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WEIGHTS AND MEASURES IN CONGRESS

Historical Summary Covering the Period of the Continental Congress to and Including the Adoption of the Joint Resolutions of 1836 and 1838

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WEIGHTS AND MEASURES IN CONGRESS[1]

By Sarah Ann Jones

ABSTRACT

This paper presents a detailed account of the steps taken to secure uniformity in weights and measures in the United States. It is an historical account of the various plans and proposals made in or to Congress on this subject, based on actual records of Congress and other original documents, and culminating in the passage of the joint resolutions of Congress of 1836 and 1838.

The most important plans submitted on this subject were those of Thomas Jefferson and John Quincy Adams. Neither plan was adopted, but the reports of Jefferson and Adams have great historical and technical value for students in this field. The first act of Congress relative to establishing uniformity in weights and measures was the Surveyor Act of 1799, but since no standards had been adopted, this legislation was not put into effect at the time of its passage.

The first act of Congress to be put into effect promptly after passage was the Mint Act of 1828 adopting the troy pound and providing for uniformity in the weight of the coins of the United States. After the passage of this act, the work of securing uniformity in weights and measures was seriously begun. This work finally resulted in the construction and adoption of standards as provided in the joint resolutions of 1836 and 1838.

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[1] This paper includes the subject matter used in a thesis submitted to the faculty of the division of library science of the George Washington University in partial fulfillment of the requirements for the degree of master of arts in library science. Two copies of this thesis are on file at the university library.

I. INTRODUCTION

The science of weighing and measuring has become so exact that experts in this field are able to weigh to one part in a billion or to talk and work to a millionth of a second or a billionth of an ampere.

Testing machines which can apply tensile loads up to a million pounds and compressive loads of 10 million pounds are now in use. They accurately measure loads up to a thousand tons or the force required to crush an egg or to break a horsehair.

Means have been devised to rule 50,000 or more lines within 1 inch, straight and parallel, exact to a millionth of an inch. Such a ruled surface has the power to analyze a ray of light from a star or atom, to tell its composition, and to disclose its structure.

Master gages, true to size within one-millionth of an inch, have been made.

Temperatures ranging from absolute zero (459° below zero Fahrenheit) to temperatures hotter than the surface of the sun (10,000° Fahrenheit) can be measured.

Countless other achievements have been made possible because of the exactness of the modern science of weighing and measuring.

The leading countries of the world have adopted certain standards for weighing and measuring, and international cooperation in this field has been established.

In the United States, the National Bureau of Standards is the custodian of the standards which govern all weighing and measuring. These standards were adopted by the Treasury Department for use in the customhouses and were authorized by joint resolution of Congress in 1836. Copies of these standards were subsequently furnished to the Governors of the States.

This paper gives a documentary, historical account of the events leading up to the joint resolution of 1836 on weights and measures and mentions other significant dates in the history of weights and measures in the United States, based upon official documents and actual records of Congress. References to this material have been brought together for the first time.

Acknowledgment is made of previous work done in this connection by the late Louis A. Fischer, the first Chief of the Division of Weights and Measures at the National Bureau of Standards. In his address to the first conference on weights and measures of the United States, held in Washington, D. C., 1905, Mr. Fischer gave a short account of the steps taken to secure Nation-wide uniformity in standards of weight and measure in the United States. He did not, however, go into detail as to the proposals made in Congress and the action taken on them. Mr. Fischer's address, entitled "History of the Standard Weights and Measures of the United States", was printed in Bulletin of the Bureau of Standards, volume 1, number 3 (1904–5), and in the Proceedings of the First Annual Conference on Weights and Measures of the United States, 1905, Miscellaneous Publication M4. It has since been reprinted as Scientific Paper S17, later superseded by Miscellaneous Publication M64.

In the preparation of this paper, the records of the Continental Congress and of the Congress of the United States, and other pertinent records, have been studied and abstracted. A bibliographical description of this source material is given on page 16.

II. EARLY PROVISIONS FOR UNIFORMITY IN WEIGHTS AND MEASURES

Early settlers of this country brought with them such standards of weight and measure as were in use in the countries from which they came. Consequently, there was little or no uniformity in their standards. They were able, however, to carry on commercial relations with one another for a long time. But as the settlements grew, and different customs and usages were introduced, the growing need for uniform standards was felt.

The leaders of the country provided for this need when they wrote the Articles of Confederation, of which article 9, paragraph 4, reads as follows: "The United States in Congress assembled shall also have sole and exclusive right and power of regulating the alloy and value of coin struck by their own authority, or by that of the respective States; fixing the standard of weights and measures throughout the United States." This power was transferred to Congress by the Constitution of the United States, article I, section 8, paragraph 5 of which reads as follows: "The Congress shall have power . . . To coin money, regulate the value thereof, and of foreign coin, and fix the standard of weights and measures."

III. CONSIDERATION OF WEIGHTS AND MEASURES IN THE CONTINENTAL CONGRESS

Consideration was given to this subject by the Continental Congress on April 4, 1783, when a committee was appointed, consisting of Alexander Hamilton, delegate from New York, and James Madison of Virginia, "To report the proper arrangements to be taken in consequence of peace." The object of this committee was to provide a system for foreign affairs, for Indian affairs, for military and naval peace establishment, and also to carry into execution the regulation of weights and measures, and other articles of the Confederation not attended to during the war. This committee apparently did not make a report [1].[1]

The first motion made in the Continental Congress on this subject was on August 19, 1785, by Rufus King, and seconded by William Cumming: That the board of treasury report an ordnance fixing the standards of weights and measures throughout the United States of America. No records were found showing any action on this motion [2].

IV. EARLY DISCUSSION IN CONGRESS

President Washington called the attention of Congress to the importance of this matter in his first message, on January 8, 1790, in which he stated: "Uniformity in the currency, weights, and measures of the United States, is an object of great importance, and will, I am persuaded, be duly attended to" [3].

On motion of Representative William Smith, the House went into a Committee of the Whole on the President's speech. Representatives Abraham Baldwin and William Smith offered a resolution to the effect that so much of the speech of President Washington as related

[1] The figures given in brackets in the text correspond to the numbered references at the end of this paper.

to the establishment of a uniformity in the currency, weights, and measures be referred to a select committee. The part of the resolution relating to weights and measures was finally referred to Thomas Jefferson, then Secretary of State, with a request that he prepare and report to the House a proper plan for establishing uniformity in the weights and measures of the United States [4].

V. THOMAS JEFFERSON'S REPORT

It is interesting to note that both the French and English Governments were considering the subject of uniformity in weights and measures at the same time it was being considered by the United States Government.

Thomas Jefferson, who had previously been requested to prepare a plan for establishing uniformity in weights and measures, submitted his report on July 13, 1790. In his letter of transmittal to the Speaker of the House, Jefferson stated that just as he was ready to submit his report, he received on June 15, 1790, a printed copy of a proposition made by the Bishop of Autun to the National Assembly of France on the subject of weights and measures; and 3 days later he received through the channel of the public papers, the speech of Sir John Riggs Miller of April 13, 1790, in the House of Commons on the same subject. Jefferson further explained that after reading the French and English propositions he thought it advisable to make some changes in his report. He had proposed the latitude of 38° as that which would fix the United States standard because it was the medium latitude of the United States, but the proposition before the National Assembly of France to take 45° as being a middle term which might unite the nations of both hemispheres, seemed to Jefferson so well chosen that he too suggested 45° as the latitude for the standard seconds-beating pendulum from which the unit of length was to be derived. This, of course, necessitated changing all of the calculations previously made by Jefferson, and accounted for the delay in submitting his report.

Jefferson submitted two plans for establishing uniformity in the currency and weights and measures of the United States. The first plan was "to define and render uniform and stable the existing system; * * * to reduce the dry and liquid measures to corresponding capacities by establishing a single gallon of 270 cubic inches and a bushel of 8 gallons, or 2,160 cubic inches * * *." The second plan was "to reduce every branch to the decimal ratio already established for coin, and thus bring the calculations of the principal affairs of life within the arithmetic of every man who can multiply and divide plain numbers" [5].

The report of Jefferson was laid before the House by the Speaker on July 13, 1790. It was ordered to lie on the table [6].

President Washington, in his second message to Congress, December 8, 1790, called the attention of Congress to this subject with the following statement: "The establishment of the militia, of a mint, of standards of weights and measures, of the post office and post roads, are subjects which (I presume) you will resume of course, and which are abundantly urged by their own importance" [7].

A few days later, December 28, 1790, the report of Jefferson was communicated to the Senate, and a committee composed of Senators

Ralph Izard, James Monroe, Robert Morris, John Langdon, and Philip John Schuyler, was requested to study the report and to make suggestions as to what should be done thereon [8].

On March 1, 1791, Senator Izard made the following report from the committee referred to above:

> As a proposition has been made to the National Assembly of France for obtaining a standard of measure which shall be invariable, and communicable to all nations, and at all times; as a similar proposition has been submitted to the British Parliament, in their last session; as the avowed object of these is, to introduce a uniformity in the measures and weights of the commercial nations; as a coincidence of regulation, by the Government of the United States, on so interesting a subject, would be desirable, your committee are of the opinion, that it would not be eligible, at present, to introduce any alteration in the measures and weights which are now used in the United States [9].

This report was accepted, and the matter rested there, although President Washington, on October 25, 1791, in his third message to Congress, repeated his recommendations in the following words: "I shall content myself with a general reference to former communications for several objects * * *. There are, however, some of them of which I cannot forbear a more particular mention * * *. A uniformity in the weights and measures of the country is among the important objects submitted to you by the Constitution and, if it can be derived from a standard at once invariable and universal, must be no less honorable to the public councils, than conducive to the public convenience" [10].

A week later, November 1, 1791, the Senate ordered Senators Izard, Monroe, and Langdon to be a committee to take into consideration the subject of weights and measures, and to report their opinion thereon [11].

On April 4, 1792, Senator Izard reported from the committee referred to above. It was ordered that the report be printed for the use of the Senate [12].

On the following day, April 5, 1792, the report referred to above, was read. It contained the following recommendations:

> That the standard for the weights and measures of the United States be a uniform cylindrical rod of iron of such length as in latitude 45 degrees in the level of the ocean, and in a cellar of uniform natural temperature, shall perform its vibrations in small equal arcs, in one second of mean time.—That the President of the United States be requested to have such a standard rod provided; that it be prepared with all accuracy which the importance of the object merits.—That the expenses of the measures he shall adopt be defrayed by the public.—That the standard rod, so to be provided, shall be divided into five equal parts, one of which, to be called a foot, shall be the unit of measures of length for the United States.—That the foot shall be divided into 10 inches.—That the measures of surface in the United States shall be made by squares of the measures of length, and in the case of lands, the unit shall be a square 100 feet on every side, to be called a rood.—That the unit of the measures of capacity in the United States be a cubic foot, to be called a bushel.—That the unit of weights of the United States be a cubic inch of rain water, to be called an ounce, and to be measured and weighed in a cellar of uniform natural temperature.

This was an entirely decimal system, the principal units being successively multiplied and divided by 10 to produce the variety of units considered necessary for commercial use. The system was substantially the second plan proposed by Jefferson. It was ordered that consideration of this report be postponed until the next session of Congress [13].

On Monday, December 3, 1792, the Senate again took up the weights and measures report submitted April 5, 1792, and after debate, ordered that further consideration be postponed until the following Thursday [14].

The report of the committee on weights and measures was accordingly brought before the Senate on December 6, 1792. A motion was made that the committee be requested to report a bill for rendering the weights and measures of the United States uniform and invariable, retaining in general the weights and measures in use at that time. Further consideration of the report was again postponed [15].

The report of April 5, 1792, was once more brought up in the Senate on December 17, 1792, but consideration thereof was again postponed, and the following resolution was offered:

> That the present measures of length be retained and fixed by an invariable standard; that the measures of surface remain as they are, and be invariable also as the measures of length to which they are to refer; that the unit of capacity, now so equivocal, be settled at a medium and convenient term, and defined by the same invariable measures of length, that the more known terms in the two kinds of weights be retained and reduced to one series, and that they be referred to a definite mass of some substance, the specific gravity of which never changes; and that a committee be appointed to bring in a bill accordingly.

After debate, it was ordered that consideration of this resolution be deferred until the following day [16].

On the following day, December 18, 1792, the Senate took up the motion made December 17, action on which had been postponed, and substituted a new motion. The new motion provided in part:

> That the units of weights and measures of the United States should be equal to certain weights and measures then in use.—That the standard be a uniform cylindrical rod of metal, of such length as in the latitude of 45 degrees, in the level of the ocean, and in a cellar of uniform natural temperature, shall perform its vibrations in small and equal arcs in one second of time, and which standard rod shall be divided into four hundred and eighty-nine equal parts.—That the unit of measures of length shall be a foot, equal in length to one hundred parts of the aforesaid rod.—That the measures of surface be made by squares of the measures of length; but in the case of land the unit shall be an acre.—That the unit of the measures of capacity shall be a bushel.

The records do not show that any action was taken on the above motion [17].

Three years elapsed before the attention of Congress was again called to the subject of weights and measures. On January 8, 1795, President Washington laid before Congress a communication from the Minister of the French Republic to the Secretary of State of the United States regarding the adoption by the United States of a system of weights and measures conformable to that lately adopted by France [18].

On the following day, January 9, 1795, the Senate ordered that 300 copies of the communications from the Minister of France be printed for the use of the Senate [19].

After the printing of the French report, the matter rested for almost another year. On December 24, 1795, the House appointed another select committee, consisting of Representatives Carter Bassett Harrison, John Samuel Sherburne, and Samuel Maclay, to consider that part of the report of the Secretary of State of July 13, 1790, and the message of the President of January 8, 1795, which related to weights and measures [20].

Representative Harrison submitted a report of the committee on April 12, 1796, which was read twice and referred to the Committee of the Whole [21].

The House formed itself into a Committee of the Whole on May 14, 1796, to consider the report of Representative Harrison's committee involving that part of Jefferson's report relating to weights and measures. The Committee recommended that the following principles be assumed in regulating the standards of weight and measure:

> That all measures of surface, capacity, and weight, ought to be regulated by measures in length.—That the unit of measures in length, and the unit of weights to be adopted as standards, ought not to vary in any sensible degree from the present foot now in use, and the present pound avoirdupois.—That the objections against assumed standards, on account of their being arbitrary, and always liable to be injured or lost, make it a matter worthy the attention of an enlightened Legislature to refer to some certain measure in length derived from an uniform principle in nature, more especially if it can be made to appear that reference may be had to such a measure, with sufficient certainty of uniformity, in the result of different experiments, and without much time, trouble, or expense, in making them.

It was stated that in order to carry out the first and second principles mentioned above, reference need only to be made to a very remarkable correspondence which was said to exist between the avoirdupois pound and the English standard foot.

In order to carry into effect the third principle, recourse ought to be had to the pendulum rod, vibrating seconds of mean time in a given place and in a known temperature, because it was thought that this would furnish a standard derived from a uniform principle in nature. The city of Philadelphia was suggested as the place to make the experiments.

The Committee offered a resolution to the following effect:

> That the President of the United States be authorized to employ such persons, of sufficient mathematical skill, as he should think most proper, for the purpose of making the following experiments, the result of which should be reported to Congress at their next session: To ascertain the length of a pendulum rod; to ascertain the weight of a cube of rain water; to ascertain the respective weights of the divisions of the pound, under the conditions set forth in the report.

After a long discussion, it was agreed by the Committee of the Whole that the experiments be made, and that $1,000 be appropriated to cover the expense of same, and a bill was ordered to be brought in to accompany this.

On May 16, 1796, Representative Harrison reported a bill entitled "An act directing certain experiments to be made to ascertain uniform standards of weights and measures for the United States", which was twice read, and ordered to be committed to a Committee of the Whole on the following day [22].

On May 18, 1796, on motion of Representative Harrison, the House went into a Committee of the Whole to discuss further the bill introduced 2 days before. Following the discussion, the bill was ordered to be engrossed for a third reading the following day [23].

On the following day, May 19, 1796, the bill was brought in and passed the House with little opposition [24]. It was sent to the Senate the same day. It was read, and ordered to a second reading on May 20, after which it was referred to Senators John Rutherford, Henry Tazewell, and Alexander Martin to consider and report thereon to the Senate [25].

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Senator Rutherford reported on May 31, 1796, that the above named committee ordered that the report be printed for the use of the Senate, and that consideration of the bill be deferred to the next session of Congress. The House was informed of this action on the same day [26].

Thus was Jefferson's report disposed of in Congress. No laws on this subject were enacted, but the discussion and plans referred to above, give historical evidence of the importance attached to the subject by Congress and the country at large and of the difficulties involved in enacting satisfactory legislation thereon.

VI. THE SURVEYOR ACT OF 1799

The number of resolutions which were sent to Congress for the next few years give testimony to the fact that the States literally begged Congress to adopt uniform standards of weights and measures so that commercial transactions could be made without confusion. Most of these resolutions were made in the form of memorials and were read to Congress by various members. The first of these resolutions was presented by Representative Joseph Leonard Tillinghast of Rhode Island on January 11, 1798 [27]. A committee was appointed on the following day, but no report was ever made [28].

Congress did, however, pass an act in 1799, ordering that the surveyor of each port of the United States should from time to time, and particularly on the first Monday of January and July in each year, examine and try the weights, measures, and other instruments used in ascertaining the duties on imports with standards to be provided each collector at the public expense for that purpose; and when disagreements and errors were discovered he should report the same to the collector and obey and execute such directions as he might receive for the correction thereof agreeably to the standards aforesaid.

This was the first act passed by Congress in regard to weights and measures, but due to the fact that no standards had ever been adopted, the legislation was not put into operation until about 35 years after its passage, when certain standards, which will be referred to later, were adopted by the Treasury Department [29].

VII. DISCUSSIONS IN CONGRESS 1804–21

For several years after the passage of this act, resolutions continued to be sent to Congress. Representative Caesar Augustus Rodney of Delaware introduced a resolution on February 14, 1804, calling the attention of Congress to the subject of weights and measures [30]. Consideration of his resolution was postponed to March 2, 1804, when a committee was appointed, but the matter rested there [31].

On December 10, 1806, Senator Samuel White presented the memorial of John Hays and others, citizens of Delaware, stating that the variety of weights and measures then in use in the United States was productive of much uncertainty and difficulty, and praying that Congress would take effective measures for the establishment of a uniform system. This resolution was also read, a committee appointed, but no report was made [32].

On January 7, 1808, Representative Henry Southard presented two resolutions of the legislature of the State of New Jersey relating to uniformity of weights and measures. These resolutions were read, a committee appointed, but no further action was taken [33].

Senator Samuel Smith of Maryland presented a resolution on March 7, 1810, from his State legislature asking Congress to use all proper means and exertions to procure the passing of a law establishing uniformity in weights and measures. No action was taken on this resolution [34].

This subject was not again considered in Congress until December 3, 1816, when President Madison in his message to Congress reminded that body that no provision had yet been made for the uniformity of weights and measures. He suggested that the decimal system proposed by Jefferson be adopted [35].

On the following day, December 4, 1816, Senator Nathan Sanford moved that a select committee be appointed to consider that part of the President's message as related to weights and measures [36]. Senator Sanford made a second motion, however, on December 6, 1816, to postpone the selection of a committee [37]. The selection of the committee was again postponed on motion of Senator Sanford on December 9, 1816 [38]. A committee was finally appointed on December 13, 1816, consisting of Senators Whittlesey Dana, Martin Davis Hardin, Jeremiah Morrow, Rufus King, and Benjamin Ruggles [39].

Senator Dana reported from the Committee on Weights and Measures on March 1, 1817. A resolution was offered in which it was requested that the matter be referred to the Secretary of State with instructions that he prepare a report to the Senate relative to the regulation of and standard for weights and measures, and relative to proceedings in foreign countries for establishing uniformity in weights and measures, together with such propositions relative thereto as might be proper to be adopted in the United States [40]. The Senate agreed to the resolution of Senator Dana on March 3, 1817 [41].

The House also continued to appoint committees. On motion of Representative John Linn, a select committee was appointed on January 8, 1818, to inquire into the expediency of establishing by law a standard of weights and measures. Representatives Linn, Timothy Pitkin, Adam Seybert, William Lowndes, and David Ogden were appointed to this committee [42].

On November 27, 1818, on motion of Representative Lowndes, a committee was appointed to inquire whether it would be expedient to make any amendment to the laws which regulate the coins of the United States and foreign coins. Representatives Seybert, Hugh Nelson, William Irving, and William Harrison were appointed to this committee, a reference to which will follow [43].

On motion of Representative Alexander Smyth, January 5, 1819, the Committee of Commerce and Manufacturers was instructed to inquire into the expediency of fixing the standards of weights and measures [44]. This committee, however, was discharged from further consideration of the subject on January 14, 1819 [45].

On the following day, January 15, 1819, on motion of Representative Thomas Newton, Jr., consideration of weights and measures was

turned over to the committee appointed on November 27, 1818, to inquire whether it would be expedient to make any amendment to the laws which regulate the coins of the United States and foreign coins [46].

Representative Lowndes, from the select committee of the House appointed on November 27, 1818, referred to above, having been instructed on January 15, 1819, to inquire into the expediency of fixing the standards of weight and measure, presented the committee report on January 25, 1819.

The report stated that the weights and measures in use in all the States had been derived from England; that the laws of the colonies before the Revolution showed evidence of uniformity, but since then no legislation on the subject had been made; that the tendency at that time was toward the more simple standards derived from the English. The report listed the standards in most common use in the United States at that time, and those which had been discarded. Reference was made to the fact that the situation had become more complicated because neither the metric system in France nor the system in common use in England was at that time well established, and since the States, independently of one another, had secured standards, they differed widely, and caused endless confusion in commerce between them.

This committee made the following recommendations:

> To adopt absolute standards conforming to the weights and measures in common use.—To obtain through a commission, to be appointed by the President, copies of the yard, the bushel, the wine gallon, and the pound supposed to conform to those in common use in the United States.—To preserve these standards and to distribute copies of them to the States.—To compare the length measure with the length of the seconds-beating pendulum, and also with that of an arc of the terrestrial meridian.—To connect them by the weight of a certain bulk of distilled water, and to define the bushel and the gallon by the weight of water which they contain.

This report was read and ordered to lie upon the table [47].

At the next session of Congress, Representative Robert Allen offered a resolution on December 13, 1819, to the effect that a committee be appointed to inquire into the matter of weights and measures. Whereupon, Representative Lowndes reminded him that he had presented his committee report at last session, and had not brought the matter up again because he thought it advisable to wait for the report of the Secretary of State, which the Senate had requested him to prepare on March 3, 1817. Representative Allen withdrew his motion [48].

VIII. JOHN QUINCY ADAMS' REPORT

On February 22, 1821 the Speaker laid before the House a letter from John Quincy Adams, Secretary of State, transmitting his classic report on the subject of weights and measures. The letter and report were read and ordered to lie upon the table [49].

The report of Adams, like that of Jefferson, was very elaborate, and contained a vast amount of information on the subject of weights and measures in general. Adams went into the history of the subject also, giving a great deal of information about the standards used in

various countries, and what he called the natural reasons for their adoption. His report also contained documentary evidence of the confusion caused by the lack of uniform standards in the United States. He made a compilation of the laws which existed at that time in the various States on this subject, showing the difference in the standards used, and pointing out the confusion brought about by these differences.

The most important recommendations offered by Adams were: "To fix the standard with the partial uniformity of which it is susceptible for the present, excluding all innovations. To consult with foreign nations for the future and ultimate establishment of universal and permanent uniformity" [50].

On the following day, February 23, 1821, President Monroe communicated the report of Adams to the Senate. The report was read and 600 copies of it ordered to be printed, 500 of which were for the use of the Senate and 100 for the Department of State [51].

Congress did not consider this subject again until December 26, 1821. On motion of Representative Lowndes, the report of Adams was referred to the following committee: Representatives Lowndes, John W. Taylor, Ezekiel Whitman, Alexander Smyth, and John Russ.

Representative Lowndes reported for the committee on March 11, 1822. The committee agreed that Mr. Adams had given so comprehensive a view of the origin and history of the weights and measures in use at that time in the United States, and so full an examination of the different proposals which had been made for their improvement, that it was deemed scarcely necessary to do more than to submit the resolutions which they thought expedient that Congress should pass at that time. The object of the resolutions was to "render uniform and stable the measures and weights which we at present possess."

The committee submitted the following resolutions:

> That the President of the United States be requested (if the consent of the Government of Great Britain shall be given thereto) to cause to be traced on a rod of platina, the yard of the year 1601, which is kept in the British Exchequer.—To cause to be made of platina a pound, of the weight in vacuo of the English avoirdupois pound.—And that he also cause to be made, of whatever material he shall deem best for standards of those measures, a vessel of the same capacity as the standard Winchester bushel, and also a vessel of the same capacity as the standard wine gallon of England.—That the President be requested to cause to be made, for distribution among the States and territories, and for the purpose of verifying the weights and measures used therein, models of the yard, on which shall be traced its divisions of feet and inches; models of the bushel, half bushel, quarter bushel or peck, thirty-second part of a bushel or quart; models of the wine gallon, of the wine quart and pint; models of the pound, half pound, quarter pound, of the sixteenth of a pound or ounce; of the seven thousandth part of a pound or grain; models of the penny-weight or twenty-four grains, of the scruple or twenty grains; and of the apothecaries dram or sixty grains; models of the weight of twelve and a half pounds, of twenty-five pounds, of fifty pounds, and of one hundred pounds.—That these models of weights and measures be formed with the utmost practical exactness from the weights and measures procured under the authority of the foregoing resolution.

This in effect was a recommendation that the President be requested to obtain for the use of the different States and Territories duplicates of the English standards. No action was taken on above resolutions [53].

IX. RESOLUTION OF 1826 REQUESTING THAT EXPERIMENTS BE MADE

Four years elapsed before Congress again considered the subject of weights and measures. On May 16, 1826, Representative William Czar Bradley, from the House Committee on Weights and Measures, reported the following joint resolution:

Resolved: That Professor James Renwick, of New York, be employed, under the direction of the President of the United States, to repeat the experiments heretofore made, and also to make further experiments, for the purpose of ascertaining the true length of the pendulum, vibrating sixty times in a minute, at the city of New York, and also at the city of Washington, and to compare the length thereof with such measures, now in possession of this Government, as will best show the proportions between the length of such pendulums and the standard yard recently adopted by the British Government, and to make report of the results to Congress, at their next session; and that there be appropriated, for that purpose, a sum not exceeding seven hundred dollars, to be paid out of any money in the Treasury, not otherwise appropriated.

The English had established the standard yard of 1760 as the one from which all their measures of length, weight, and capacity, were to be derived, and had also declared the relative proportion of that standard to the length of a pendulum, vibrating seconds in London. The length of the English pendulum had been determined with great care by the apparatus of Captain Kater. The pendulum of Captain Sabine, who had also done important work in this connection, had been taken to New York, and the length had been determined in New York by Captain Sabine and Professor Renwick of Columbia University. They thought that the errors in observations did not affect the accuracy of the result "to the extent of one-tenth of a vibration, or one ten-thousandth part of an inch in the length of the pendulum." Representative Bradley thought that if the experiments were repeated in Washington, a complete chain of them might be formed between the cities of London, New York, and Washington, subject to no sensible error. He urged speedy passage of the resolution, as the proposed experiments would lay the basis for legislation on this subject.

The resolution was read twice, not passed, but referred to a Committee of the Whole on the state of the Union.

Representative Bradley then moved that the House resolve itself into a Committee of the Whole to consider the resolution. The motion was agreed to, and a lengthy debate followed.

Representative Bradley thought it appropriate to state the course the committee had pursued in the investigation, and the objects they had taken into view in this matter. The first question considered by the committee was the extent of the evil of the existing standards of weight and measure, and the necessity for immediate legislation. The committee had carried on considerable correspondence with customhouses all over the country. Communications had been received from 80 of them. Mr. Bradley did not state the particular information received, except to say that the difference in standards in use in various parts of the country had caused great loss in revenue. It was estimated that the amount lost in revenue in 1 week would more than compensate the expense of establishing uniform standards.

The Committee then turned attention to the best way of remedying the evil, which could only be done by fixing a standard to which the weights and measures should be brought to conform. Mr. Bradley called to mind the fact that this matter had been considered many times in Congress, and the reports of Jefferson and Adams were again turned to for suggestions as to the best way of solving the problem. He referred also to the standards adopted by Great Britain and France. He favored those of the English, but was decidedly against the decimal system adopted by the French. The committee recommended the adoption of the English standards because they more nearly coincided with those in practice in the United States at that time. It was further recommended that the experiments with the pendulum be repeated both in New York and Washington, by Mr. Renwick, and thus lay at once the basis of legislation analogous, in this respect, to that of Great Britain.

Representative Taylor offered an amendment to the motion by striking out the part relating to the appointment of Mr. Renwick, and by inserting "some competent agent." His objection to the appointment of Mr. Renwick was made on the ground that the President should be left free in his choice of an agent. After some debate Representative Taylor's amendment was rejected, and the resolution was ordered to its third reading the following day, May 17, 1826 [54].

The records do not show that the resolution mentioned above came up for a third reading on May 17, 1826, or that the experiments were made as provided therein.

X. MINT ACT OF 1828 ADOPTING THE TROY POUND

The subject of weights and measures was not discussed again in Congress until May 6, 1828, when a bill "to continue the mint at the city of Philadelphia, and for other purposes", was introduced into the House by Representative Sergeant. The House thereupon went into a Committee of the Whole on this bill. Representative Sergeant explained that the principal provisions of the bill were to continue the mint at Philadelphia for an indefinite time, and to establish the troy pound of England as the standard weight for gold and silver in the United States. The Committee of the Whole reported the bill to the House without amendment, and it was finally approved on May 19, 1828. Section 2 of this act reads as follows:

> *And be it further enacted*, That, for the purpose of securing a due conformity in weight of the coins of the United States * * * the brass troy pound procured by the minister of the United States at London, in the year one thousand eight hundred and twenty-seven, for the use of the mint, and now in the custody of the Mint at Philadelphia, shall be the standard troy pound of the Mint of the United States, conformably to which the coinage thereof shall be regulated [56].

This act, known as the Mint Act of 1828, was the first act of Congress relative to the establishment of uniformity in weights and measures, which was effective in producing results.

The troy pound adopted under the Mint Act of 1828 was a copy of the British parliamentary troy pound of 1758, recognized and designated in 1824 as the imperial troy pound of Great Britain. It was procured in 1827 by Albert Gallatin, minister of the United States at London, and sent by special messenger to the Director of the Mint at Philadelphia.

The standard weight was of brass, the same material as the original, and was said by Captain Kater, who made the comparison, to be an exact copy of the original. The weight was enclosed in a casket under seal of the American legation at London, and was accompanied by a packet containing certificates by Captain Kater and Mr. Gallatin, testifying to its accuracy. The casket and accompanying packet remained under seal until President Adams arrived in Philadelphia on October 12, 1827, and verified the seal of Mr. Gallatin and other facts regarding the authenticity of the whole transaction [57].

XI. RESOLUTION OF 1830 AUTHORIZING COMPARISONS OF THE CUSTOMHOUSE STANDARDS

It will be recalled that on May 16, 1826, a resolution was offered in Congress to have certain experiments made in New York for the purpose of ascertaining the true length of the pendulum, and the committee to whom the question was referred reported that investigations had been made as to the standards used by the various customhouses. It was found that there was enormous loss in revenue because of the differences in standards used.

This state of affairs was called to the attention of Congress by Senator Woodbury on May 29, 1830, when he offered the following resolution:

Resolved, That the Secretary of the Treasury be directed to cause a comparison to be made of the standards of weights and measures now used at the principal custom-houses in the United States, and report to the Senate at the next session of Congress.

The motion was adopted by unanimous consent, and the Secretary of the Treasury was so instructed [58].

XII. ORDER OF 1832 BY THE SECRETARY OF THE TREASURY PROVIDING UNIFORM STANDARDS FOR CUSTOMHOUSES

The Secretary of the Treasury at the time the comparison of standards used in the customhouses was begun was S. D. Ingham. He delegated this work to Ferdinand Rodolph Hassler, who was at that time Superintendent of the Coast Survey. Mr. Hassler made his first report on March 3, 1831, which was transmitted to the President of the United States and to the Senate by Secretary Ingham. A more complete report was submitted by Mr. Hassler on June 20, 1832. Louis McLane was Secretary of the Treasury at this time, and in his letter of transmittal to the President of the Senate, Mr. McLane stated that Mr. Hassler's investigations showed that large discrepancies were found to exist among the weights and measures in use at the different ports. While some discrepancies were large and some small, the average value of the various denominations agreed fairly well with the weights and measures in use in Great Britain at the time of the American Revolution. Mr. McLane further stated:

It is, nevertheless, a serious evil, inasmuch as it produces inequalities in the duties levied at the different ports; and thus contravenes the spirit of the Constitution, which declares that all duties, imposts, and excises, shall be uniform throughout the United States. It is believed, however, that this department has full authority to correct the evil, by causing uniform and accurate weights and measures, and authentic standards, to be supplied to all custom houses.

The Secretary of the Treasury gave a broad interpretation to the resolution of May 29, 1830, as is indicated by the statement above, and instructed Mr. Hassler to proceed to the construction of the weights and measures to be supplied to the customhouses in order to assure uniformity in the customs. Preliminary to the construction of these weights and measures, it was necessary to select the units and prepare the standards. It was decided that the yard of 36 inches, the avoirdupois pound of 7,000 grains, the gallon of 231 cubic inches, and the bushel of 2,150.42 inches be adopted.

The brass bar made by Troughton of London for the Coast and Geodetic Survey and brought to this country by Hassler in 1813, was adopted as the standard of length. This bar was 82 inches long, and the standard yard selected was the one comprised between the twenty-seventh and the sixty-third inch marks. This was believed equal to the English standard yard at 62° Fahrenheit, although direct comparison with that standard had not been made.

The avoirdupois pound was derived from the troy pound of the mint. For this purpose, the avoirdupois pound was assumed to be 7000/5760 pounds troy.

The units of capacity selected were closer than any other to the average in use at that time in the United States. They were the wine gallon of 231 cubic inches and the Winchester bushel of 2,150.42 cubic inches.

After the adoption of the units referred to above, the work of constructing the weights and measures for the customhouses was begun in earnest. Hassler made progress reports to the Secretary of the Treasury over a period of several years. His letters are full of interesting statements about the work in general, and the difficulties encountered in the performance of so large and responsible a task are clearly shown [59].

XIII. RESOLUTION OF 1835 URGING COMPLETION OF STANDARDS

While Hassler and his assistants were working at feverish haste to complete the construction of the standards, a memorial was sent to Congress from businessmen of Philadelphia urging Congress to establish a standard of weights and measures. The memorial was referred to a committee of which Representative Horace Binny was chairman. Representative Binny reported from that committee on February 17, 1835. He reviewed previous action of Congress on this subject, and read extracts from Hassler's reports which he hoped would make Congress realize the confused state of affairs in commerical transactions. He offered the following resolution:

> *Resolved*, That it is highly expedient that the Treasury Department should complete, with as little delay as practicable, the fabrication of standards of weights and measures, for the supply of the different customhouses of the United States, upon the principles set forth in the reports of the Secretary of the Treasury to the Senate, on March 3, 1831, and June 20, 1832.

Representative Binny had obtained several letters and progress reports of the work which Hassler had written to the Secretary of the Treasury. These were read and made a part of the records of Congress, together with the above resolution [60].

XIV. JOINT RESOLUTIONS OF 1836 AND 1838

The resolution finally adopted at this time was the joint resolution, approved June 14, 1836, which reads as follows:

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Treasury be, and he hereby is, directed to cause a complete set of all weights and measures adopted as standards and now either made or in progress of manufacture for the use of the several custom-houses, and for other purposes, to be delivered to the governor of each State in the Union, or such person as he may appoint, for the use of the States, respectively, to the end that a uniform standard of weights and measures may be established throughout the United States [61].

The joint resolution of 1836 was supplemented in 1838 by a joint resolution of Congress, directing the Secretary of the Treasury to furnish balances to the States [62]. By 1838, the balances for the States were reported finished, and during the following year the weights for the customhouses were completed and delivered.

XV. CONCLUSION

In conclusion, it may be said that the period covered by this paper, 1775–1838, may be thought of as one of struggle and uncertainty in the history of weights and measures in the United States. There was serious diversity in the standards used by the various States, and the result was confusion in commercial transactions and loss of revenue to the Government. Notwithstanding these conditions, the early records show that the leaders of the country were slow to relinquish the standards then in use, even though they spent much time and serious thought as to what standards should be adopted.

With the completion and delivery of the standards of weight and measure (see fig. 1) as provided for in the joint resolutions of 1836 and 1838, there was at last established a ground work upon which a weights and measures structure, uniform throughout the country, could be erected. The legal basis having been laid down by these resolutions and by the Mint Act of 1828, it was then that the States began to proceed independently, but at the same time in reasonable harmony, to effect a practical control of this fundamental of Government—uniformity in the standards of weight and measure.

XVI. SOURCE MATERIAL

U. S. Continental congress.

Journals of the American congress from 1774 to 1788. In 4 volumes. . . . Washington: Printed and published by Way and Gideon, 1823.
4 v. 23½ cm (hereafter referred to as Journals of the American congress).

U. S. Continental congress.

Journals of the Continental congress, 1774–1789. Ed. from the original records in the Library of Congress . . . Washington, Govt. print. off., 1904–34.
31 v. front. (v. 9) facsims. (part fold.) 27 cm (hereafter referred to as Journals of the Continental congress).

U. S. 1st Congress, 1789–1791. House.

The Congressional register; or, History of the proceedings and debates of the first House of representatives of the United States of America: namely, New-Hampshire, Massachusetts, Connecticut, New-York, New-Jersey, Pennsylvania, Delaware, Maryland, Virginia, South-Carolina and Georgia. Being the eleven states that have ratified the Constitution of the government of the United States. Containing an impartial account of the most interesting speeches and motions;

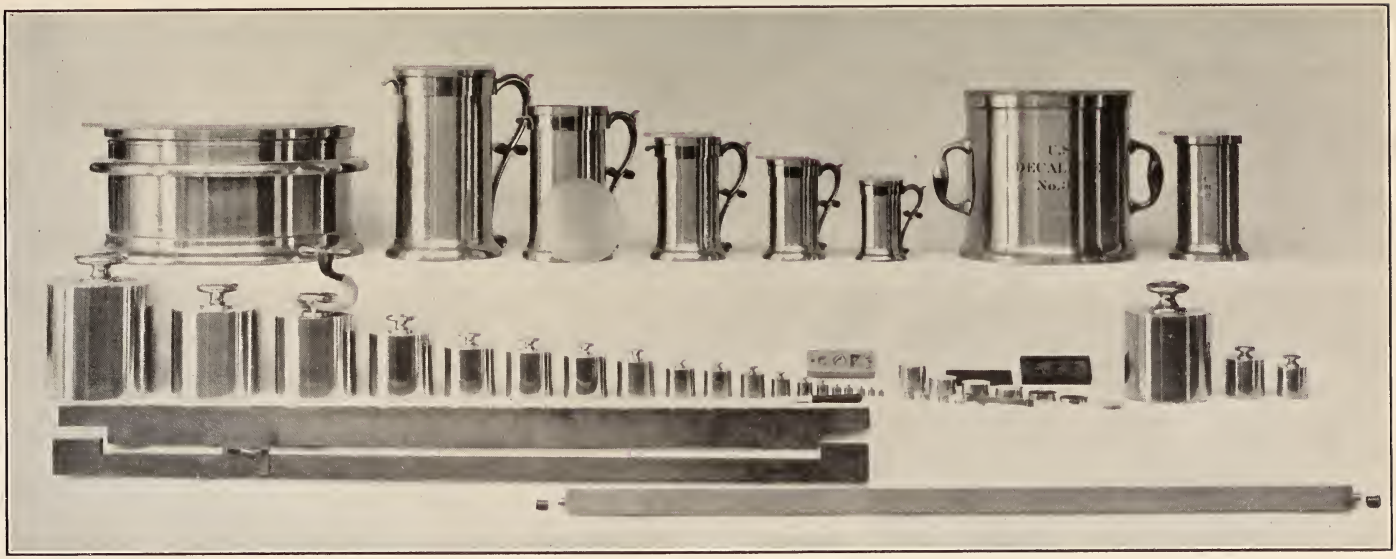

FIGURE 1.—*Standard weights and measures furnished by the Federal Government to the States.*

The standards of the customary weights and measures furnished to the States under authority of the Joint Resolution of Congress of June 14, 1836, comprised: 33 avoirdupois weights, from 50 pounds to 0.0001 ounce; 27 troy weights, from 1 pound to 0.0001 ounce; a yard measure with matrix; 5 liquid capacity measures, from 1 gallon to ½ pint; and a half-bushel dry capacity measure.

Metric standards were later furnished, under a Joint Resolution of July 27, 1866, comprising a set of weights from 10 kilograms to 1 milligram; 2 meter bars, one a line standard and one an end standard; and 2 capacity measures, a liter and a dekaliter.

and accurate copies of remarkable papers laid before and offered to the House. Taken in short hand by Thomas Lloyd . . . New-York, Printed for the editor, by Harrison and Purdy etc., 1789–90.
4 v. 21 cm (hereafter referred to as Congressional register).

U. S. Congress.

The debates and proceedings in the Congress of the United States; with an appendix, containing important state papers and public documents, and all the laws of a public nature; with a copious index . . . First to Eighteenth Congress.—first session: comprising the period from March 3, 1789 to May 27, 1824, inclusive. Comp. from authentic materials. Washington, Gales and Seaton, 1834–56.
42 v. 25½ cm (hereafter referred to as Annals of Congress).
Half-title: Annals of the Congress of the United States.
Continued by "Register of debates in Congress".

U. S. Congress.

Register of debates in Congress, comprising the leading debates and incidents of the second session of the Eighteenth Congress: Dec. 6, 1824, to the first session of the Twenty-fifth Congress, Oct. 16, 1837 together with an appendix, containing the most important state papers and public documents to which the session has given birth: to which are added, the laws enacted during the session, with a copious index to the whole . . . Washington, Gales & Seaton, 1825–37.
14 v. in 29. 25½ cm (hereafter referred to as Register of debates).

U. S. Congress.

American state papers. Documents, legislative and executive, of the Congress of the United States . . . Selected and edited under the authority of Congress . . . Washington, Gales and Seaton, 1832–61.
38 v. maps, plans. 33 cm (hereafter referred to as American state papers).
Nos. 01–038 of the Congressional series.

The short passages on this subject in the first five sets have been copied, and photostats of the longer ones have been obtained from the Library of Congress copies. These extracts are in the National Bureau of Standards Library. A photostat copy of all material on weights and measures in American state papers. Class X. Miscellaneous, volume 1, has been obtained from the Library of Congress copy and bound for the National Bureau of Standards Library. This volume contains the reports of Thomas Jefferson and John Quincy Adams, the most important reports submitted to Congress on this subject.

The following editions of the reports of Jefferson and Adams are also in the National Bureau of Standards Library:

U. S. Dept. of State.

Report of the Secretary of state, on the subject of establishing a uniformity in the weights, measures and coins of the United States. Published by order of the House of representatives. New York, Printed by F. Childs and J. Swaine, 1790.
v, 7–49 p. 18 cm.
Thomas Jefferson, secretary of state.
A photostat copy.

U. S. Dept. of State.

Report upon weights and measures by John Quincy Adams, secretary of state of the United States. Prepared in obedience to a resolution of the Senate of the third March 1817. Philadelphia, Published by Abraham Small, 1821.
245 p. 25 cm.

XVII. BIBLIOGRAPHICAL REFERENCES

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[3] Annals of cong., v. 1 (1834) col. 932–33, Senate, Jan. 8, 1790.
[4] Congressional register, v. 3, p. 106, Jan. 15, 1790.
[5] Amer. state papers. Cl. X. Misc., v. 1 (1834) no. 15–18, 1790.
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[21] Annals of cong., v. 5 (1849) col. 916, House, Apr. 12, 1796.
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Washington, December 16, 1935.

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