticable for the reason that there were over 7,000 mines in the United States; also that the Bureau of Mines does not countenance a visual inspection, but believes in inspection by adequate machinery and good men, and that with this character of inspection my plan would require a force of between 20,000 and 25,000 men throughout the country. They are now working on a plan to take care of the inspection of coal at the points of largest distribution. This they claim will take time, but that is as far in the matter as anyone has gone up to now.

The ACTING CHAIRMAN. It seems to me that the question Mr. Estes asks is one purely of quality and not one of weights and measures law at all. I do not believe it could be handled under any weights and measures laws that I have had any dealing with.

Mr. HOLBROOK. The sixteenth conference passed a resolution in relation to this matter two years ago.

Mr. SWEENEY. Mr. Chairman, formerly there was a great deal of inferior coal in Massachusetts, and the legislature in 1923 enacted a law the substance of which is to empower the department of public health, local boards of health, the director of standards, and local sealers of weights and measures, or their representatives, to enter any place where coal is stored or kept for sale and any railroad track or car or any vehicle used for its conveyance and inspect said coal or take samples for analysis or inspection. Under this law local sealers became very active, and at last we brought about a condition resulting in a better quality coal being shipped into the State.

Mr. CLUETT. Mr. Chairman, in Chicago we have a coal ordinance which provides that where two or more kinds of coal of superior and inferior quality are delivered on the same load the bill of lading shall show the percentage in which it was mixed. However, the difficulty of definitely establishing grades and varieties makes prosecutions almost out of the question. The best we have been able to do is to bring the buyer and seller together on a settlement.

The ACTING CHAIRMAN. Is there anything else to be considered in the way of unfinished business?

The Chair at this time will appoint as the committee called for in the ice-cream resolution A. W. Schwartz, of New Jersey; George Warner, of Wisconsin; and William Foster, of Springfield, Mass.

The next item is new business. Is there any new business to come before the conference?

It would seem that we have reached the end of our program.

I think that all of you will agree with me that the session this afternoon has the largest attendance that has ever been present in the afternoon of the last day. I had thought we would have only a handful, but we have a splendid representation. It is mighty fine the way the delegates and representatives have stayed with the conference.

Mr. MARONEY. Mr. Secretary, I move you, sir, that a rising vote of thanks be extended to our efficient presiding officer in appreciation of his services throughout the conference.

Mr. HOLBROOK. I am very glad to put that motion and ask that all in favor of the motion please rise.

(The entire conference rose.)

The ACTING CHAIRMAN. I want to thank you gentlemen for your courtesy. If there is nothing else to consider a motion to adjourn is in order.

(A motion to adjourn was made and seconded, the question was taken, and the motion was agreed to.)

(Thereupon, at 2.45 o'clock p. m., the Eighteenth National Conference on Weights and Measures adjourned sine die.)