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BUREAU OF STANDARDS
GEORGE K. BURGESS, DIRECTOR

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REPORT OF THE
TWENTIETH NATIONAL CONFERENCE
ON
WEIGHTS AND MEASURES

ATTENDED BY
REPRESENTATIVES FROM VARIOUS STATES
HELD AT THE BUREAU OF STANDARDS
WASHINGTON, D. C., MAY 24, 25, 26, and 27, 1927



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Hartford..... MILO C. GRIFFIN, sealer of weights and measures, 225 Trumbull Street, Hartford.

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 Springfield----- WILLIAM FOSTER, sealer of weights and measures, room 9, Administration Building.
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 Winchester----- MAURICE DINNEEN, sealer of weights and measures.

MICHIGAN

City:
 Detroit----- GEORGE F. AUSTIN, Jr., assistant supervisor, bureau of weights and measures, 1300 Beaubien Street.
 Hamtramck----- JOHN ANGER, sealer of weights and measures, 2963 Dan Street.
 Highland Park----- J. W. WORDEN, sealer of weights and measures, 21 Gerald Avenue.

MISSOURI

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A. W. SCHWARTZ, assistant superintendent of weights and measures, Elizabeth.

City:

Elizabeth..... WILLIAM J. BENDER, superintendent of weights and measures, Harmonia Building.
Englewood..... JAMES E. FITZGERALD, superintendent of weights and measures, City Hall.
Kearny..... JOHN D. CASTLES, superintendent of weights and measures, Town Hall.
Newark..... PATRICK J. CAUFIELD, superintendent of weights and measures, City Hall.
Trenton..... FRANCIS J. BLACK, superintendent of weights and measures, City Hall.

County:

Cape May..... GILBERT S. SMITH, superintendent of weights and measures, Avalon.
Gloucester..... WILLIAM P. ABDILL, superintendent of weights and measures, Woodbury.
Hudson..... THOMAS J. WALDRON, superintendent of weights and measures, Court House, Jersey City.
Middlesex..... JOSEPH FERTIG, assistant superintendent of weights and measures, 184 Livingston Avenue, New Brunswick.
Monmouth..... GLENN L. BERRY, superintendent of weights and measures, Asbury Park.
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J. E. DUNKLEE, deputy sealer of weights and measures, 305 Terminal Building, Rochester.
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Ithaca.

NORTH CAROLINA

State----- WILLIAM A. GRAHAM, commissioner of agriculture,
Raleigh.
WILLIAM H. RICHARDSON, editor, department of agri-
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City and County: Char-
lotte and Mecklenburg
County----- W. R. LEE, standard keeper, Charlotte.

OHIO

City:
Cleveland----- G. A. VOTAW, commissioner of markets, weights, and
measures, West Twenty-fifth Street and Lorain
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Columbus----- M. A. BRIDGE, sealer of weights and measures, 152
East Rich Street.
County: Seneca----- CHARLES L. ECKELS, deputy sealer of weights and
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City:
Allentown----- B. FRANK RINN, inspector of weights and measures,
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Harrisburg----- GEORGE B. NEBINGER, inspector of weights and meas-
ures, 114 Walnut Street.
County:
Dauphin----- JOHN E. BOWERS, inspector of weights and meas-
ures, 13 South Third Street, Harrisburg.
Lehigh----- HARRY E. BIERY, inspector of weights and measures,
Court House, Allentown.
Philadelphia----- THEO. A. SERAPHIN, district supervisor, bureau of
weights and measures, 2017 Arch Street, Phila-
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HENRY W. RHODY, sealer of weights and measures,
Greensburg.

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City:

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OTHER DELEGATES, AND GUESTS APPEARING ON THE PROGRAM

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EBRIGHT, A. W., supervisor scales and weighing, Pennsylvania Railroad, Altoona, Pa.

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MILLER, D. R., Bureau of Standards, Washington, D. C.

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PEFFER, E. L., Bureau of Standards, Washington, D. C.

PIENKOWSKY, A. T., Bureau of Standards, Washington, D. C.

ROESER, H. M., Bureau of Standards, Washington, D. C.

SMITH, RALPH W., Bureau of Standards, Washington, D. C.

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American Oil Pump and Tank Co.: C. C. BURT, sales manager, 165 Broadway, New York, N. Y.

Associated Supply Co.: H. W. KEITH, engineer, 79 New Montgomery Street, San Francisco, Calif.

Becker, Christian (Inc.): C. A. BECKER, 92 Reade Street, New York, N. Y.

Black & Decker Manufacturing Co.:

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H. L. PRINCE, engineer, loadometer department, Towson, Md.

Bowser, S. F., & Co.: L. E. PORTER, vice president, Fort Wayne, Ind.

Buffalo Scale Co.: E. D. GORDON, chief engineer, 1200 Niagara Street, Buffalo, N. Y.

Chatillon, John, & Sons:

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- Clear Vision Pump Co.: GEORGE F. RADFORD, special representative, Wichita, Kans.
- Correct Measure Co. :
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 G. W. MACKENZIE, general manager, Rochester, Pa.
 E. W. ALLINGTON, 17 Battery Place, New York, N. Y.
 C. C. DIMMETTE, Rochester, Pa.
 BOYD H. LOGAN, 17 Battery Place, New York, N. Y.
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- Dayton Scale Co. :
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 J. L. SURGALA, Baltimore, Md.
- Demco (Inc.) : J. F. MYRICK, president, 105 South Calvert Street, Baltimore, Md.
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- Fairbanks, Morse & Co. :
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- Gilbert & Barker Manufacturing Co. :
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 E. LEIGHTON HAM, assistant to president, Rochester, Pa.
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 E. R. MOWBRAY, division manager, 1007 Maryland Trust Building, Baltimore, Md.
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- HARRISON, M. J. J., general scale inspector, Pennsylvania Railroad, Chicago, Ill.
- HITE, G. C., Pennsylvania Railroad, Altoona, Pa.
- HOSFORD, C. C., general scale inspector, Pennsylvania Railroad, room 1021 Pennsylvania Railroad Station, Pittsburgh, Pa.
- KING, C. A., chief scale inspector, Western Weighing and Inspection Bureau, 1800 Transportation Building, Chicago, Ill.
- LAWRENCE, E. KENT, general scale inspector, Baltimore & Ohio Railroad, Baltimore, Md.
- MCATEER, JOHN, inspector, Consolidation Coal Co., Watson Building, Fairmont, W. Va.
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- PERIGO, J. L., chief scale inspector, Southern Railway, Washington, D. C.
- SCHAEFFER, A. A., scale erector, Pennsylvania Railroad, Altoona, Pa.

SCHLINKERT, F. H., superintendent of scales, Missouri Pacific Railroad, 1055 Railway Exchange, St. Louis, Mo.
 STROODY, C. G., chief scale inspector, Chicago, Rock Island & Pacific Railroad, Valley National Bank Building, Des Moines, Iowa.

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BRIGGS, C. A., livestock weight supervisor, United States Department of Agriculture, Washington, D. C.
 CHEYNEY, A. R., executive assistant, engineering division, Post Office Department, Washington, D. C.
 FELL, F. B., weight supervisor, United States Department of Agriculture, 530 Livestock Exchange, South St. Paul, Minn.
 MILLER, J. C., skilled draftsman, Post Office Department, Washington, D. C.

OTHER GUESTS

ANDERSON, R. P., technologist, American Petroleum Institute, 250 Park Avenue, New York, N. Y.
 BOOTH, W. H., purchasing agent, Sun Oil Co., Finance Building, Philadelphia, Pa.
 BROWN, RUSSELL, Vacuum Oil Co., 61 Broadway, New York, N. Y.
 COURTENAY, W. A., Jr., engineer of stations, Sun Oil Co., Philadelphia, Pa.
 GRAVES, W. A., Richmond, Va.
 HOFFMANN, ARTHUR J., Army and Navy Club, Washington, D. C.
 JAFFE, MEYER, clerk, board of fire and police commissioners, Paterson, N. J.
 MACKEY, E. C., Henry L. Doherty & Co., 219 North Broad Street, Philadelphia, Pa.
 MALONE, H. B., director of purchases, Sinclair Refining Co., 45 Nassau Street, New York, N. Y.
 MARSH, J. L., Ohio Petroleum Marketers Association, % Vahey Oil Co., Youngstown, Ohio.
 MAXWELL, M. M., 3325 Georgia Avenue, Washington, D. C.
 MILNE, W. A., executive secretary, Ohio Petroleum Marketers Association, 606 Commerce Building, Columbus, Ohio.
 RAFFEY, C. O., Fostoria, Ohio.
 RASMUSSEN, FRED, executive secretary, National Association of Ice Cream Manufacturers, Telegraph Building, Harrisburg, Pa.
 ROSENBAUER, OTTO W., Standard Oil Co. (N. J.), 241 Pennsylvania Avenue NW., Washington, D. C.
 SMITH, JAMES, 145 Main Street, Paterson, N. J.
 SNYDER, IRVING, 193 Fulton Street, Brooklyn, N. Y.

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

REPORT OF THE TWENTIETH NATIONAL CONFERENCE ON WEIGHTS AND MEASURES

HELD AT THE BUREAU OF STANDARDS, WASHINGTON, D. C., MAY 24-27, 1927

FIRST SESSION (MORNING OF TUESDAY, MAY 24, 1927)

The conference was called to order at 10.55 o'clock a. m. by George Warner, first vice president of the conference.

ABSTRACTS OF STATE REPORTS¹

ALABAMA

By H. L. FLURRY, *Chief, State Division of Weights and Measures*

Mr. Flurry reported that during the past year the fraudulent conditions formerly existing in connection with the weighing of cotton had been largely corrected; also that a very considerable amount of time had been spent on the testing of gasoline-dispensing devices and on checking up on gasoline sales. He stated that a revision of his entire law was in progress and that the next legislature was expected to approve the addition of provisions regulating ice, coal, bread, Babcock glassware, and the sale of service, and the strengthening of the provisions for prosecutions.

CALIFORNIA

By CHARLES M. FULLER, *Sealer of Weights and Measures, City and County of Los Angeles*, and THOMAS FLAHERTY, *Sealer of Weights and Measures, City and County of San Francisco*

Mr. Fuller reported a new State law making it the duty of all weights and measures officials of the State to attend the conferences called from time to time by the State superintendent and requiring that their expenses be paid. He also mentioned new laws whereby the State superintendent can establish standard tare weights for commodities and which penalize buying by false weight. He stated that during the past year there had been an increase in the number of weights and measures officials in California. Mr. Flaherty commented briefly on the progress of the work in San Francisco County.

¹ For convenience of reference these reports have been arranged in alphabetical order throughout.

CONNECTICUT

By PHILIP T. PILON, *Deputy State Superintendent of Weights and Measures*

Mr. Pilon outlined some of the special activities of his department during the past year, which included frequent testing of the platform scales used in the campaign to prevent the overloading of trucks on the highways, and an extensive survey of the work of the local weights and measures officials of the State, who have been increased in number from 32 to 44. He stated that a revision of all of the laws of the State had been authorized by the legislature, and that it was expected that the weights and measures laws would be improved in the course of this revision.

DELAWARE

By MRS PETRICHA E. MANCHESTER, *Executive Secretary, Consumers' League of Delaware, Wilmington*

Mrs. Manchester spoke briefly concerning the steps taken during the year to draw up and introduce into the legislature a competent weights and measures bill, closely following the provisions of the model law of the conference. Much interest was aroused by the effort to procure its passage, but it was unsuccessful. However, she predicted that it would be enacted in the near future.

DISTRICT OF COLUMBIA

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

Mr. Roberts reported increased facilities for carrying on his work, comprising an additional inspector, funds for two additional automobiles, increased funds for try-out purchases, and salary increases for the inspectors of his department. He anticipated that by another year appropriations would be secured for a heavy-scale-testing equipment, which, he said, was greatly needed. He also mentioned a successful record of convictions secured during the year as compared with the number of cases started.

ILLINOIS

By FRED BENJAMIN, *State Superintendent of Standards*, and WILLIAM F. CLUETT, *Chief Deputy Inspector of Weights and Measures, Chicago*

Mr. Benjamin stated that there had been no new State legislation during the year, that the department had had a few prosecutions on short-weight bread and coal, and that the use of dry measures had been practically eliminated. He said that a program of distributing weights and measures literature to manufacturers, dealers, schools, organizations, etc., was being regularly followed with excellent results. Mr. Cluett added that the standard-weight bread bill was again lost in the last legislature, but that it would be reintroduced.

INDIANA

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

Mr. Miller stated that there had been no new legislation enacted in Indiana during the past year, but that good results were being secured under existing statutes. He spoke particularly of the bread law, in which connection he said that the only trouble being experienced was with a small amount of short-weight bread shipped across the State line. He expressed the interest of the weights and measures officials of the State in the entire question of the sale of gasoline and the devices used for this purpose. One new State inspector has been added during the past year.

MAINE

By C. V. FICKETT, *Sealer of Weights and Measures, Portland*

Mr. Fickett stated that the only new State legislation related to milk and cream bottles and jars. Under the former statutes these bottles and jars could be made in any size, such as 10-ounce, 7-ounce, etc., and such bottles could be legally sold and used throughout the State. Under the new law the bottles may be made only in standard sizes of 1 quart, 1 pint, and one-half pint. The change in the law is expected to be effective in clearing up the milk and cream bottle situation in Maine.

MARYLAND

By S. B. SHAW, *Chief Inspector, State Department of Markets*, and S. T. GRIFFITH, *Chief, Division of Weights and Measures, Baltimore*

Mr. Shaw and Mr. Griffith outlined the provisions of the Maryland law under which the county commissioners control local weights and measures supervision in most parts of the State, there being a city organization in Baltimore, and the State department of markets having concurrent jurisdiction with local officials in matters connected with the buying or selling of farm produce. Efforts have been made, and will be continued, it was said, to have the next legislature enact more effective legislation to provide supervision throughout the State.

MASSACHUSETTS

By JOHN J. CUMMINGS, *State Inspector of Standards*

Mr. Cummings stated that three laws affecting the work of his department were enacted by the last legislature. Two of these were amendments to the hawkers and peddlers licensing law; the third was a new statute establishing a schedule of fees to be charged by weights and measures officials for the testing of vehicle tanks. Under the former law the fee for all measures was the same; under the new schedule for vehicle tanks the amount of the fee will depend on the capacity of each compartment tested.

MISSOURI

By CLIFFORD G. HALEY, *Commissioner of Weights and Measures, St. Louis*

Mr. Haley detailed many of the activities of his department during the past year, commenting, among other items, upon taximeters and upon sales of gasoline, ice, coal, fuel oil, and coke. He stated that considerable trouble was experienced with the sellers of coal in small lots in baskets; a number of these dealers were found to be giving short measure and were prosecuted. An ordinance was recently passed relative to the weighing of coal hauled from the mines outside the city limits direct to the consumers. He emphasized that test purchases of different commodities were very frequently made.

NEW HAMPSHIRE

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

Mr. Webster mentioned an increased appropriation granted his department by the last legislature as evidence of the favor with which weights and measures supervision is being received in his State. He spoke of the success attending the efforts of the State and local weights and measures officials to secure the replacement of small-capacity wagon scales with modern large-capacity auto-truck scales for weighing large loads, and noted the very great increase in the number of gasoline-dispensing devices. He said that, in general, devices of an automatic character gave the officials more trouble than simpler types.

NEW JERSEY

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

Mr. Foley reported a new State law regulating the selling of service by laundries, and three new regulations of his department, requiring the marking of packages put up in advance of sale, the marking of all wrapped bread with a statement of weight, and the submission to the State department of all weighing and measuring devices before their distribution or sale in the State. He also stated that a new heavy-duty-scale-testing unit was under construction and that another such unit was in contemplation for next year, and commented upon the great increase in supervisory activities during the past year.

NEW YORK

By CHARLES H. BULSON, *Sealer of Weights and Measures, Jefferson County*

Mr. Bulson reported that there had been no new State legislation during the past year, largely due to the program of reorganization and consolidation of the State departments, which had crowded out weights and measures legislation. He said that the standard-weight bread bill would be reintroduced at the next legislative session, and that the State department and local weights and measures officials were cooperating in efforts to secure its passage. He also commented briefly upon the progress of type approval in the State.

NORTH CAROLINA

By WILLIAM H. RICHARDSON, *Editor, State Department of Agriculture*

Mr. Richardson outlined the provisions of the new law enacted by the last legislature, which provides for state-wide weights and measures supervision in North Carolina. The work is placed under the charge of the commissioner of agriculture, and provision is made for a superintendent of weights and measures and for a number of State inspectors. It was stated that as yet enforcement of the new law had not been started, but that an organization would be perfected during the summer and active work started.

OHIO

By M. A. BRIDGE, *Sealer of Weights and Measures, Columbus*

Mr. Bridge commented upon the difficulty of securing sufficient appropriations to carry on the weights and measures work in Ohio. He stated that there were several district weights and measures associations in the State, made up, respectively, of the officials from the several sections of Ohio. He also described a plan in force whereby a committee of 22 local sealers considers specifications and other questions affecting weights and measures administration, and said in this connection that the State sealer promulgated only those regulations which had previously been approved by the committee.

PORTO RICO

By E. J. SALDAÑA, *Executive Secretary, Government of Porto Rico*

Mr. Saldaña outlined the organization of the weights and measures bureau and briefly commented upon the work accomplished during the past year, especially pointing out the increase in the number of pieces of apparatus examined, and the decrease in the percentage found incorrect and in the average errors encountered. He mentioned that special inspectors were assigned to the service of testing electric, gas, and water meters and of investigating complaints involving this class of apparatus.

TENNESSEE

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

Mr. Mahoney stated that the progress of weights and measures supervision was being delayed by reason of lack of appropriations by the legislature, but that there were four cities in the State which were maintaining active city departments. He cited the necessity for the enforcement of the specifications and tolerances for vehicle tanks, as shown by investigations which he had made in Chattanooga, and also stated that he expected soon to secure the enactment of an ordinance in his city relative to the sale of service by laundries.

VERMONT

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

Mr. Davis reported that his office was now functioning under the department of industries and that the officers of that department were taking a gratifying interest in weights and measures enforcement. He stated that his office was making progress, and as evidence of the support being received he cited the recommendation of the governor that his appropriations be increased; this increase was denied, however, by the legislature.

VIRGINIA

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

Mr. Ragland spoke briefly of the weights and measures activities in Richmond. He stated that now, in addition to inspections relative to the quality of gasoline, his department was enforcing an ordinance requiring the inspection of lubricating oil for use in internal-combustion engines.

WEST VIRGINIA

By P. T. SULLIVAN, *State Inspector of Weights and Measures*

Mr. Sullivan reported that an effort was made at the past legislative session to revise the weights and measures laws, particularly to abolish the office of county sealer and increase the force of State inspectors sufficiently to cover all parts of the State except the larger cities; this effort was unsuccessful owing, it was stated, to an economy program in the legislature. Notwithstanding this, however, the department received some increase in its appropriations for this year. At the present time the State department finds it necessary to devote almost its entire time to testing the scales at the coal mines.

WISCONSIN

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

Mr. Warner reported that a new State superintendent of weights and measures had been appointed, in the person of C. J. Kremer. He outlined the weights and measures proposals which were before the legislature, which was still in session, as follows: A bill requiring certain liquid-measuring devices to be equipped with means to indicate when the systems are properly filled; a bill to eliminate bucket deliveries of gasoline to automobiles; a bill making three additions to the bushel list; and a bill to legalize the one-third quart milk bottle. He said the last-mentioned bill had been withdrawn by the author.

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

MASSACHUSETTS ASSOCIATION OF SEALERS OF WEIGHTS AND MEASURES

By MAURICE DINNEEN, *Sealer of Weights and Measures, Winchester*

Mr. Dinneen presented to the conference a report of the proceedings of the thirty-second annual meeting of the association held at

Hyannis, Mass., October 7 and 8, 1926, outlining the substance of the papers given, these including the necessity of test of clinical thermometers and vehicle tanks, the advisability of the installation of master scales, methods of sale of ice, fruits, and vegetables, etc. He also described the legislative program of the association. He stated that 125 sealers were present at the meeting.

NEW JERSEY WEIGHTS AND MEASURES ASSOCIATION

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

Mr. Foley spoke briefly of the meetings of the association, and issued an invitation to the members of the conference to attend the next meeting of the association, which is to be held at Atlantic City.

NEW YORK ASSOCIATION OF SEALERS OF WEIGHTS AND MEASURES

By A. W. CORWIN, *Sealer of Weights and Measures, Allegany County*

Mr. Corwin spoke of the excellent meetings held by this association, which are attended by approximately 125 weights and measures officials, and issued a general invitation to the members of the conference to attend the next meeting of the association, which is to be held at Syracuse. He stated that the association was regularly issuing a monthly News Letter to all sealers of the State, containing various items of interest to weights and measures officials, and that this publication was serving a very useful purpose.

NORTHWESTERN OHIO WEIGHTS AND MEASURES ASSOCIATION

By CHARLES L. ECKELS, *Deputy Sealer of Weights and Measures, Seneca County*

Mr. Eckels mentioned the three district associations which have been formed in Ohio—his own, the Northeastern Association, and the Southwestern Association. He stated that all of the associations were cooperating in an effort to secure the passage of legislation placing the local deputy sealers, who are appointed by the county auditors as the active weights and measures officials, under civil service, so as to eliminate changes in the personnel every time a new auditor is elected. He stated that a joint meeting of all of the associations was planned for this fall.

VIRGINIA WEIGHTS AND MEASURES ASSOCIATION

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

Mr. Ragland merely reported the existence of the association without giving any details of its activities.

WISCONSIN WEIGHTS AND MEASURES ASSOCIATION

By WILLIAM F. STEINEL, *Sealer of Weights and Measures, Milwaukee*

Mr. Steinel, in reporting for the association, spoke upon some of the phases of weights and measures prosecutions in the city of Milwaukee.

(At this point, at 12.18 o'clock p. m., the conference took a recess until 2.25 o'clock p. m.)

**SECOND SESSION (AFTERNOON OF TUESDAY, MAY 24,
1927)**

The conference reassembled at 2.25 o'clock p. m., George Warner, first vice president, in the chair.

DEPARTMENT STORE CONTROL OF FABRIC MEASUREMENT

By MISS MARGARETTA BARNES, *Superintendent of Training, Hutzler Bros. Co., Baltimore, Md.*

Inaccurate measurement of fabrics has been a problem for the store owner since the first yardstick was invented, and before. At that time the yardstick was probably hailed with as much satisfaction as the mechanical devices are to-day. While we think now that our machines are as satisfactory and fool proof as possible, within the next 10 years I suppose we shall have improved machines that will make the present devices appear as inadequate as the yardstick.

Most large stores have installed one of the mechanical devices now on the market because of the enormous shortage shown by inventories of yard-goods departments. Because of the many thousands of dollars lost each year through faulty measurement, store management insists on the use of the most scientific methods of measuring. It also insists upon an intensive system of training in order to impress on its sales people the seriousness of the problem, both because of the large financial loss to the store owner and the more serious possible loss of customer good will in instances of short measurement. The ethics of the modern high-grade department store are very different from the old barter and trade methods, the sharp practice of long ago. A store now feels its responsibility to the public—it realizes its purpose is to serve the public and that success depends on the extent of that service. Generations of honest dealing are necessary to establish the reputation of a store in a community. That which has taken years to build may be destroyed in a few minutes by a careless or indifferent clerk. The modern high-type store stands for the strictest kind of honesty in all of its dealings whether they are with the manufacturer, the customer, or the employee. If an agreement is made, it is carried out. If by some mischance a mistake occurs it is corrected as far as is humanly possible. The store always goes more than half way in carrying out its ideals and principles of service. This is a matter of common sense. Thousands of people, as well as millions of dollars, are involved abroad and in this country. We have representatives in all of the big trading centers of the world. Their job is to buy. Ours is to distribute. It doesn't take a prodigious intellect to see that the policy of accuracy and honesty is the only policy that results in permanent success.

That there are inaccuracies is very easy to believe. By actual tests made in the store, of fabrics measured by the yardstick, errors of from one-half inch to 19 inches on a 1¾-yard purchase are disclosed.

The conference on weights and measures is probably more interested in the public getting full measure, but I understand they also insist on the use of machinery that will not overmeasure. Mr. Griffith told us of a man selling gas by a pump that overmeasured. The owner was told to repair it, but he claimed that no one could stop him giving away his own gas. I believe the city department admitted this, but insisted that he must have a pump that measured the gas correctly. After that he could do as he pleased about the extra quart.

We find by actual tests in different stores all over the country that in yardstick measurement between 80 and 90 per cent of the purchases are overmeasured and about 5 per cent are short measured. We want to be accurate. It is unfair to the customer to give her short measurement, but this can be rectified from her standpoint by giving her a new length. It is equally unfair to the store to give overmeasure, and this is a dead loss.

There are some few fabrics which can not be measured by the present machines. Stretchy materials, such as the jerseys and laces, would show a shortage if pulled through the machine. Bumpy surfaces, such as Irish lace and embroidered swisses and voiles, would show an overage because the machine would jump from one high spot to another and would skip part of the intervening spaces. Hitting the high spots usually ends in a smash, and in this case profits end in one grand smash! In these departments we still have to use the yardstick, but we do not allow the yardstick to be used in measuring merchandise which may be run through the machine. We have taken almost all of our yardsticks off of the floor. There was some objection at first, but now everyone prefers the machine. The only objection now is when there is a sale at a price not on the chart, then we can all cheerfully murder the buyer.

We believe much of the success of the machine depends on the training given the individual. It might be helpful to outline our procedure.

Our store feels that the success of any new undertaking depends largely upon the publicity given it; on the store employees being convinced of its value, "sold" on it; and on the training given those using the article. Consequently the first thing the training department had to do was to make each and every sales person appreciate the reason for installing our new machine and the advantages it has for her.

Our store believes in thorough training at the start and in periodic follow up. We first sold the sales people on the use of the machine, the ease with which it is operated, the time it saves, the nervous exhaustion it prevents, the chance it gives to wait on more customers, thus increasing the bonus. We compare the measurement by yardstick—slow, awkward, and frequently inaccurate—with the quick, easy, and accurate use of the machine. We have several sales people measure a piece of material by the yardstick. Usually no two come out alike.

We explain the price chart. Computing sales is very slow and frequently nerve racking. Often after the customer has left, sometimes after the sales person is in bed, she is nervous wondering whether she has figured the amount up correctly. And when one gets

a school teacher as a customer and she starts to help figure! Well, one might as well throw up her hands. All of this confusion is eliminated by the machine. We want sales people to be calm, pleasantly and courteously helpful to each and every customer; not nervous and jumpy.

We have sales people figure $3\frac{7}{8}$ yards at \$2.95 while the instructor is measuring the material through the machine. The instructor does this without any hurry. She is always through first and stands quietly by while the sales people figure nervously and almost invariably inaccurately. That usually sells them the new idea. When the end of a perfect day comes they have a big book, no thought of errors, and their nerves are not all frayed and on edge. Often they can even give the floorman a pleasant "good night."

We show and explain the purpose of each lever, letting each sales person see what happens. Then each one measures several pieces of material kept in the training department for that purpose. After regular measuring is done easily we ask what is to be done when the customer changes her mind (this always gets an appreciative comeback) and when various other conditions arise. We endeavor to use modern teaching methods in getting the operator to think herself out of a predicament. When she is certain of herself she answers several questions furnished by the manufacturer, signs a statement to that effect, and is allowed to use the machine on the floor.

During the lesson we ask what kind of material the piece used is and what is its probable cost per yard. When some one over or under measures we have her stop, and she and the entire group figure the loss per year at that rate.

1 inch on 1 dress length.

30 inches on 30 dress lengths.

180 inches or 5 yards per week.

250 yards per year (allowing two weeks vacation), at \$2 per yard—there is a loss of \$500.

She had better take a long vacation.

Few would think of taking that money out of the cash register, yet many feel it is legitimate to give an inch over accurate measurement—a part of Hutzler Service!

The actual money is usually impressive and has the desired effect. We ask her if she wants a raise in salary and where she thinks raises come from. She must understand that raises are divided net profit. We ask her what the customer is going to do with the extra inch. She doesn't want it for the skirt length, surely. Nine times out of ten it goes into the rag bag—no advantage to anyone and a big loss to the store. We get the sales people to see cloth as money and a few inches as the profit. If the customer is short measured, the sales person is taking money away from her; if she is given too much, the sales person is taking money from the store that is paying her a salary. She prevents her own chances for a raise, and the worst of it is nobody is gaining anything.

We have 75 machines finished to match our fixtures and tested by the sealers of weights and measures of Baltimore before they were used. Our sales people like them because of the machine itself and the training given them. We think we did a good job.

In teaching the correct use of the yardstick we have several sales people measure material with it and then show how the use of the thumb nail, and dropping the material aid in arriving at a fairly accurate result. The use of the yardstick is not shown to any but those sales people handling materials which can not be put through the machine.

We follow up the instructions by a weekly check in the wrapping department. At odd times each week purchases are remeasured by the head wrapper. There are few offenders. When one is discovered, she is asked to measure the material again herself and to figure the loss. The personnel superintendent interviews her, as this is a matter of carelessness and discipline, not of training.

Recently a study of our department was made by the training group of the Retail Research Association, and they reported that the machine was operated "with facility and ease"; that all the sales people seemed to like it and preferred it to the yard stick.

Of course, "eternal vigilance is the price of liberty," and each sales person must understand that these checks are apt to be made at any time. The ideal sales person does not need this, but few of us are ideal.

There will always be losses in any yard-goods department, because of the giving of samples, irregular cutting of material, and theft, but our store feels that a large part of the problem has been solved by the installation of the modern measuring devices and the definite follow up expected at any time by all sales people.

We feel that a customer's satisfaction in knowing and seeing her purchase scientifically measured is worth much more than the cost of the machine and the training. Thousands of dollars are spent to earn and deserve the approval of the public, to give service commensurate with high principles. Good will is worth all that it costs. I thank you very much.

THE PLATE-FULCRUM PRINCIPLE IN SCALE CONSTRUCTION ²

By L. R. BOYER, *Sales Engineer, Fairbanks, Morse & Co.*

The substitution of the thin plate to take the place of the knife-edge and bearing in scale construction is a fine example of the engineering profession rising to the needs of the times. Testing machines in small capacities for determining the physical properties of structural materials have been in use from a time much further back than the writer can trace in the short time available for the preparation of this paper. Early in the seventies the late A. H. Emery, of Stamford, Conn., recognized the necessity for more accurate methods of measuring test loads applied by the large capacity testing machines than were available, using scales that were then built on the knife-edge principle. Without checking patent records, it was about 1875 that the first patent was granted covering scale levers using the plate instead of the knife-edge or pivot. The successful working of the levers required that they be supported on a foundation as nearly rigid as could be constructed. It was recog-

²In the absence of Mr. Boyer, this paper was read to the conference by M. J. J. Harrison.

nized further that the development of scales and their use in commercial life had not progressed to the point where scales requiring such rigid construction would be practical. This period of development required about 40 years, so that it was 1915 before the first application of the principle to a scale for weighing railroad cars was made, although it had been used in testing machines up to 2,000,000 pounds capacity for many years. This first plate-fulcrum track scale has been in constant service since installation and is fulfilling all of the hopes of its builders. The general plan of building knife-edge railroad track scales in four sections was followed.

Experience in manufacturing, installing, and calibrating the four-section scale led to the development of a scale using the same basic principle, but made in two sections. In other words, it has a platform of the length required to weigh railroad cars, but supported only at the ends by the scale levers instead of at the ends and two intermediate points. A typical one of these scales will be generally described in the remainder of this paper. Without the plates bolted in place, the primary or main lever would look much like a knife-edge lever prepared for the reception of the usual pivots. The recess in which the intermediate or main load plate fits and the shoulders against which the end plates fit are spaced so as to give the required multiple to the lever; for instance, in the scale under consideration the multiple is 3.5. In this case when 70,000 pounds is applied on the load plate the butt plate of the lever carries 50,000 pounds and the tip plate carries 20,000 pounds. Twenty thousand pounds is the load transmitted to the next lever in the scale.

The function of the plates is to localize the point of application of the load and the points of support of the lever acting as a beam. They have no function as a spring, but act merely as column supports. Reducing the thickness of the plate localizes the point of application of the load and the lever supports, and allows the necessary flexure for the lever to move very slightly as the tip of the weighing beam moves in its trip loop. If the tip of the beam moves through a distance of 1 inch, the tip of the main lever is required to move only about $3/1000$ of an inch, plus that due to compressibility or deflection in supporting members, so that the necessity for flexing of the main lever plates is very slight. In the plates closer to the beam the plates are thinner, but the load is reduced according to the multiplication of the levers. As all of the levers are of the second class, all of the plates act in compression.

The load plate in the scale which is being described is designed to support a load of 200,000 pounds. It is 24 inches long. The thin section of metal is 0.2 of an inch thick and 1 inch high. It is made of chrome vanadium steel, heat treated so as to have a strength of 200,000 pounds per square inch of cross-section area. As the cross section of the thin part of the plate is 24 inches by $\frac{2}{10}$ of an inch or 4.8 square inches, the safety factor, including allowance for impact, is 4.8. Twelve years of service has not been enough to show any deterioration in these plates.

An essential feature of the installation of this type of scale is that the levers be assembled so that the plates are free from any twisting strains. To accomplish this the main levers, with their stands and

the stand supporting the fulcrum end of the center extension lever, are assembled at the factory on heavy base castings, which are machined top and bottom to true parallel surfaces. Figure 1 shows the assembly of one end section of the scale. When all parts are set correctly the stands and base castings are drilled and pinned with taper dowel pins. Before dismantling for shipment, parts are punch marked to assure identification and correct assembly in the field.

The connections between the tips of the main levers and the longitudinal extension levers are made by means of steel castings provided with recesses, one in the top to engage the main lever plate and one in the bottom at a right angle to engage the load plate of the extension lever.

Heavy steel castings are machined to engage the tops of the main-lever load plates. These are tied together with heavy steel bars to insure that they rest on the plates without causing side or twisting strain in the plates. The blocks are the connecting part between the scale platform or weighbridge and the scale levers. Up to the top of the blocks both ends of the scale are alike.

Movement of the platform, such as is inherent in a knife-edge scale, must be prevented or the plates would be destroyed immediately. To accomplish this the weighbridge is anchored securely to the pit walls, not by the usual loose check rod, but by heavy stay bolts which prevent any side or end play. At one end of the scale the bridge is anchored securely to the pit walls in both longitudinal and transverse directions. Provision must be made, however, for expansion or contraction of such a large steel structure as the weighbridge for changes in temperature. A mechanism requiring accurate thermostatic control of temperature at a constant value winter and summer would be impracticable in the rough work of weighing railroad cars. Therefore, while one end (called the fixed end of scale) is tied to the pit walls in both the longitudinal and transverse directions, the other end (called the free end) is tied to the pit wall in the transverse direction only so that the weighbridge can expand or contract.

To allow the slight movement of the free end of the bridge, the bridge rests on rocker struts. These struts are machined at the bottom end to a curve, the radius of which is the length of the strut. They rest on hardened, smooth, steel surfaces. Any movement of the end of the bridge due to temperature changes or sagging at the center under changing loads, rocks the struts slightly without changing the direction of application of the load from the plumb condition.

Similar provision is made to allow for expansion or contraction of the long extension levers reaching from the end sections of the scale to the transverse extension lever. The tip or nose iron end plate rests on a rocker strut carried on a platen which is hung by four bolts from a top block engaging the load plate of the transverse lever. The strut is set plumb at the time of installation. If at a later time when the scale is calibrated or sealed any movement of the nose iron is required, the lower end of the strut is moved the same amount as the nose iron. Expansion or contraction of the long levers does not effect the multiple of the levers as both arms of the

lever expand or contract in the same ratio as the multiple of the lever.

As the expansion or contraction depends on the length of the lever, the short main levers are not affected sufficient to notice by changes in temperature between winter and summer. Their support will expand and contract with them and not cause strains in the plates.

One method of anchoring the fixed end of the bridge to the pit walls is by the use of two alloy-steel stay rods which protrude through holes in the cross member. They are fastened to suitable castings inside the structure and over the bridge support. The wall ends of the rods engage heavy castings anchored securely to the wall. The rods are made long to allow for necessary flexure. A similar transverse rod is placed at the corresponding position on the free end of the bridge.

The scale must be adjusted with the use of standard test weight cars, and the effect of the stay rods compensated for by the setting of the nose irons. The stay rods, being securely fixed, have a constant effect and do not cause any variable indications of the scale.

Above the weighbridge the style of pit cover and rail supports varies according to the ideas of different designers. In the installation being described steel crossties carry rail chairs passing through holes in the deck. The floor beams are steel with a timber filler on top, which is sawed so as to give a crown to the deck along the center line to run off water like a roof. The deck is wood covered with mastic asphalt. Most of the decks used on this type of scale are all steel, using a steel floor beam crowned the same as this timber and a steel plate deck covered with asphalt.

The rail chairs are built with side flanges, two of which are an integral part of the casting. The other two are loose plates which are bolted in place for assembly and inspection purposes. Cast-iron collars are placed over the openings in the deck around the rail chairs. These telescope up under the flanges of the chair so as to be storm proof but free of interference. When the mastic asphalt is placed carefully on the floor and around the base of the collar a water-tight joint is accomplished.

In a typical installation the rails and rail chairs have been painted white to make it easier for the weighman to see when the car is completely on the scale. The beam is connected directly to the tip of the transverse extension lever by two rods instead of the customary single rod of knife-edge scales. These rods are fastened securely to blocks one at the lower end to engage the tip plate of the transverse lever and one at the top to engage the load plate of the beam.

The beam is supported at its fulcrum by steel strips which have the necessary strength and flexibility to insure sensitive action. It is provided with an indicator which moves over a graduated scale, furnishing a ready means of obtaining an exact balance. An oil dash pot at the tip end of the beam serves to steady the motion of the beam and bring it to rest quickly. A weight located above the beam fulcrum can be adjusted vertically so that the period of oscillation can be increased or decreased, while a weight above the indicator fulcrum provides adjustment of the sensibility to suit local conditions. Several styles and capacities of beam can be applied to the scale. The one under consideration is type registering to the full ca-

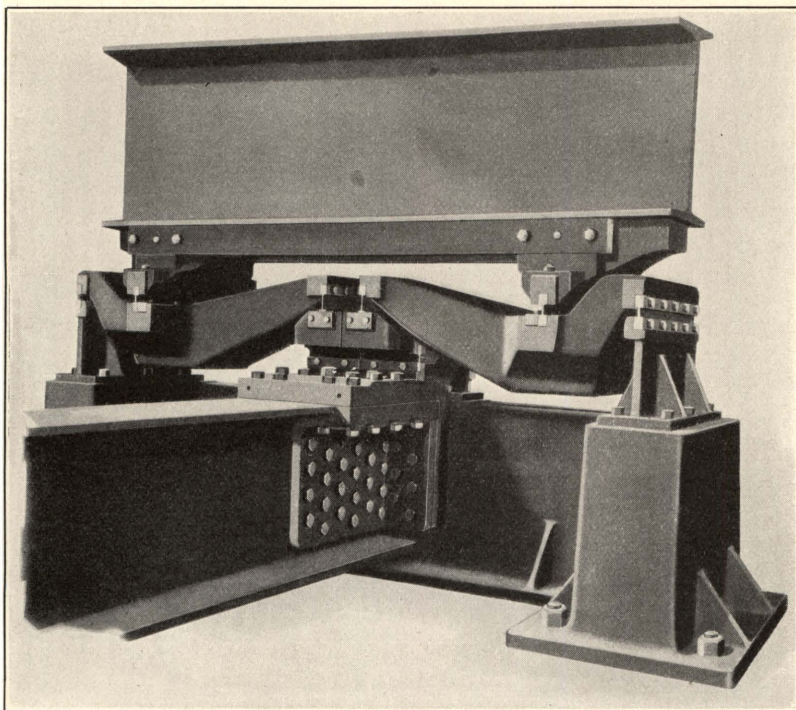


FIG. 1.—Assembly of one end section of two-section plate-fulcrum track scale

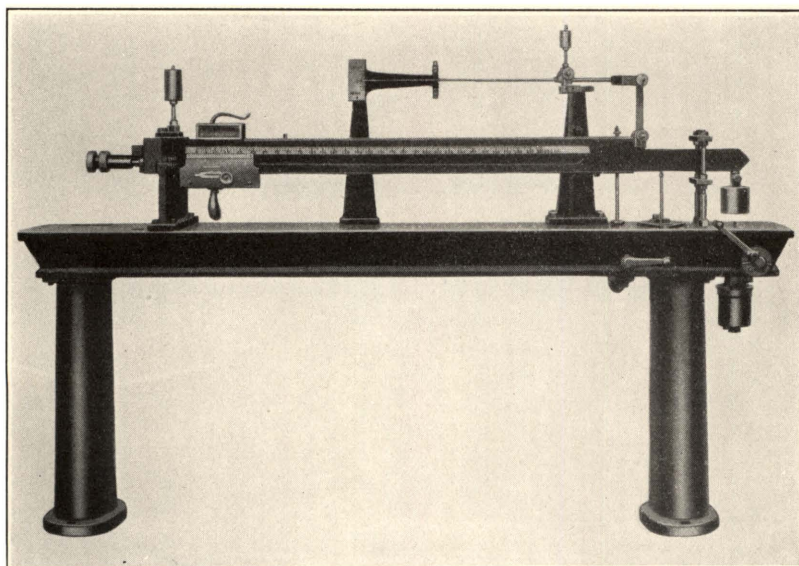


FIG. 2.—Type-registering beam of 300,000 pounds capacity utilized on two-section plate-fulcrum track scale

capacity of 400,000 pounds by 20 pounds. Another beam (see fig. 2) is sometimes utilized. This is type registering to a capacity of 300,000 pounds, which is sufficient for most service, and provided with a non-registering bottle weight for use in special work like weighing locomotives. Weighmen are not all equally careful, so this beam has been provided with ball bearings at the points of maximum motion, the tip of the beam and the butt and fulcrum of the indicator, to make this part more sturdy. In some cases the beam outfit has been replaced by an automatic machine for weighing cars in motion in hump yards. Since the scale has no parts to wear out it is particularly suitable for installations without dead rails so that locomotives operate over the scale, eliminating loss of time for the locomotive and crew as well as maintenance expense for dead-rail track.

While the scale described so far has a rigid deck the scale yields equally well to live-deck construction, where weighing conditions require it, as in the case of a scale with a live deck or platform covered with fire brick for weighing hot-metal cars at a steel plant. It yields also to various styles of special construction; for example, a scale measuring 28 feet between main lever load plates and 50 feet long has been installed overhead in a steel structure. A platform hung from the levers supports a rotary car dumper for unloading cars of coal at a large power plant. In pit scales it has been built in various lengths from 12 to 75 feet and in every case has justified the vision of its inventor over 50 years ago.

(During the reading of the above paper, Mr. Harrison illustrated by means of lantern slides a number of the matters discussed.)

PLATE-FULCRUM MASTER SCALE INSTALLATION AT ALTOONA WORKS ON PENNSYLVANIA RAILROAD¹

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

In connection with the past and present interest taken in the use in scale construction of the plate fulcrum or, as termed by some, the flexure plate, attention is invited to the most recent application of this principle in the just completed master track scale of the Pennsylvania Railroad at its Altoona works. This master scale is the outgrowth of a gradual development during the past 12 years, during which time the application of the plate-fulcrum principle to track scale construction has been studied in minute detail on the Pennsylvania, and its completion marks another forward step in the efforts of the Pennsylvania Railroad to provide itself with the best obtainable weighing equipment. Some of the considerations which led up to the present installation are as follows:

THE FIRST PLATE-FULCRUM TRACK SCALE

Approximately 260 track scales are owned and used currently by the Pennsylvania Railroad for weighing both loaded and empty cars. Prior to 1915, all of these scales were of the knife-edge type, with continuous weighbridges, and almost entirely of the four-section type. During the year 1915 the first plate-fulcrum track scale was installed at East Tyrone, Pa. This experimental installation was of the four-

¹ In the absence of Mr. Epright, this paper was read to the conference by M. J. J. Harrison.

section type with articulated weighbridge, but the complicated construction and the expense incident to its manufacture suggested the wisdom of developing a two-section design. This was done, and the two-section design proved so successful in every way that it was adopted as standard for all new construction on the Pennsylvania, and some 28 track scales of this type, in lengths of 52, 62, and 75 feet, are now in regular service.

TEST WEIGHT CARS

The advantages of the plate-fulcrum over the knife-edge type of track scale are too numerous to mention in detail, but they include such important factors as economy in maintenance, absolute freedom from friction, definite control of sensitivity, uniformly correct indications, and continuity of satisfactory service under practically any or all operating conditions.

To permit of ready calibration of all track scales, and to prove the continued correctness of such scales at the required frequency with reasonable certainty and without undue expense, it is necessary to provide test weight cars. Such cars are in reality portable test weights which may be handled in train service. Since the most important requirement for this class of equipment is, obviously, constancy in the actual weight, these cars, as designed and built by the Pennsylvania Railroad for its own use, are of the most approved type. They are self-contained, and so constructed as to shed quickly all rain and snow, and are of the roller-bearing type. This last feature is especially valuable in that, first, repacking of the journal boxes while the cars are en route, with the attendant erratic changes in weight, is eliminated, and, second, the power required to move a car from point to point along a scale during a test is greatly reduced.

THE MASTER SCALE AT ALTOONA

Test weight cars are operated in pairs, each consisting of one 40,000-pound car and one 80,000-pound car, and each pair is scheduled over a definite route at approximately three-month intervals. Each route starts and ends at a master scale, at which point the cars are thoroughly cleaned, inspected, and reconditioned, the weight of each car being recorded as it arrives at the master scale and again when necessary reconditioning has been completed and the car is ready to be sent out again.

The Pennsylvania Railroad has for some years maintained three master scales, the most important of which, from the standpoint of the number of its test weight cars calibrated, being that located in the system scale shop at Altoona. Shortly after completion of the first plate-fulcrum track scale at East Tyrone, the need of a more satisfactory master scale at Altoona was apparent. As has already been indicated, the plate-fulcrum track scales had been found to be more sensitive and to maintain their adjustment more closely than preceding types. Test weight cars had been developed which were more constant in weight under service conditions. It therefore remained to provide a facility for checking the weights of test cars, which would be at all times beyond question.

ACCURACY IN WEIGHING TEST WEIGHT CARS

The importance of unquestionable accuracy in the weight of test cars can not be overestimated. As an indication of the situation, in 1926 the Pennsylvania Railroad handled 230,000,000 tons of freight. The revenue derived from transporting this enormous tonnage was based directly on the weight thereof, and as an exceedingly large proportion of such weights must be determined on track scales, it is obvious, for both the railroad and the shipper, that the facilities for determining the correctness of the track scales must be adequate and of the greatest obtainable accuracy.

When the scale shop was recently moved to its new and larger building, it became necessary to either move or replace the old master scale, and the decision was finally reached to install in the new shop building a new plate-fulcrum master scale, the first of its kind in the United States, in fact, in the world, as far as we can find record.

In the design of this scale the following general principles were agreed to:

1. It should conform to the general specifications of the American Railway Association for master scales of the knife-edge type as far as those specifications were applicable.
2. It should be installed under cover in a location as free as possible from vibrations due to machinery, train, or other causes, and where it would not be run over by cars or material not to be weighed.
3. It should be used primarily for calibrating test weight cars or for other special weighing where extreme accuracy might be required. It should not be used for general weighing.
4. It should be of the two-section type, with multiple of 100:1 at the butt of the beam.
5. The scale rail should be 12 feet long, and should be located centrally over and entirely inside the span of the scale bridge. The approach tracks should be on a tangent for at least 25 feet in each direction from the scale.
6. The capacity of the scale should be 150,000 pounds.
7. It should be capable of adjustment, and the maintenance of such adjustment should be possible within the limits shown in the following tabulation, respectively:

Test load in pounds	Tolerance in pounds	
	For adjustment	For maintenance
20,000 ----	3.00	6.00
30,000 ----	3.68	7.36
40,000 ----	4.24	8.48
50,000 ----	4.75	9.49
60,000 ----	5.20	10.40
70,000 ----	5.62	11.22
80,000 ----	6.00	12.00
90,000 ----	6.37	12.74

NOTE.—The figures shown in the above tabulation are those adopted by the United States Bureau of Standards and by the scale committee of the American Railway Engineering Association.

8. The design and installation of the scale should be such as to enable the above tolerance requirements to be consistently met and the adjustment of the scale to be held constant.

In addition to the foregoing general principles, the further requirement was laid down by the management of the Pennsylvania Railroad that, regardless of the Bureau of Standards' tolerances, the proposed scale was to be consistently accurate to the irreducible minimum limit.

With these specifications and requirements as guides, the manufacture of the scale was completed and the installation was accomplished in due time to the apparent satisfaction of all concerned, at a total cost of approximately \$32,000.

DETAILS OF CONSTRUCTION

Some of the details of the scale are described as follows:

The inside dimensions of the pit which is of monolithic reinforced concrete, are 24 feet by 11 feet by 10 feet $2\frac{7}{8}$ inches deep. The inside dimensions of the neck are 6 feet 8 inches by 8 feet. The neck is covered with a concrete ceiling supporting the beam cabinet, reinforced to sustain within the permissible limits of deflection the weight of the cabinet and the load transmitted thereto by the beam rod. All piers supporting any part of the lever system were bush hammered and carefully rubbed down to exact level. Walls or piers, part of the foundation, support the approach tracks rigidly. Access to the interior of the pit is by means of a stairway leading to the neck.

The lever system is of the two-section type and the multiples of the various levers are as follows:

Main levers, $3\frac{1}{2}:1$.

Longitudinal extension levers, $6\frac{6}{7}:1$.

Transverse extension lever, $4\frac{1}{6}:1$.

Total multiplication to butt of beam, 100:1.

In the design of this scale every effort was made to incorporate parts which were already standard in the existing 52, 62, and 75 foot track scales. Therefore, the main base plates, fulcrum stands, main levers, connections between main and longitudinal levers, heel castings, nose irons, and connections between longitudinal and transverse extension levers are standard parts. The main base plates are of cast iron, the top and bottom surfaces of which are machined, and are secured to the foundation by means of cinch anchor bolts, placed after the base plates were accurately spotted. The fulcrum stands are bolted to the upper surfaces of the main base castings, and are accurately doweled to exact location.

THE FULCRUM PLATES

The fulcrum plates throughout the lever system correspond in form to the standard design used in connection with track scales, and are made of special chrome vanadium steel. The physical properties of this steel are:

Elastic limit.....	pounds..	95,000
Ultimate strength.....	do.....	125,000
Elongation in 2 inches.....	per cent..	21
Reduction in area.....	do.....	61

These plates receive a special heat treatment, after which they are machined and ground to exact dimensions as shown by the drawings and are jig drilled to permit interchangeability of like parts. To absolutely insure this interchangeability, all surfaces against or on which the fulcrums bear are accurately scraped to exact planes. This provides perfect contact and freedom from initial strain in the plates when they are secured in place. No plates are used in direct tension.

GENERAL SPECIFICATIONS

Both the longitudinal and transverse extension levers are of composite construction. The lever itself consists, in each case, of a 20-inch, 140-pound H beam, to the ends of which special castings are securely fastened by means of taper-fit alloy-steel bolts. The casting at the butt end of the lever is designed to receive the butt fulcrum plate and load plate, while the casting at the tip end of the lever is designed to receive, in full machined ways, the nose iron, the movement of which is controlled by an adjusting screw. The selection of the section used as the main part of these levers was based on a deflection limit of one sixty-fourth inch.

The connection between the longitudinal extension levers and transverse extension lever is made through a platen which is suspended from the transverse lever, and to which the load is applied by compression through vertical connections with the longitudinal levers. These connections are provided with fulcrum plates at both top and bottom, and screw adjustment is provided at the bottom in order to permit vertical alignment at normal temperature. The primary purpose of the compression connection is to compensate for changes in length of the longitudinal levers, caused by temperature variations, which, without this arrangement, would affect the accuracy of the scale. The load platen is stayed to the foundation in order to maintain accurately its position, and a stay rod is also applied between the tip end of the transverse extension lever and the pit wall, for the same reason. These stays permit free vertical movement, within the necessary limits, of the scale parts to which they are bolted.

THE WEIGHBRIDGE

The weighbridge consists of one 30-inch, 180-pound rolled section under each of the scale rails. These beams, which are heavily cross-braced, are supported on the main bearing plates of the lever system, through suitable cross girders. On the bridges are mounted combination crossties and rail columns of cast iron, and accurate alignment of these castings is obtained by means of machined steel pads which were welded to the upper surface of the girders at proper points. The weighbridge is stayed by a plate applied at one end to prevent both longitudinal and transverse motion (see fig. 3), and by a stay rod applied at the other end to prevent traverse motion.

THE WEIGHBEAM AND INDICATING MECHANISM

The entire pit is covered with a steel deck supported by channel sections and at such elevation with respect to the scale mechanism that the tops of the scale rails fall below the top surface of the deck.

The openings which are necessary on account of this condition are covered, when the scale is not in use, by hinged steel plates which present no obstacle to walking across the deck. When the scale is in use these plates are turned back. Some difficulty having been experienced on account of air currents through these comparatively large openings, a series of baffle plates was later introduced to break up the air currents. Arrangements were also made to maintain more uniform temperatures in both the pit and the beam cabinet with thermostatic control. The surface of the steel deck is coated with mastic, $1\frac{3}{8}$ inches thick.

The weighbeam mechanism is entirely inclosed in a cast-metal frame cabinet provided with hinged plate-glass windows. (See fig. 4.) A glass partition is provided between the operating handles referred to below and the rest of the cabinet, so that, even when the scale is in use, no air currents can strike the beam. The interior of the cabinet is illuminated by a series of incandescent lamps similar in type and location to those usually seen in show cases.

SENSITIVITY OF SCALE

The connection from the tip end of the transverse extension lever to the weighbeam, which is located in the upper section of the beam cabinet, is through a twin steelyard rod which passes through an oil seal at the base of the beam cabinet. The load thus applied to the butt of the beam 4 inches from the main fulcrum is counterbalanced by three groups of telescopic counterpoise weights. The first group of nine 100-pound weights is located 8 inches from the beam fulcrum; the second group of nine 1,000-pound weights is located 20 inches from the main fulcrum; and the third group of fourteen 10,000-pound weights is located 40 inches from the main fulcrum. The fractional bar is graduated at 1-pound intervals up to 100 pounds, and the use of a vernier poise on this bar permits accurate readings to be taken to the nearest one-tenth pound. The beam is sensitive to this amount under a load of 100,000 pounds and by means of adjustment provided can be made much more sensitive than this without the usual tendency to become unstable.

The manipulation of both the telescopic weights and the vernier poise is controlled by operating levers in the middle section of the beam cabinet. This operating mechanism is interlocked mechanically with the beam-locking device in such a way that no telescopic weight can be applied or removed at any time unless the beam is locked. The amount represented by the telescopic weights when applied to the beam is indicated to the weigher by vertical bars connected with the operating mechanism on the face of which are numerals that correspond to the weight.

ACCURACY OF COUNTERPOISE WEIGHTS

The equilibrium of the beam is shown by the position of the indicator or pointer, which is connected to tip of the main beam to magnify its motions. The tip of this pointer moves across a graduated arc the middle graduation of which corresponds to a horizontal position of the main beam. Zero load balance of the weighbeam is obtained by two balancing weights which have screw adjust-

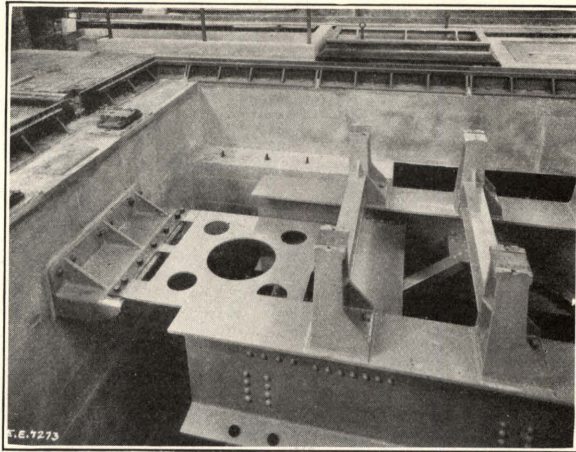


FIG. 3.—Section of scale bridge of plate-fulcrum master scale showing longitudinal stay plate connected

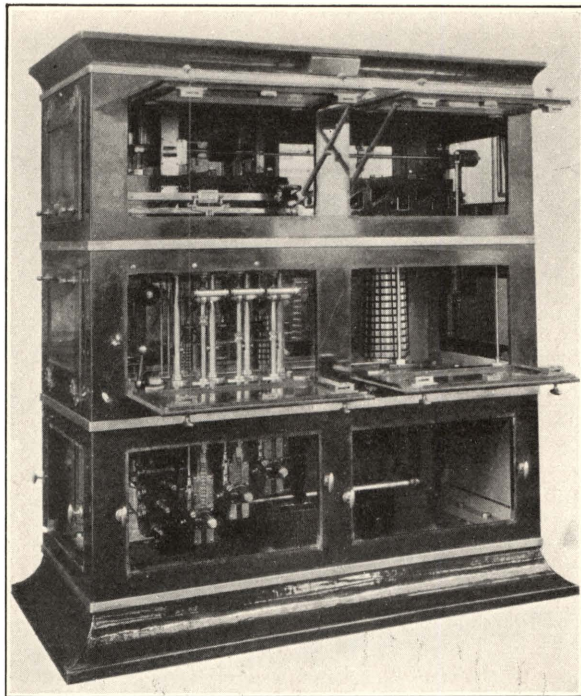


FIG. 4.—Beam cabinet of plate-fulcrum master scale showing beam-indicating and beam-control mechanism

ment. The sensitivity and frequency of the beam are controlled by vertically adjustable weights supported on spindles and located, respectively, over the main fulcrum of the weighbeam and the fulcrum of the indicator pointer. The tendency of the beam to respond to outside influences is controlled by means of an oil dashpot in which vertical oscillation of the beam causes horizontal displacement of the oil in the dashpot, which is connected with and operated by the indicator referred to above.

INTERNAL OPERATING MECHANISM

The telescopic counterpoise weights, and also the vernier poise used on the fractional bar, are gold plated to prevent tarnishing or change in mass due to oxidation. Before being applied to the scale these weights were submitted to the Bureau of Standards, where they were tested, as a result of which the bureau furnished a certificate to the effect that the weights had been found to be correct within the limits of tolerances for class A weights and to remain constant within one-fifth of these tolerances during a period of three months. The following tabulation shows the tolerance values referred to in the Bureau of Standards certificate:

Weight	Weight value	Tolerance
	<i>Pounds</i>	<i>Grain</i>
Fractional poise.....	0.25	0.1
100 pounds telescopic weight.....	.5	.1
1,000 pounds telescopic weight.....	2.0	.3
10,000 pounds telescopic weight.....	10.0	.8

The spindles supporting the telescopic weights are also gold plated. The lower section of the beam cabinet is devoted entirely to the weight-operating and interlocking mechanisms. The manipulation of the telescopic weights is accomplished by means of rack and quadrant mechanism suitably counterbalanced to obtain uniform resistance when raising or lowering the spindles which control the telescopic weights. When the sealed and tested counterpoise weights and the fractional poise were received at Altoona from the Bureau of Standards, the weigh beam was set up and the beam was sealed to the weights on the basis of the established multiple at the butt of the beam of 100:1. After this had been done, the beam was connected to the scale proper and the scale was carefully tested up to 100,000 pounds with carefully calibrated weights. The weights used in this test had previously been sealed by the Bureau of Standards, and the probable error of the entire nest of weights has been determined to be 0.24 pounds. This value is materially less than the tolerance adopted by the Bureau of Standards for this class and quantity of test weights.

CALIBRATION OF SCALE

The weights were applied at each end and at the center of the scale. While it is realized that this condition of loading does not correspond to either actual weighing or to the load used by the Bureau

of Standards in their routine master-scale tests, it is believed that the method of concentration used constitutes a more severe test than with the load applied on four wheels. In view of this, it is also believed that when the official Bureau of Standards test is made the performance of the scale will be even better than that determined by the tests made up to this time, in which a maximum error of five-tenths pound under a load of 100,000 pounds has been developed.

A MASTERPIECE IN DESIGN AND CONSTRUCTION

The completion of this scale has thus far been received by members of the engineering, mechanical, and scale professions in a most gratifying manner. It is generally conceded by all who have seen it that it is a masterpiece in both design and construction, especially for a scale of its capacity.

The original design was worked up under the direction of A. H. Emery (deceased), former civil and mechanical engineer, Glenbrook, Conn., while the work of redesigning the scale was done in the engineering department of the Pennsylvania Railroad at Altoona, and was participated in by A. S. Vogt (deceased), former mechanical engineer, who should be given great credit for his many valuable and helpful suggestions, R. N. Miller, assistant engineer, the writer, and others.

That the scale has finally been completed and installed is due to the persistent efforts and personal interest taken in the matter by J. T. Wallis, assistant vice president in charge of operation, Pennsylvania Railroad, whose foresight and ability made this achievement possible.

(At this point Mr. Harrison illustrated by means of lantern slides a number of matters discussed in the above paper.)

Mr. HARRISON. In conclusion I wish to say that through the courtesy of the secretary we have some illustrated pamphlets here descriptive of this master scale, and every one of you is welcome to help himself. I also wish to say that any of you or any of your friends who are interested in this installation will be most welcome at any time that you care to stop in Altoona to see it.

SCORING MACHINES FOR ICE

By G. A. VOTAW, *Commissioner of Markets, Weights, and Measures, Cleveland, Ohio*

Mr. Chairman, delegates, and friends, the merchandising of ice has always been a most perplexing problem for weights and measures officials. Years ago when ice was cut from lakes, ponds, and streams it was so cheap that the exact weight or size of a piece was of little importance. The most costly item in connection with ice service was the delivery labor, and little attention was paid to weights.

Later, sources of pure natural ice became scarce and the use of ice manufacturing machinery became general. The cost of labor and other items became higher and the price of ice advanced accordingly. The weight of a delivered piece of ice now became a matter of considerable importance to three distinct parties—the consumer, the ice company, and the driver or delivery man.

As was to be expected, the delivery man and the company were careful that their interests did not suffer, and when the price became an inducement the domestic customer began to suffer a considerable loss because of short weight.

Many laws and ordinances were passed to correct this evil. Some cities passed weight ordinances applying specifically to the ice industry, such as requiring each piece to be weighed, and in some cases specified that scales be carried on each delivery wagon. Weights and measures officials in many localities made strenuous efforts to see that these laws were enforced and that the public received fair treatment from the iceman.

Our department at Cleveland was no exception. Special crews of inspectors were assigned to checking the ice dealers, often 50 per cent of all inspectors of the department being assigned to this work. An average of two or three cases were in court every morning, and it was not unusual to have 10 or 12 in a day.

Even with all of this attention and activity, the public, the newspapers, and the ice dealers were dissatisfied. There seemed to be no solution for the problem. Weights and measures ordinances as applied to other articles could not be enforced in the ice business.

If a customer wanted a 25-pound piece of ice and the delivery man actually wanted to give the patron all she was entitled to, she would either get more or less than the sale called for. Even the most expert iceman could not hope to cut 25, 50, and 75 pound pieces without a variation of 2 or 3 pounds. Hence, if the ice man was an expert and 100 per cent honest, or if the law enforcement was 100 per cent perfect, the most that could be said was, "There are as many people getting overweight as there are getting short weight," or "On the average a customer will get overweight about as many times as he will get short weight."

The ice business is seasonal. Men were changed often, and in unusually hot weather the use of inexperienced men was often imperative. What an inexperienced man did to a big block of ice with an ice pick was often far different from what he intended to do when he started to work on it. The pieces were often irregularly shaped and seldom of uniform dimensions. If a piece was a few pounds short, the customer would get it just the same. The iceman could not paste another piece on, and no one would thank him for a large piece and 3 or 4 pounds in chips. If the piece weighed 2 or 3 pounds overweight, it was sold just the same, but for every piece overweight there would be a small one for some one else.

In checking the icemen in Cleveland the inspectors did not molest a man if his overweight about balanced his short weight, except where the variations were out of reason, which sometimes happened with inexperienced men. Some customers learned they could get overweight by bribing or threatening the delivery man, and thus managed to profit by the loss of others. Because exact and accurate weight was unusual and because customers had no way of telling when they were being cheated the opportunity to profit by dishonesty was very great.

Reputable ice companies adopted many plans to protect their customers. One company of Cleveland tried to prevent their employees from giving short weight by selling ice only on a ticket or

coupon basis. No employee was permitted to sell ice for cash. Tickets were sold in sealed packages, and \$100 reward was offered for information leading to conviction of any employee selling loose tickets or selling ice for cash. It was hoped that the men would be unable to sell ice for cash, and would thus have no inducement to short weight their customers. No plan was found, however, that would guarantee full weight to all customers, and under the very best conditions the system was a crude hit-and-miss game.

This unsatisfactory condition and the disrepute cast upon the ice industry caused certain leaders in the business to develop a mechanical means of marking the ice. A period of experimentation has extended over a term of about five years and has developed the ice-scoring machine. This is a machine which marks the large blocks of ice into regular and uniform pieces which are sold for 25 pounds. The machine consists of two sets of saws. One set cuts a groove about 2 inches deep, along each side lengthwise of the block; the second set cuts grooves crosswise on each side of the block, thus marking it into regular cubes. The marks or cuts are not deep enough to cause the large block to break and yet a few sharp jabs with an ice pick in the grooves will split it into the desired number of pieces. It is very difficult to cut the blocks without following the grooves because the ice has a tendency to crack along the marks of the saw teeth. Should a dishonest delivery man succeed in cutting a block differently than intended, he will have pieces with the grooves in the center and anyone can tell at a glance that he is not delivering properly sized pieces.

I can safely say that this machine has solved the short-weight problem in the ice business so far as Cleveland is concerned. Instead of requiring 25 to 50 per cent of our inspection force during summer months, we now check the ice dealers only periodically, and a complaint on short weight of ice is very unusual.

Our experience has taught us that the ice-scoring machine makes it possible to remove all guesswork in the selling of ice by weight. It makes it possible to fix the responsibility for short weight directly upon the one responsible for the violation. The remedy is simple and positive.

The few justifiable complaints we have received were due to carelessness on the part of some one operating the machine. We have not found a single case where there was evidence of dishonesty on the part of the delivery man. In other words, they can not beat the scoring machine. When we compare this condition with the time when every summer day found several inspectors tied up in court and two or three icemen in the workhouse, we are very well pleased.

To merchandise ice with the scoring machine, however, most companies will have to make some radical changes in their present system and practices. These changes will involve all departments of the business, including the manufacturing. All blocks must be made of a uniform size, shape, and weight. The saws are set in a rigid position and irregularity of the block will cause the pieces or cubes to be irregular in size and weight.

It is a common practice with some companies when ice is needed badly, to increase the capacity of the plant by pulling the blocks before the cores or centers of the blocks are completely frozen, thus

leaving a deep hole or cup in one end. With the scoring machine, this would, of course, cause the cubes at that end of the block to be short weight. Hence, the scoring machine makes it necessary to leave the blocks in the tank until they are completely frozen. Blocks of ice that are taken from the storage rooms and handled carelessly may have large pieces broken off the corners. Blocks of this kind can not be scored through the machine so as to give uniform weight, and hence, should not be sold except in bulk.

If the cubes are to be sold for 25, 50, 75, and 100 pound pieces, it is, of course, necessary to make adequate allowance for the loss in scoring and for the melting which is likely to occur before the ice is actually delivered to the home. In Cleveland, for example, it had been the custom to freeze the ice in 400-pound blocks. When the scoring machine was introduced it became necessary to reduce the size of the block to 380 pounds. This block is now scored into 14 uniform cubes which are sold for 25 pounds each. Anyone wanting a larger piece receives their desired weight by taking any number of these cubes. Of course, the block is not actually separated into the cubes until it is delivered, so that anyone getting 100 pounds can have one large piece of ice made up of four 25-pound pieces. The actual weight of each of these smaller pieces is about 27 pounds. This allowance has proven sufficient, so that the last customer served from the wagon receives something more than the 25 pounds.

Under the old system many companies attempted to guarantee their customers full weight by making liberal allowances on the large blocks for shrinkage. For example, they would require the delivery man to report and pay for only 380 pounds out of a 400-pound block. They soon found, however, that this only added to the graft of the delivery man and the more allowance the company made the greater the opportunity for graft their delivery man had. With the scoring machine the full allowance for shrinkage must be delivered to the customer; hence, all allowances made by the company result in a corresponding benefit to the public.

Shrunken ice or blocks that have melted due to hot weather present a problem. The scoring machines are expensive, and hence are installed at the manufacturing plants. In Cleveland we have many substations called cash-and-carry stations, or in some localities they are known as jitney stations. They are insulated coolers where ice is received in large truck loads and the customers then come to these stations for their own ice. If ice is permitted to stand in these cash stations overnight, the blocks frequently melt down, so the cube will not weigh 25 pounds. There is only one solution to this problem; that is, to keep fresh blocks in the cash stations at all times and the melted blocks must be picked up and sold in bulk.

You will observe that the scoring machine in some ways is a source of extra expense and annoyance to the ice companies. It also removes all chance of profit from short weight to the company or the delivery man. The companies installing them have also received many benefits; first, and most important, they have been able to place their business on a legitimate basis and have removed the stigma of suspicion from the industry. It has speeded up deliveries, because very little time is now wasted in cutting ice into the desired pieces.

Inexperienced men can now be employed during the rush season, so that it is not necessary for the companies to carry so large a number of men during cold weather.

The scoring machine is in such general use in Cleveland, and the public has accepted it with such enthusiasm, that it would be very difficult to market unscored ice to the domestic users in our city. If one company in a community can be induced to install these machines, competition will soon force all others to follow, and one of the most difficult problems of the weights and measures department will have been solved.

(At this point Mr. Votaw illustrated by means of lantern slides the ice-scoring machines, scored blocks of ice, cakes of ice of various sizes being weighed, etc.)

DISCUSSION OF ABOVE PAPER

A DELEGATE. What do these machines cost?

Mr. VOTAW. I do not know; I am not in the ice business.

Mr. BELLIS. Where are they manufactured?

Mr. VOTAW. There are a number of makes, produced in various places. Some are made in Toledo.

Mr. BELLIS. No doubt it is a good plan.

Mr. VOTAW. When you get the ice guaranteed the dealers do not have to bother with a scale on any of their ice wagons. In fact, we do not ask them to do so because a 380-pound block is sold for 350 pounds, and while some of that excess is lost in "ice dust," resulting when the saw goes through the block, each small cube will weigh close to 27 pounds. In case the sawed blocks are held at the station overnight and melt so that the cubes will not weigh 25 pounds, we compel them to sell such ice in bulk to large consumers for just what it weighs at the time of sale.

Mr. FOSTER. You have no natural ice?

Mr. VOTAW. No, sir; while a number of our plants have the old 400-pound or 420-pound cans, they regulate their filler so as to use 380 pounds of water and get 380 pounds of ice. As I have said, the blocks must be frozen solid.

Mr. SWEENEY. Do you operate under a statute or an ordinance?

Mr. VOTAW. No, sir; there is no statute nor ordinance to force the use of the machine, but when our people ask for 25 pounds of ice we want to see that our people get 25 pounds. We are cooperating with our ice companies who want to see that the people get their full weight. We want to prevent some from getting a larger piece and others a smaller piece, and when they put it through the machine it is a guaranty.

Mr. SWEENEY. Suppose a man sawed ice 5 pounds short, would you prosecute him?

Mr. VOTAW. Yes, sir; we would prosecute the manufacturer. There is only one man responsible, for after the saws are once set they will always cut the same sized blocks.

Mr. SWEENEY. It seems a rather peculiar situation, to permit the use of a machine of that nature to determine weights.

Mr. VOTAW. The machine does not weigh, it only cuts; but through those cuts we guarantee you that you will get 25 pounds or a fraction over.

Mr. SWEENEY. A man could not buy a 30-pound piece under that system.

Mr. VOTAW. No, sir; the cubes weigh 25 pounds or multiples of that weight.

Mr. SWEENEY. You permit them to sell scored 25-pound pieces of ice without weighing them. Is your indorsement of their method of selling ice a declaration on your part that they can not sell it any other way?

Mr. VOTAW. No; you can go to any of the manufacturing plants and probably get any kind of piece you want; but from their cash-and-carry stations you can only get it in 25, 50, 75, and 100 pound pieces, etc.

Mr. SWEENEY. What do you figure the loss is by scoring?

Mr. VOTAW. I do not know, but it can be determined.

Mr. BELLIS. I weighed about 50,000 pounds of scored ice at three different factories last week, and I figured that the loss was about 1 per cent. The machines that I saw cut it into 25 and 50 pound pieces.

Mr. VOTAW. I might add that one firm put in the scoring machine and the rest quickly followed.

Mr. BELLIS. The ice-manufacturing firms I am familiar with claim that they allow a margin of about 20 pounds for shrinkage. I have been on the job and checked them and I think the people are getting nearer to the correct weight than before.

Mr. CLUETT. Mr. Votaw, are these saws adjustable?

Mr. VOTAW. They are adjusted when the machine is set up.

Mr. CLUETT. How would you prevent them from changing the saws? How would a purchaser know he was getting a 25-pound piece instead of, perhaps, a 20-pound piece?

Mr. VOTAW. We have checked the weight of blocks from time to time and find they are of the weight guaranteed by the manufacturers.

Mr. SWEENEY. Suppose a combination of dealers, such as we have around these large cities, get together and buy ice at wholesale. Suppose they buy the ice from these manufacturing concerns and then bring it into their own place and start to cut it into 20-pound pieces instead of 25-pound pieces. Don't you think that would be the cause of confusion?

Mr. VOTAW. If your sealer were asleep on the job, yes; but I dare say that in the city of Cleveland it would not last a day. We do not care how they score it, but it must be full weight.

Mr. STEPHENSON. During the past winter about six of the largest dealers in Rochester merged and we now have a large plant manufacturing scored ice. I weighed a number of pieces and found that a 50-pound piece weighed 54 pounds and a 25-pound piece weighed 28 pounds. There are a lot of manufacturers who do not sell scored ice. While our law says ice must be sold by net weight, dealers attempt to sell it by the block.

Mr. VOTAW. I will say that years ago we used to have that trouble, but we have no such trouble any more since we have the ice-scoring machine method.

Mr. STEPHENSON. We are trying to stop it. At this time of the year we see that every wagon has a proper scale on it. We started

a week ago. In one case a block, supposedly 100 pounds, weighed 60 pounds. I asked the purchaser if he had it weighed, and he said "No." We find after checking a few ice men that we have little trouble.

Mr. VOTAW. Of course, all of the ice wagons and jitney wagons have scales and will gladly weigh the ice. We do not bother the wagons; we wait for the delivery to be made. The ice is not any more than delivered and the iceman barely turns the corner when our man checks the delivery.

Mr. SWEENEY. Did you ever find any of the tanks short which determine whether the retailer gets the full weight?

Mr. VOTAW. No, sir.

THE TESTING OF STANDARDS OF LENGTH

By L. V. JUDSON, *Bureau of Standards*

Mr. Chairman, the paper now to be presented is one of a number of papers dealing with methods of testing, given from time to time before these conferences by members of the Bureau of Standards staff.

The remarks which I have to make relate chiefly to the comparison of your secondary, office, and working standards with your primary standards, although many of them apply also to our methods of comparing your standards with the standards of the United States, and some of them likewise apply to your field measurements.

It may be of interest to mention at this time that there will be exhibited to you during the trip that is to be made through the Bureau of Standards, our precision length comparator, so that those of you that care to will have an opportunity to see it. The tape-testing laboratory for the testing of the ordinary commercial steel tapes and of the geodetic tapes of the Coast and Geodetic Survey will also be visited.

I believe that in only a few of the States, possibly two or three, are there any elaborate comparators or tape benches in the State departments or available for their use. The problem is then to obtain sufficient precision with the available apparatus.

Let us consider some of the factors to which attention must be given in making precision length comparisons.

No matter what apparatus is used, the effects of temperature must be given consideration. If the air in a room is increasing or decreasing in temperature very rapidly, temperature equilibrium in metal length standards or other similar objects will not be reached until some time after the temperature has become fairly constant. To use a rather extreme case you know that the electric iron of the housewife retains its heat for a considerable length of time after the current has been shut off. Since, for purposes which we have to consider here, the change in length of a standard may be taken as proportional to changes in its temperature, it is essential that the standard be kept at a rather constant temperature for several hours before measurements are made. The average expansion coefficients of several materials used in length standards are given in the following table. Each of these represents the fraction of a unit length—the

part of a yard per yard, or of a foot per foot—which a bar expands or contracts in length for an increase or a decrease in temperature of 1° F.

Platinum iridium -----	0.000045
Steel -----	.000065
Brass -----	.0000100
Nickel -----	.0000070
Invar -----	.0000005

To illustrate the part which temperature variations play in the comparison of length standards and also the use of the above coefficients in such work, let us suppose that one desires to compare a brass standard yard with a steel standard yard of the same cross section, and that these bars have been subjected for several hours to similar temperature conditions and that there has just occurred a rather rapid temperature increase of 5° F. How soon after this temperature increase could the comparison safely be made if it were desired to eliminate errors of comparison of 0.0005 inch or more, due to temperature variations alone?

Now were the temperature of the air to be read correctly and recorded and used as the temperature of the comparison, the computations might be made on the basis of a temperature higher than the actual temperature of the bars by a maximum of 5° F. The brass bar in consequence might be determined as too long by the following amount, namely,

$$0.0000100 \times 5 \times 36 \text{ inches} = 0.0018 \text{ inch,}$$

while the similar equation for the steel bar would be

$$0.0000065 \times 5 \times 36 \text{ inches} = 0.00117 \text{ inch.}$$

The difference between these two results, namely, 0.00063 inch, would be the maximum error probably resulting solely from the fact that the temperature of the bars was not known and was incorrectly recorded. Since this maximum is only slightly greater than the 0.0005-inch error assigned above for the temperature variation, and since the bars would constantly be coming closer and closer to the temperature of the surrounding air with the result that the error would be constantly decreasing, therefore, under the state of facts given, only a short time would need to elapse before it would be safe to make the measurements. If, however, a smaller error due to temperature variations is to be guarded against, a much longer time would be needed since the rate of the change of temperature of the metal bars continually decreases as they approach nearer and nearer the equilibrium temperature. Thus in high-precision work it is customary to allow many hours, perhaps even a day, to elapse to enable the bars to come to the temperature of the surrounding medium.

There is another source of error, possibly of more importance than temperature change, namely, that due to parallax. You doubtless all have known of this sort of error from your experiences, for instance, with visible liquid-measuring devices or with indicators on automatic scales which are placed too far from the reading face. When using a simple magnifier or the unaided eye, it is essential for accuracy that the parallax error be avoided. Hence we try to have

the two scales which are being compared, in the same plane. With comparators using micrometer microscopes, the remedy for parallax is to secure a better focus.

For very precise work it is essential that a standard be supported at very definite points, as otherwise distortion of the bar may cause errors. Bars used in high-precision work have been designed with a cross section of such a type that the probability of distortion has been reduced to a minimum.

In length measurements there is apt to be need of discrimination and judgment in deciding just what constitutes the interval on a bar; poor lines are sometimes encountered even on what appear to be good-quality standards. Intervals on the best grade of standards are defined as the distances between two graduations, using that portion of the graduations between two parallel longitudinal lines about 0.2 mm apart; on other standards the portion of the line to be used is that portion at the edge of the bar.

Turning now to tapes, there is an additional feature which must be given attention, namely, tension. The standard tension is 10 pounds (4.5 kilograms) for tapes 25 to 100 feet or from 10 to 30 meters in length, and 20 pounds (9 kilograms) for tapes longer than 100 feet or 30 meters, when supported throughout their entire length. A variation in tension will obviously result in a variation in the length of a tape whether it is supported throughout or at intervals. This variation for a 100-foot tape supported throughout, will be about 0.001 or 0.002 foot per pound, depending upon the cross section of the tape. 68° F. (20° C.) is the standard temperature at which steel tapes are standardized according to the bureau specifications. The nominal value given as the expansion coefficient for steel tapes, namely, 0.00000645 per 1° F., is sufficiently accurate for ordinary steel tapes through the range of temperature at which they will be used, so that it may safely be assumed as the actual expansion coefficient for such tapes.

In Bureau of Standards Handbook No. 1, Manual of Inspection and Information for Weights and Measures Officials, there is given a brief description of two types of equipment for testing steel tapes. For most of you I presume that a rather simple device will be necessary, possibly marks on the floor of some building, along a wall, along a railroad track (on a siding), on a bridge, or on posts set in the ground. Permanence in distance between marks would be desirable, but not essential, because the interval should be measured up in any case with a standardized tape each time that a tape is being tested. Two tapes can be directly compared with one another, but as a rule this is rather awkward and inconvenient, probably leading to greater errors than any which might be avoided by this method. A substitution method is preferable.

Probably there is no one with much experience in measurements where tolerances are involved who has not encountered the problem of what to do with the tested article which is "just exactly on the tolerance limit." In the case of a sealer's standard found to be at the limit prescribed for a sealer's standard, it might be well to retest, using more refinements in methods, or to have a recheck made by another observer. If it is still found to be in error by the full

amount allowed, it will usually be advisable not to use it as a standard.

Since there is a tendency for many length standards to change in length over periods of time, they should be checked at regular intervals. Section 5 of the model law provides that the State weights and measures official shall submit the State standards at least once in 10 years to the National Bureau of Standards for certification. I have not checked up to determine how many States have such a clause in their law, but I do know that State standards of length are not submitted for test as often as might be desirable if the highest precision is to be maintained.

(During the course of this paper Doctor Judson illustrated by means of lantern slides some of the apparatus and standards used in the bureau in the testing of standards of length.)

DISCUSSION OF ABOVE PAPER

Mr. SWEENEY. Mr. Chairman, I would like to ask the gentleman a question. Suppose you were testing out a steel tape using a 10-pound tension. Have you ever made a calculation as to the change that a variation of one-sixteenth of a pound would cause?

Mr. JUDSON. One-sixteenth of a pound would not make a readable difference in the length of a tape of the ordinary type; however, if this small weight were added to the tension on a tape with very fine graduations, and micrometer microscopes were used to sight on the lines, the change in the length could be observed and measured. A variation in the tension of 1 pound on a tape 100 feet in length will result in a variation in the length of approximately 0.001 inch, when the tape is supported throughout. If the tape is supported at intervals the variation will be considerably larger, depending upon the weight of the tape.

Mr. SWEENEY. What do you mean by "supported throughout"?

Mr. JUDSON. By "supported throughout" I mean that it is resting throughout its length on a smooth surface.

Mr. SWEENEY. Do you weight it to keep it down? You know that sometimes a tape, after use, has a tendency to twist and curl up and even if you have a weight on it you do not entirely overcome this tendency.

Mr. JUDSON. Yes; I agree with that; with such a condition you can not get high precision results.

The ACTING CHAIRMAN. Are there any other questions? If not, and there is no objection, the meeting will stand adjourned until to-morrow morning at 9.30 o'clock a. m.

(Thereupon, at 4.45 o'clock p. m., the conference adjourned to meet at 9.30 o'clock a. m., Wednesday, May 25, 1927.)

**THIRD SESSION (MORNING OF WEDNESDAY, MAY 25,
1927)**

The conference reassembled at 10.12 o'clock a. m. at the Bureau of Standards, Dr. George K. Burgess, president, in the chair.

ADDRESS BY THE PRESIDENT, DR. GEORGE K. BURGESS

I am very sorry, indeed, that I was unable to be with you yesterday at your opening sessions. It so happened that I had a very important official engagement out of town and thus was unable to be present. However, I certainly am only too glad to-day to welcome this conference again to Washington. I am impressed with the fact that this is our twentieth meeting and am surprised to find that this is the fifth conference over which I have had the honor of presiding. There are some 24 States represented here, including the District of Columbia and Porto Rico, which, while not quite up to our record of last year when we had 28 States represented, is a good attendance.

I am very sorry, indeed, to have to announce that Secretary Hoover is still on the Mississippi and not able to be with us this week. He had agreed to speak before you—you remember that he has spoken at every conference since he has been Secretary of Commerce—and takes a very great deal of interest in your work. He considers it one of the most important activities in which the Department of Commerce has an interest, and on account of his many contacts with the industrial and commercial relations of the country, he is in a position, certainly, to appreciate, perhaps, more than any other man, the value of the work of the State and municipal and other officials in keeping our weights and measures up to standard. I was sorry also to learn that Doctor Stratton was unable to be with us to-day on account of the fact that he was compelled to attend another meeting. He maintains a very great interest in the work of this conference. I see him frequently, and he always asks what progress you are making.

I am glad to state that the proceedings of the nineteenth conference were published and distributed in good time this year. I trust that you all have received them and appreciate, as we do here in the bureau, the very valuable material that is contained in that volume of proceedings.

You will remember last year that I started the practice of giving a short résumé of Federal weights and measures legislation in contemplation, or actually passed, so that we might get this in our official record for convenient reference. This is the year of the short session, and no new item was brought up.

Specific reference to the action taken on a few of the more important items heretofore mentioned, is made as follows:

H. R. 9096, the bread bill, introduced by Representative Brand, of Ohio, was reported out of the Committee on Agriculture on June 8, 1926, with amendments and recommendation that the bill pass. A minority report, signed by two members, disapproved the bill on the grounds that it served no useful purpose. One of the two amendments proposed by the committee related to the exclusion of special breads used as a diet, and the other amendment struck out the provision for the disposition of illegal bread "by destruction or sale," leaving the matter to the court. The bill failed to pass.

S. 2059, the clinical thermometer bill, has passed the Senate twice, but has not yet passed the House. The attitude of the Bureau of Standards on this bill, as on others of this type, is one of neutrality. Upon request we will give technical advice but we do not advocate their passage.

H. R. 6728, relating to the District of Columbia and requiring the marking on the bottle of the name of the distributor of milk and cream, became a law July 3, 1926.

H. R. 5677, the baskets and hampers bill, was reported at the last conference as having been passed by the Senate and then recalled for reconsideration; no further action appears to have been taken.

H. R. 4539, the bill on mill products, was reported by the Committee on Coinage, Weights, and Measures of the House on April 5, 1926, without amendment, with the recommendation that the bill pass. No further action was taken on the bill.

You will note from this brief summary of the status of Federal legislation relating to weights and measures that only one bill has been passed since the nineteenth conference.

Now, there is an item that interests a considerable number of you in connection with which I reported progress at the last conference, and that is the establishment in the Chicago district of a master track scale and depot for the testing of the test cars used for checking scales on the railroad systems of the country. The situation is briefly this: The law is passed and the money appropriated for the erection of this track scale depot on land to be acquired by gift from the railroads. The railroads offered an excellent site, the deed to which contained a reversionary clause which was not acceptable to the Attorney General of the United States. It took some eight months to get to that point, since it had to go before three or four railroad boards before the offer of the deed could be made. The railroad interests have now agreed in principle to grant the land in fee simple upon agreement that the Secretary of Commerce will request that Congress authorize him by law to reconvey the land to the grantor railroad company in case the Government at some future date ceases to use the land for the purpose for which it was conveyed. That is a remote contingency, but in perfect fairness the possibility should be recognized in this transaction. I hope to be able to report at the next conference that we have this very important track scale depot in operation.

It may be of some interest to the members of the conference to mention a few of the standardization activities in which you have some direct or indirect interest.

Standardization, as most of you appreciate, is very much in the public eye at the present time. In general, there are three factors involved: The first is the setting up of the specification; the second is the testing of devices to measure the performance or the quality of the material which has been specified; and the third, in which the bureau is particularly active, is research in relation to standards and their use and application.

The Pan American Standardization Conference, held here in Washington a few days ago, is one of the very recent activities in the standardization field. Their discussion related mainly to raw materials from South American countries. This is the second conference of that type which has been held, and the prospects are that in future the standardization work on an international scale, as represented by the Pan American joint activities, will be very much on the increase. It would be well for us to keep in contact with the decisions reached by these international organizations, as well as by the national organizations.

In the United States the active standardization group representing the country as a whole is the American Engineering Standards Committee and that committee is still active in the cause of commodity standardization.

There are two recent publications of the Bureau of Standards in connection with standardization work: One, the "National Directory of Commodity Specifications," which contains a list of all specifications of a national type which are current in this country, whatever be their origin. Also, the Bureau of Standards has issued the first number of what will be an annual publication, called the "Standards Yearbook." In this are described practically all the standardization activities of the country, with some reference to activities in other countries. Unfortunately, the rules and regulations of the Government do not allow us to distribute this book gratis to those interested. Under the law we are compelled to sell it and, therefore, we can not give copies to members of the conference. It can, however, be obtained from the Superintendent of Documents, Government Printing Office.

Now, a few words in reference to the Federal Specifications Board, an activity in which some of you are interested, which promulgates specifications which are mandatory for use in purchases by all the Government departments. Every department has an opportunity to take part in the formulation of these specifications. We are celebrating next week the issuance of the five-hundredth specification. Many of these are of interest to you in your activities in your various communities. We have noticed a tendency on the part of State and municipal purchasing agencies, as well as institutions and, to a very considerable extent, industrial purchasers and groups of purchasers, to make use of the Federal specifications. Copies of the list of specifications, and the specifications themselves, can be obtained by writing to the Federal Specifications Board at the Bureau of Standards.

There is one thought that I am inclined to interject at this point and upon which I would like discussion later, and that is a closer relation during at least one session of our meetings between the business man and the weights and measures official. I have the thought

that it might possibly be well to invite one or more outstanding business men to present, so to speak, their side of the questions considered here. As I see it in this conference we are interested from three points of view—that of the weights and measures official, of the manufacturer affected, and of the consumer who receives the material upon which the weights and measures official passes.

In connection with the program number, "Methods adopted for regulation of new types of devices," which will be discussed this morning, I would like to make a general remark, to the effect that we have had brought to our attention by another association the desirability of the adoption of some certification plan in connection with specifications for types of apparatus. Now, it seems to me that in the weights and measures field the adoption of some such proposition by the conference presents an opportunity for increased uniformity. The conference draws up specifications for various types of appliances. The manufacturers then, naturally enough, construct products designed to comply with those specifications. The question then arises whether each State should independently investigate the product from the standpoint of compliance and reach an independent conclusion or whether it would not be possible to devise a means of arriving at some general conclusion which would be acceptable to all States.

This afternoon there is on the program a very comprehensive trip through the laboratories of the bureau, which will give the delegates and guests as complete an idea as practicable of the many diversified activities carried on here. This conference is so intimately connected with the work of the bureau, and the interests of the delegates and guests lie so closely along the line of many of the bureau's activities, that we desire to have you well informed concerning them. Both delegates and guests are very cordially invited to participate in this tour.

This morning we are having the relation of the weights and measures official to the press set forth by David Lawrence, the president of The United States Daily, which is a most interesting newspaper, describing everything going on every day in the Federal Government. Mr. Lawrence is a publicist of great note and activity, and we are certainly honored and favored by having him with us this morning.

I think, gentlemen, that that brings up all the items that I wish to mention at this time, and I want to congratulate the conference again on the large attendance and on the very effective program that has been arranged.

WEIGHTS IN THE SUGAR AND TOBACCO INDUSTRIES

By E. J. SALDAÑA, *Executive Secretary of Porto Rico*

Mr. President and gentlemen, the sugar industry constitutes the chief source of wealth of our country. Together with coffee and tobacco, it is the basis of the island's prosperity. This being so, the activities of the bureau of weights and measures logically have had to do more closely and extensively with the commercial and industrial transactions arising from these three sources of wealth than with those connected with other enterprises.

Since the American occupation of the island the sugar industry has grown to such proportions that scarcely a piece of land is to be found suited to sugar growing that has not been used for the purpose. The old method of grinding by means of small mills propelled by animal power, called "trapiches" in our country, has been replaced by modern and gigantic sugar mills, which at present grind practically all the sugar cane grown on the island. The hundreds of tons of cane required daily to feed these costly machines make it imperative that they be assured of all the cane grown on the adjacent lands through contracts with the greatest possible number of planters, whereby every planter pledges himself to sell his harvest on a weight basis to the large sugar mills or centrals. Lack of governmental control over the scales used by the centrals to weigh the cane delivered to them by the planters gave rise on the part of the latter to endless controversies and suspicions, and as a result the majority of the most important planters for self-protection provided themselves with their own scales or compelled the centrals to set them up for use by planters on the railroad sidings where they delivered their cane. Nevertheless, the protection thus sought in reality proved to be of little avail to the planters, for the reason that instead of insuring uniformity in weights it tended, owing to lack of governmental intervention, to cause ever-growing confusion as the number of such scales increased. As soon as the bureau of weights and measures was created in 1913 it devoted most of its attention to the task of remedying this evil, and to this end we made an inspection trip for the purpose of testing all scales employed in weighing sugar cane sold by planters to the centrals. Some figures will clearly show the situation with regard to these scales at the time. Out of 67 railroad scales tested, 34, or over 50 per cent, were rejected for repairs. Out of 192 cart scales tested, 146, or more than 76 per cent, were condemned. The errors found in railroad scales on the average amounted to $1\frac{1}{2}$ per cent against the planters. In two cases they were as high as 10 per cent. The mean error detected in cart scales was 1.83 per cent and their counterweights had an average of $1\frac{1}{2}$ per cent in excess. An estimate showed that these errors represented a loss to the planters of 1,231,400 pounds of sugar, which, at \$3 per 100 pounds, aggregated \$36,942.

This state of affairs has been improving from year to year as a result of the efforts of the bureau. Every year during the grinding season we make a trip along the railroad extending practically round the island, called the American Railroad of Porto Rico, where most of the scales are installed. Since we do not own and do not have the money with which to acquire a vehicle fitted out to test this kind of scales, we are forced to employ the services of the American Railroad Co., which for \$30 per day puts at our disposal an engine with its engineer and fireman and a car in which to carry 6 tons of standard weights and two of our inspectors. The trip lasts from 12 to 15 days. It is to be deplored that our appropriation is not sufficient to allow us to make more than one trip a year, as it would be very advisable to be able to test all scales before the grinding season begins, to make sure that they are in good condition, and then to carry out another trip when the season is about halfway over to ascertain that they have not been tampered with.

Inasmuch as the 6 tons of standard weights we take for this work would not be sufficient for testing the larger scales, we also use for this purpose the weight of the car in which they are carried, such weight being added to the standard weights after it is carefully ascertained. The testing of a cane scale is made as follows:

The inspector balances the beam, having previously made sure that the platform is entirely free from obstructions. Then the iron car with the weights is run on the platform and placed in the center as nearly as possible. The reading of the beam is taken and noted. If the platform is much longer than the car, and there is a possibility that the car when loaded with cane would be out of the center of the platform, the car is pushed back and forth and the readings of the beam taken. If there is an error greater than 40 pounds—a very large number of these scales have a minimum graduation of 20 pounds—the scale is rejected for repairs. The scales are tested with our 6 tons of weights alone, only when their owners object to our using the railroad car as an additional weight. In these cases the 6 tons of standard weights are first placed on the platform in the space that would have been occupied by the forward truck supporting the car, then in that which would have been occupied by the rear truck, and finally equally divided between the two. Note is taken of the readings of the beam in every instance. The empty car is then run on the platform, the weights loaded on the car, and the final test made with both weights and car. Whenever during the trip the inspectors find a railroad scale that appears to be particularly sensitive, they retare the car. Thus, during the trip the car is retared several times to make sure that its weight, which is being used as additional standard weight, is correct. The cars loaded with cane have an average gross weight of about 50,000 pounds. Cart scales are usually tested with 2 tons of standard weights. The average smallest graduation on these scales is $2\frac{1}{2}$ pounds. The inspectors test the scale in the center, and on the right and left of the platform, as well as with the weights distributed over it.

As I have already said, cane scales are usually installed at or near railroad sidings. When they are not so located we have to ask the centrals to carry us over their own railroads to the proper place. There are some scales which are set up far from railroads, and in such cases we are compelled to take our standard weights in trucks hired for the purpose.

These trips to test scales along the American Railroad must consume the shortest time possible, since the funds at our disposal are very limited. The number of scales to be inspected during each trip is in the neighborhood of 130. The inspectors with their special train must, therefore, work as fast as they can from daybreak until sunset so as to accomplish their task within the time actually left free after such unavoidable delays as transportation from place to place, waiting for mail, freight, or cane trains to pass to secure the right of way to the next scale, etc. In order to be in constant communication with the train dispatcher, our special train is equipped with a telephone that is hooked up to the dispatcher's wire as soon as it reaches a siding.

As we are aware of the fact that mere correctness of the scales does not completely close the door to the commission of fraud, especially

in purchases and sales of sugar cane, where the weights of cane deliveries are not reported by centrals to planters until after the cane has been ground, every year we also organize during the grinding season an excursion by our traveling inspectors for the purpose of ascertaining if the weight credited to planters is the true weight of their cane deliveries and likewise if the tare weight deducted to planters from the gross weight of cane and car is the real tare weight of the car employed. During this excursion our inspectors can, of course, exercise vigilance only over those weighings actually being made at the very moment on which they make their appearance. Very often they are compelled to lurk around for some time to surprise the operation the instant it takes place.

Although the service rendered by the bureau in this respect is not as complete as it should be, on account of lack of available funds, yet the results thus far obtained for the benefit of the planters have been striking. Complaints are now but seldom received in the bureau. The centrals bestow greater attention on the care of scales, it being sufficient to state to show this, that in the fiscal year 1925-26 the percentage of scales tested by us found to be correct was 75.7, while during the first year of the existence of the bureau such percentage was but 30.5. Moreover, a large number of centrals now have their own standard weights to keep their scales in good condition, which was never the case before. Centrals not yet equipped with standard weights to test and maintain their scales in good condition will eventually be forced to the conclusion that such equipment is absolutely necessary for satisfaction on the part of their planters and to avoid as a corollary the danger of being taken to the courts for using scales that are incorrect. Some centrals not owning sets of standard weights apply for those of the bureau, which are cheerfully furnished upon the condition that transportation charges are paid. Three or four cases are usually taken to court every year for errors found in scales. The moral effect produced by these court cases upon the minds of the planters, which is evinced by doubt and distrust of the culprit, is the best remedy to put a stop to negligence in the care of scales, for the reason that the consequences of such feeling among their planters are feared more by those arraigned in court in such cases than any penalty that may be imposed upon them by a court.

In the annual reports for the fiscal years 1915-16 and 1925-26 there is information permitting us to assert positively that a great step forward has been taken in the efforts to have cane weighers of the centrals credit the planters with the true weights of their cane deliveries. Here are the facts: During the year 1915-16, 12 cases were taken to the courts for short weights credited to planters in cane deliveries. During the year 1925-26 only two such cases were so denounced. In 1915-16 but 45.36 per cent of reweighings were found correct. In 1925-26 such percentage rose to 93.65. During 1915-16, 27.15 per cent of the loads weighed were proved to be deficient in weight. This percentage was only 6.35 for the year 1925-26.

The tobacco factories employ in their stripping departments hundreds of women, who are paid for their work on a weight basis. When the bureau of weights and measures was organized, complaints were received to the effect that these women were being cheated in their work. As a result of an investigation made by inspectors of

the bureau it was found that these complaints were true, but in attempting to take the matter to the courts it was seen that our weights and measures law as originally enacted contained no provision upon which to base action, for the prohibition of the use of fraudulent or short weights and measures had reference only to the purchase, sale, or conveyance of goods, wares, or merchandise, and did not extend to the purchase or sale of work. Such omission compelled the bureau to lodge its informations in this respect as violations of section 470 of the penal code, which among other things prohibits the perpetration of fraud in work. Considerable difficulty was, however, encountered in the efforts to make this section apply to weights and measures cases on account of the many circumstances that had to concur for the commission of an offense. Hence, not a single conviction was secured in any of the cases proceeded against. Later on the weights and measures law was amended so as to make punishable frauds in work. Our inspectors are constantly visiting the tobacco factories for the purpose of testing the scales used in weighing out to each woman her apportioned amount of leaf tobacco, and of reweighing the tobacco distributed among the women during visits. Although the factories have been forced to deal with these operatives much more fairly than formerly in weighing out to them tobacco portions, it is very difficult to suppress fraud entirely, due to the fact that in many cases the factories are able to circumvent the law, sometimes by using as witnesses the workers themselves, who, through fear of losing employment, are ready and willing to testify in favor of their dishonest employers, and in other instances by recourse to various sorts of subterfuges.

While the coffee crop is being harvested in Porto Rico thousands of men, women, and children find employment as pickers of coffee berries, and their wages are reckoned on a measure basis. Investigations undertaken when the bureau of weights and measures was created demonstrated that the use of arbitrary measures was imposed upon this important class of our rural workers. To relieve this unsatisfactory situation rules were promulgated, making obligatory the use of metric measures of volume in the work of gathering the coffee crop. All coffee plantations were visited, incorrect measures were confiscated, and coffee growers were compelled to provide themselves with legal measures, of which in one year alone 11,992 were tested and sealed by the bureau. Since then the bureau has ever kept a vigilant eye over coffee plantations, and has not failed to test the measures in use in them, to confiscate such as are worthless or deficient, and to make any needful provisions for the protection of these workers so far as within its province.

I thank you.

THE PRESS AND THE OFFICIAL

By DAVID LAWRENCE, *President, The United States Daily*

I am venturing on somewhat uncertain ground in talking to you this morning about your relations with the press because I must confess that I have the same academic knowledge of your work that people in general have, and therefore I shall attempt to give you the

impressions that I have of your problem as it relates to the press. Of course, there are certain considerations involved in any public program in dealing with the press. There are certain difficulties that confront every public official, whether his work is of a scientific nature or whether it is of some other kind.

The press is to-day so much interested in stimulating news, in news of a sensational sort and character, that all groups of a serious kind are having difficulty in getting the attention of the newspapers. This is partly because there exists the demand that a newspaper shall entertain as well as inform, and the newspaper editors are not making to-day the newspapers they would like to make. They are making the newspapers they are required to make, and with one or two illustrations I can convince you what their difficulties are so that you can approach the problem more sympathetically.

First of all, the newspaper exists as a result of the advertising income, very incidentally as a result of circulation income. I know of one newspaper property where the gross income per copy is about 11 cents; 9 cents of that 11 comes from the advertising and 2 cents comes from the readers. The total cost of production in that instance happens to be 7 cents, and the property is very profitable at 4 cents a copy. And that is why some newspapers refrain from circulation stimulation, which is not desirable unless advertising revenue can accompany it. When newspapers face rising production costs they must quickly reach a high circulation so as to permit higher advertising rates. In order to get a high circulation you must have a newspaper that appeals to the mass as well as the class. The class might read it, but the mass might not.

A newspaper is supposed to appeal to the younger generation, the older generation, tickle the fancy, excite the readers and keep them day after day, and so we have features of many kinds competing for the columns of a newspaper. And in order to get into those valuable columns you must have something interesting to the mass and it must be written in an interesting fashion. There is a common saying among newspaper men that skilled writers can make any subject interesting, and I dare say that many of you have seen front-page items relating to science, some perhaps inaccurate and which should be condemned, but nevertheless items which have attracted attention and which are about scientific subjects, so that we know we can have material in our newspapers of to-day interesting to the mass if it is properly written. That brings me to the first point in your relation to the press.

Most officials, and it is true almost of all officials, find it difficult to think about the press during their work. They have so much to do getting the job done they are not thinking of the newspaper side. This is proper, but it is not beneficial in the long run. But when they do think of the press as requiring some formal statement they issue a formal statement with all the formal English they know. To give you a concrete illustration of this: I, myself, had an interesting experience with this type of announcement during the war when the draft system was being put in operation, and somebody in the War Department had the habit of writing very stiff English, fine for the War Department and fine for people who had a college education, but poor for those who had to understand the draft law.

It was my habit to take announcements from the War Department and put them into simple English, and I found to my surprise that I could take an announcement issued two or three days before and rewrite it so that it was understandable and it would be prominently displayed in the papers. For example, the word "exemption," which affected everybody, was not understood. That was a thing that touched the heart and minds of the common people and they wanted to know what it meant. I always said such and such a person would not be called to go to war. That was clear, and that was what they wanted to know. That was what was exciting the people.

You would not think that the words you use would have a bearing on the kind of publicity you get. If your announcements are couched in very formal language you frequently do not get attention, because many people do not understand technical words (and you would be surprised how many people are in that group).

My first suggestion is that formal announcements should be phrased in as simple language as possible. How often, however, do public officials forget that the most interesting part of their work—things the public would like to know about—is not treated in their formal announcements. To recognize these, you must develop a news sense, and if you haven't it—and many people haven't, for it is an instinct—my thought is that you could enlist the cooperation of the press where there is news instinct. A very practical way to accomplish this is to make the acquaintance of some newspaper man in your city who you think is capable of writing interestingly and invite him to your office and tell him about the things that you are doing. You might talk for half an hour before he notes something that he thinks people would like to know. If you do that you can very frequently develop an interest on the part of other newspapers in that community, which leads me to this point, that public officials are in the habit of issuing announcements to all the press. That is all right, and is the right way for announcements, but news frequently is not covered that way. News is something which when given to everybody on the same basis does not always excite the competitive element among the newspaper men, and my suggestion would be for you to select one man one week and some other one the next week and show him the inside, telling him what it is all about, without giving a formal announcement. Give him the information on which he can base his story. Often, indeed, it is helping him if, after he has written his story, you give it the once over to see that he has accurately included technical details. I think you will find newspaper men all over the country anxious to cooperate with you. When you do have one man who has worked up what they call an "exclusive story" on one thing it gets the others interested in either following it up or getting some for themselves. Thus you have a system of competition and you have the benefit of that competitive idea which exists among newspaper men.

I have oftentimes noticed that many times when a bureau which would otherwise get attention has simply followed the usual way of making announcements formally, the result has been that every newspaper man knew that everybody else had it and then it was simply a question of condensing the item. They do not take kindly to something which is common property.

I am not advocating a special brief for any of your newspapers. I think if you issue an announcement you should have it very interesting. But there are effective ways, as I have outlined, to issue news apart from formal announcements.

Now, your relations with the press vary, of course, as to the size of the city. In smaller cities I suppose it is not unnatural for you to make the acquaintance of the editor. Most people think that is the easiest way to get attention. I think it is the hardest way. The editor has usually a million things to do, and tries to keep track of this or that activity. First, you should find the man who is actually handling the news in the paper; he may be a subordinate, but he is the man with whom you should deal constantly and with whom you should have contact.

Now, the subject of weights and measures, I suggest, bears a very close relationship to some of the delicate problems that newspapers have to handle. If there should be a movement in the city, for instance, toward improving weights and measures, which involved a particular individual or group of individuals, I think you will find newspapers cautious, very cautious, about handling news of any organizations, institutions, or companies which may be involved therein. It is a natural caution on the part of the newspapers dealing with the business world. Even if it were not a case of injuring an individual or injuring a company for fear that they might ultimately be libeled, it is a caution not to do anything which would in any way disturb the retail situation in the city, or perhaps the wholesale situation. Whatever is done in the way of publicity should be specific, so that you would not indict a group, and in order that you may give the public the idea that yours is an agency for their protection.

I think these are obvious considerations in dealing with the press, but, just the same, we are increasing our field, our activities, in a governmental sense, and I think people are relying more and more upon the Government to be the arbitrator in the thousands of cases of this kind that occur in business life. We are seeing a good deal of that in Washington and you are hearing a good deal of talk about excessive legislation and excessive laws in Congress, but you notice each year the regulatory function is more and more clearly defined. It may be that we are in an age in which our interests are so widespread, so farflung, that regulation will be more and more necessary. It may be that we have developed in this country a feeling that the Government must act as an arbitrator. I feel that in recent years, notwithstanding the condemnation, there is an increase rather than a diminution of regulation, and I think it is fair to say that in regulating the affairs of private life there has been more intelligence shown than in the past. We are developing intelligent cooperation between the Government and the public in contrast to the rather meddlesome attitude of the Government of 20 years ago.

So I would say to you there is nothing that is more difficult to handle in relation to the press than the regulatory function, and you will find the newspapers just a bit shy, as you have always found them, in dealing with items which might disturb their local situation. But news, after all, is a controlling factor, and if you can make the news of your respective offices interesting, if you can find people who

can write of your activities in an interesting way, I feel sure you will command a great deal of attention from the press which will accumulate from time to time.

While I am on the subject of the press, I do not think you should stop with newspapers. I think we have grown in the last few years on the communication of intelligence to the point where we can discuss the radio as an essential factor in the spread of intelligence. There are many things which can be said over the radio which probably never would be said in newspapers or publications of like character, and I think radio stations are beginning to feel that they, too, have an obligation to the public and that they are a channel through which things can be said that can be helpful and can correct abuses.

I would not be surprised if some of the things which newspapers find difficult to handle will be proclaimed over the radio. The increase or decrease of stations will not affect this question. It will be a means of reaching the people all the time, and we are bound to look forward to improved methods of reaching the people rather than to any retrogression. So the radio is essential, and it is well to prepare for the radio just as one prepares for the newspaper—simple English, short sentences, things that people will understand without too much effort.

The radio will be helpful just as the press will be helpful to you because you are engaged in a function which is of help to the public.

I thank you.

METHODS ADOPTED FOR REGULATION OF NEW TYPES OF DEVICES

PAPER OF WILLIAM F. SWOGER, DIRECTOR, BUREAU OF STANDARD WEIGHTS AND MEASURES, STATE OF PENNSYLVANIA⁴

Mr. President, I appreciate the honor of being given a place on the program of this National Weights and Measures Conference. In view of the fact that the subject of type approval as regards commercial weighing and measuring devices is becoming an increasingly important one in this country, it seems appropriate that the matter should be discussed before this body, every member of which has undoubtedly given some consideration to the proposition.

The necessity for regulation.—I think it can be said without contradiction that the experience of all weights and measures officials has proven to them the great need for some form of centralized control in the matter of approval of all types of weighing and measuring devices before they are put into commercial use. In order that there be no misunderstanding in the matter, I wish to specifically point out that I do not have in mind that such centralized type approval shall in any way exempt weighing and measuring apparatus in the field from the regular supervisory inspection and testing by local weights and measures officials. While it is true that in those jurisdictions where there is no form of type examination of weighing and measuring devices, all such types are eventually found in use and are sealed or not sealed, as the case may be, still under such a system there is always a chance of faulty or even fraudulent types of weighing and measuring equipment being put into commercial

⁴ In the absence of Mr. Swoger this paper was read to the conference by Theo. A. Seraphin.

use and actually being used for a long period of time before the local weights and measures official discovers the fact; and when he does learn of the situation he is often in a quandary as to what procedure to follow, especially if he has not had much experience in the work. He is always confronted with the problem, and often a very technical one, as to what should or should not be a proper type.

It was with the knowledge of such conditions in mind that the late William B. McGrady, my predecessor in office as director of the bureau of standards in the department of internal affairs of the State of Pennsylvania, acted in the matter of proposing the legislation which established State control as to examination of types of commercial weighing and measuring devices sold or used in Pennsylvania.

The character of control exercised.—As to the character of control exercised, our law is a very comprehensive one, and was modeled very closely on the form of the original Ashbrook bill presented in Congress in about 1912, which bill sought to place the authority of such type control in the National Bureau of Standards of the Department of Commerce.

Mr. McGrady, through his individual study of the subject of metrology and supervisory work in connection therewith, became a recognized authority in such matters, and he always believed that the function here under discussion was properly a matter for Federal control rather than individual State control, and he often said that his action in bringing about State control of the matter in Pennsylvania was done simply because of the lack of Federal supervision covering the situation.

The efficiency of enforcement secured.—We in the Pennsylvania bureau of standards feel that good progress in the work has been made, but, of course, the fact is fully realized that, being the only State in the Union which has such a comprehensive law on the subject, we have been forced to travel alone, as it were, always with the possibility of being at variance in our decisions with any other weights and measures jurisdiction in the country.

It would seem that if there is any one subject in commercial life which should be uniform as to rules and regulations, if for nothing more than the matter of comity among the States, that one thing should be the very important subject of weights and measures, and, of course, weighing and measuring devices are most intimately associated with those terms, as being the instrumentalities by means of which quantity in weighing or measuring is determined. However, we have gone ahead to the best of our ability and made every effort to enforce the act.

Difficulties encountered.—The difficulties encountered have mostly arisen because of the enormous amount of detail work involved in handling such a proposition. By this I mean not only the original physical examination of weighing and measuring devices presented but also the essential follow-up work required, such as dealing with new manufacturing companies who may not know of the existence of such a law, and the possible failure on the part of even the well-established ones to present new models or report material mechanical changes or modifications in old types previously submitted for examination.

However, we have very little complaint to make in the matter of reluctance on the part of manufacturers to cooperate with us. They have, with rare exception, given us every possible assistance, even in view of the fact that every move they make in connection with the subject is a matter of extra expense to them; this expense mostly arises in connection with the original submission of types for examination, together with the continual manufacturing complications that are caused by the requirement of special serialization markings. It might be said that the expense incident to the submission of types would exist even in case of Federal control, but under that system it would be only one item of expense for each type put out by a manufacturer, rather than several such expense items, as is the case to-day when the manufacturer is required to submit types of his apparatus to several weights and measures bureaus.

At the present time the situation, as regards the submission of types before they can be sold, exists in the following weights and measures jurisdictions:

1. In Pennsylvania it is a matter of statute and is mandatory upon the director of the bureau of standards to act in all cases before any type of weighing or measuring apparatus can be sold within the State. A serialization marking is required.

2. Massachusetts also has a serialization law, as a matter of statute, but in that State it is not mandatory upon the director of standards to act except upon the request of either the manufacturer or a sealer of weights and measures; however, he may act upon his own initiative. The Massachusetts law also requires a serialization marking on such types of weighing and measuring devices as are submitted and approved.

3. In Alabama the serialization proposition is not a matter of statute, but arises from a regulation adopted by the department of agriculture, of which department the weights and measures bureau is a division. This Alabama regulation follows the Pennsylvania law in practically every detail as to submission of types and distinctive serial marking of same.

4. In New Jersey the State weights and measures department operates in the matter under a regulation adopted by the department, which in effect is a complete approval of type law, but in that State they do not require the serialization markings.

5. In New York the State department of weights and measures operates under a regulation covering the matter, which regulation is apparently authorized by statute. No serialization marking is required.

6. In the city of New York, by municipal ordinance, they also have a system of type examination and serialization marking. This ordinance requires the commissioner of the mayor's bureau of weights and measures to act in the matter of approval of all types of weighing and measuring devices before they can be put into commercial use, and this even in view of the fact that such types already have been approved by the New York State weights and measures bureau.

In addition to this list there are weights and measures departments in various States and cities which force the manufacturer to build weighing and measuring equipment to meet specifications

which do not appear in the generally accepted code as passed by this conference in 1916 and the amendments thereafter adopted to date.

Thus we see the growing tendency of the weights and measures departments in various jurisdictions to establish a system of what might be regarded as local control of a matter which every consideration of the subject must show should be general rather than local in order to bring about uniformity of the subject throughout the whole country.

Conclusions drawn from experience.—In no other governmentally established country in the world is this important subject left to drift along under the guidance of various bureaus in territorial divisions, and, indeed, it is most clearly set forth by our own National Constitution that the Congress has authority, and in fact the implied duty, to make it a matter of Federal control just as much as Federal control of our monetary system. In that document the subject of weights and measures, of which weighing and measuring devices are an important part, and the subject of money are properly joined together, and in fact in the same paragraph in our Constitution, article 1, section 8, appears the following sentence:

The Congress shall have power to coin money, regulate the value thereof, and of foreign coin, and fix the standard of weights and measures.

It is true that after about 40 years of deliberation the Congress did act in the matter to the extent of furnishing to each State of the Union a complete set of weights and measures, but it apparently was satisfied to let the matter go at that, not caring to inquire as to how the States were using those standards. Indeed, it is a matter of record that at least one State by local legislative act established a standard of its own, differing from the standard furnished.

The immediately foregoing part of this paper may be regarded as a little apart from the subject, but is brought out as having something to do with what follows.

We can easily imagine what financial chaos would result if Federal control were entirely eliminated from the subject of our national monetary system, and in effect, to a very great extent, this chaotic condition does exist as regards our national weights and measures system, in that part having to do with weighing and measuring devices. To anyone who gives the subject even ordinary consideration this presents an anomalous situation, because all that money can have to do with is inseparably associated with the results of weighing and measuring, and this weighing and measuring can only be done commercially by means of mechanical devices.

How disturbing it would be if any form of our national currency would not be freely accepted, and without question, in every part of our country. The situation would be appalling if various bureaus or agencies in the several States could take a hand in the matter by carrying out their own views as to what money should be as to style, design, or denomination. Yet, at the present time, the mechanical devices which determine the most important factors with which money specifically is associated, to wit, volume, mass, and area, may be acceptable to one State and rejected in another. The weighing or measuring device which may please the whim, fancy, or judgment of Pennsylvania, even though being a perfectly reliable apparatus, may be disapproved in any other State, and vice versa.

It is one of the principles of business economics that uniformity in both methods and equipment must prevail, and when such is not the case a condition of excess expense arises which some one must pay for. In the situation under discussion it is easily conceivable that a manufacturer of weighing and measuring devices could be obliged to build his equipment differently for each State, and this would run the production cost to almost a prohibitive figure, and in the finals the ultimate user must pay the bill.

In conclusion, I will say that it does not seem to me that there is any question of State rights involved, because no one advocates Federal supervisory control of the manner in which commercial weighing and measuring devices may be used. That is distinctly a function of the local weights and measures officials in the various States. I am convinced that what we ultimately must have, both for the sake of economics as well as the resulting comity among the States, is federally approved types of weighing and measuring devices that will be accepted as proper types in every State of the Union.

**PAPER OF J. HARRY FOLEY, SUPERINTENDENT OF WEIGHTS AND MEASURES,
STATE OF NEW JERSEY***

For some time prior to 1926 New Jersey had been a veritable dumping ground for questionable types of weighing and measuring devices. This condition was due to a number of contributing causes, principal among which was individual State action in the redrafting of specifications covering weighing and measuring equipment, which resulted in the diversion of certain devices from States where they had become illegal to other States that had not taken action against them.

The original specifications for devices used in the merchandising of commodities were adopted in New Jersey in 1916, or practically four years after the establishment of our State department, and were in conformance with the recommendations of the National Conference on Weights and Measures. While these specifications served their purpose for a while, they began to grow inadequate as time progressed, due to changes in business methods of merchandising involving the purchase and sale of commodities through the medium of weighing and measuring apparatus, and while we attempted to meet each problem as it arose it became apparent that to deal with each case individually without a general regulation or statute was difficult and provided no satisfactory solution.

The scientific trend toward betterment in weighing and measuring devices passing through the various evolutionary stages, brought to light features of design and construction in equipment which at the beginning were quite negligently and perfunctorily considered, if at all; and so it developed that devices which passed approval in the early days of better weights and measures enforcement gave rise to various questions in connection with their features of construction which made it incumbent upon supervisory authorities to reconsider their former approval actions if fraud in its many phases through the use of certain types of equipment was not to be perpetrated.

* This paper was read to the conference by A. W. Schwartz.

This reaction naturally brought about changes which might be termed revolutionary, where States applied the scalpel and with one decisive cut eliminated many of the originally approved types of devices. Where States took this action manufacturers of weighing and measuring equipment were naturally confronted with a problem as to where to market their wares. Many of them had large stocks on hand, and naturally began a perusal of the weights and measures laws and requirements of every State to determine where such equipment would find legal status. Certain States had gone into the question of serialization, which entailed a careful examination and analysis of all equipment submitted for approval, and this naturally resulted in many of the early types of devices being thrown out so far as these individual Commonwealths were concerned. In New Jersey we were reluctant about going into the serialization proposition, as we have always felt that while this method of regulation is a good one and would produce numerous benefits, at the same time we also felt that it was a project that could be carried too far, especially in the event of such regulations being adopted by every State in the Union, as there was bound to be confliction in the numbers assigned to the various individual types of apparatus, making it necessary for each State to apply its own serialization number, with a result that each piece of equipment would soon assume the aspect of a billboard and manufacturers would be caused no end of inconvenience and embarrassment in attempting to conform with individual State requirements were serialization made a uniform procedure throughout the country. In New Jersey we have felt that the question of serialization to be properly applied should be in the hands of a centralized authority, preferably the National Bureau of Standards. This would not make it incumbent upon any State to desist in their analyses of weighing and measuring equipment, as they would always have the sovereign power of condemning any type of device which, through their investigation and within their opinion, would not be satisfactory for use in trade either on account of contributing to the perpetration of fraud or otherwise. However, this is not a paper on serialization, but merely to tell you what we have done in New Jersey to meet the problem that confronted us.

We have promulgated a regulation, effective May 15, 1926, to the effect that all new types of weighing and measuring devices, of any description whatsoever, and all devices of older types to which may be made or added any alteration or new feature designed as an improvement to such equipment, shall, before distribution or use in the State of New Jersey, be submitted by the manufacturer thereof to the State superintendent of weights and measures for inspection and approval both as to type and operation. The regulation applies to all weighing and measuring equipment whether used in the purchase or sale of commodities or for the determination of quantities where service is sold or offered for sale on the basis of weight or measurement. Equipment which does not conform with the provisions of our regulation is subject to condemnation and its use is prohibited until our requirements are met.

We have already experienced good results through the operation of this ruling. The cooperation of the manufacturers has been very gratifying, and we anticipate very little trouble in enforcing our

regulation, due to the character of our working organization throughout the State, with which we keep in very close touch from our headquarters at Trenton. Our procedure is to advise our local superintendents with respect to our action in the case of each device submitted to us for examination. If a particular type of weighing or measuring apparatus is not given approval, our men are promptly informed to be on the lookout for it in their districts in the event that a manufacturer should take the chance of distributing his equipment before first having obtained our sanction. Condemnatory action follows, and to use an illegal device makes the user amenable to a stiff penalty. We have thus found it feasible to control a very trying situation without resorting to serialization, which course we do not anticipate adopting unless subsequent developments conclusively prove that our present method will not solve the problem.

PAPER OF J. J. CUMMINGS, INSPECTOR OF STANDARDS, STATE OF MASSACHUSETTS

Chapter 72, Acts of 1925, is entitled "An act providing for uniform testing and sealing of weighing and measuring devices." It permits the director of standards, whenever he deems it desirable, and requires him when requested by the manufacturer of any weighing or measuring device or by any sealer of weights and measures, to "examine such device to determine whether or not its construction is such as to insure reasonably permanent accuracy and whether or not it may be used to facilitate the perpetration of fraud, approving or disapproving it accordingly." It also provides that "when any weighing or measuring device has been so approved or disapproved by him, he shall notify all sealers of weights and measures, who shall thereafter act in accordance with such approval or disapproval when devices of that type are submitted to them for test."

The law was enacted upon petition of the Massachusetts Association of Sealers of Weights and Measures, who urged the advantage of uniformity in the methods employed by sealers in testing and sealing devices used in their respective territories. Many of the leading manufacturers of weighing and measuring devices also advocated the bill upon the ground that it would relieve them from intolerable manufacturing conditions resulting from their efforts to meet the conflicting views of local sealers who required changes in construction to conform with their individual ideas.

It is not contemplated that all types should be submitted to the director under this act. There are many devices in use which are designed and constructed in accordance with the national conference specifications and which are accurate and consistent in their performance. Local sealers will continue to test such devices and seal or condemn them in accordance with the results of their tests. For the present at least it is recommended that only new types of devices, or those which may be the subject of controversy, should be submitted. When a device which has not been officially approved or disapproved by the director is submitted to any sealer it will still be his duty to inspect and test the same with reference to the established specifications and tolerances for devices of that type and seal or condemn in accordance with his best judgment.

When a manufacturer of a weighing or measuring device wishes to submit it for approval he is required to sign an application, under oath, in which it is agreed that all devices bearing the approval mark which may be assigned to him shall conform in every particular with the approved sample, and that affixing the approval mark upon any device which does not so conform shall be sufficient cause for the revocation of approval. He then submits for inspection and test a representative sample of the device together with blue prints, drawings, or photographs showing details of construction and operation. This descriptive matter is filed, thus obviating in most cases the necessity of retaining and providing storage space for samples of all devices which may be approved.

In the examination of devices submitted for approval the established specifications applicable thereto are carefully checked and no device is approved unless it meets with these requirements. If it complies with specifications, it is then tested at intervals in order to determine the accuracy and consistency of its performance. When a device is approved a designating mark or number is assigned to the manufacturer and he receives written authority to affix a statement of approval in a form prescribed or approved by the director upon all devices of his manufacture which conform in every respect with the approved sample.

Devices thus far approved include 16 gasoline pumps, 1 gasoline meter, various types and sizes of liquid measures, 3 fabric-measuring devices, 1 leather-measuring machine, and 1 device for determining weight of loaded trucks on highways.

Disapproved devices include 4 types of liquid measures, 1 gasoline pump, 1 basket measure for kindling wood, 1 platform scale, and 1 spring counter scale. In our next bulletin, to be issued in July, will appear a complete list of devices which have been approved or disapproved to date, with the names and business addresses of the manufacturers.

After two years' experience in the administration of the Massachusetts law, it is now possible to form an opinion as to its efficiency. Similar laws which have been proposed (and enacted in a few places) in the past have almost invariably included a rigid prohibition of the sale or use of weighing or measuring devices, unless of a type which had been approved by some central authority. In contrast with such rigidity the Massachusetts law is sufficiently flexible to permit general enforcement to be extended over a term of years, while at the same time giving ample opportunity for immediate action when controversy arises or when new or doubtful devices are brought to attention.

In other States which have not legislated upon this subject it would probably be comparatively easy, with the cooperation of manufacturers, to secure legislation based upon the Massachusetts law. Such a law would accomplish the same results as a more drastic one and be much less difficult of enforcement.

PAPER OF H. L. FLURRY, CHIEF, DIVISION OF WEIGHTS AND MEASURES, STATE OF ALABAMA

Mr. Chairman, the subject before us, as assigned and stated, is the regulation of devices with reference to make-up in the phases which particularly refer to the necessity for such regulation, the character

of control exercised, the efficiency of enforcement secured, the difficulties encountered, and general conclusions which have been reached as a result of experiences in such work.

It seems that as we approach such a discussion we should place ourselves in that state of mind which will render a clear and unmis-taken view of the statements which may be made and the conception of past, existing, and future conditions, which have been observed and prospected. To this purpose we ask you to turn momentarily to conditions which existed only a short time back, when scales were not known for and adapted to each and almost every imaginable need of industry and the merchant used the paper bag and a penny pencil as a chart for computing the price of goods poorly weighed, and gasoline pumps unworthy, under the standards of the present, of the classification, mechanical, liquid-measuring devices. We are blinded, so to speak, by the obstacles which must have beset the industrial and commercial world and are envious of the narrow limits to which the duties of the weights and measures official were confined, at the same time recognizing the thorns of inadequacy of equipment which must have been a part of his experience. Then, we are brought to the existing conditions. The wonderful improvements which have come at the hands of a cooperative force, consisting of the official who realized the need and continuously urged and supported its fulfillment and the manufacturer anxious to meet the needs of the time and receptive to the cooperation offered in his experiments to find the solution, encourages our belief that we are in a new day of progress, and I point you to an early time when weighing and measuring devices will be perfected to the needs of a complicated industry and commerce in such manner as to relegate our present requirements to the shelves of archives and history. This is no Elysian dream of mine, although there are those among us who may not be an extant factor when such is accomplished. But, as the Moses, they may stand upon the hill top and view the signs of the time.

We need only the recitation of the means of accomplishment of the past and a perspective of the activities of to-day to convince us of the medium through which this new condition is being and will be produced. That medium is the cooperative response by manufacturers to the continual and consistent urge for and holding up of high standards for weighing and measuring devices by the officials. In this connection it is realized that those standards can not be promoted any faster than the usefulness demands and the ability of the manufacturers to meet them is developed.

With this view before us, I hold out to you, as one of the principal factors in the direction of this force, the regulation of make-up exercised by the various jurisdictions in such manner as is best suited to each jurisdiction from the viewpoints of necessities to be met and practical enforcement, ever recognizing and fostering the progress of the manufacturing industry.

In our observation and experience there seems to exist a need for such regulation in the proper holding in check improper competitive methods which tend to lower the standards of quality. In the continual holding up before every one, including the general public, the requiring of high standards and the consistent enforcement of such

standards, an impetus for the manufacture and use of high quality devices is built up. And, as observed heretofore, we do not question the value of anything which will produce or aid in continuing such a condition. We are encouraged to say that this, as evidenced by past experience, classes itself as a necessary reason for regulation in the present day.

In addition to this broad and far-reaching necessity, although at first sight indirectly so, there are certain direct necessities for regulation which accrue to the benefit of the State and manufacturer. I ask the manufacturer whether he prefers that his product be condemned and removed from use after it has reached his customer, whose confidence in the product is hard to recover after once being lost, regardless of changes which are made, to having the cause for such condemnation called to his attention before offering them to his customer, in order that a correction may be had and a product delivered to the customer which will be approved. If so, we have not found his point of view, under the cost of establishing and maintaining a good reputation in the competitive industry of to-day.

For the good of the State it is necessary to prevent the introduction for distribution and use within its boundaries of devices of an unrecognized character. In order to prevent the dissemination of illegal products, it is important to prevent their introduction. Furthermore, we believe it to be more economical in the enforcement of practically any regulatory measure for the enforcement to be directed to the source. It seems that a proper control and regulation placed upon the source of production of the product to be regulated is an economical and necessary link in the chain of enforcement and supervision of regulatory requirements as to weights and measures.

We must also accept the principle that the legal interests of the citizens of a State are the proper interests of the State and the protection of those interests is its supreme duty. We are unable to conceive this as having been done in allowing manufacturers to sell for use in the State devices which will not meet with the approval of the State, thereby allowing them a loss without recourse. In this manner the State has placed the whole responsibility for violations and penalty resulting therefrom upon the general public, who can not be reasonably expected to have or exercise the same information and knowledge as may be reasonably expected of the manufacturer. It has allowed that one, who may properly be charged with information and knowledge, to escape without injury or penalty. Therefore, we would have you believe that the proper regulation of the make-up of weighing and measuring devices as relating to the manufacturer is not only a proper course but a necessary step for a full and close supervision and enforcement.

In Alabama we have felt that an exercise of such regulation has been thoroughly warranted and we have proceeded on that course. We feel that the only question for debate is the character of control exercised. So far as we have observed, there have been exercised only three different methods of control in the various jurisdictions.

The most generally exercised method of control is that of field inspections of devices with reference to make-up or type of construction. We are opposed to such a method, as being made the only means of type examination exercised, for the reasons that necessities

for regulation, as mentioned before, are poorly, if to any degree, cared for. In addition, there can be no consistent and uniform action throughout a State when such a question is left to the discretionary decisions of a number of inspectors in each State. This examination may be required before or after installation and use. In either case the enforcement music has begun at the wrong end of the procession.

Secondly, there is the method of voluntary submission of samples for examination as to make-up. We consider such a method as evidence of the recognition for such a service and the playing with the job, if you please. We are irrevocably opposed to any process of enforcement, which is necessary, being provided or conducted upon a voluntary basis.

The third method which has come into use is commonly spoken of as type approval of weighing and measuring devices. In the use of this term the word type has its common and usual meaning and significance. A type refers to a group, the individual members of which possess characteristic qualities. Then any one of the group, since it possesses the characters peculiar to the group, may be examined and approval or disapproval passed upon the group. These characters or characteristic qualities relate to the specifications which are fixed and applicable to the class of apparatus to which the type belongs. Please distinguish between the meaning of a class as created in the specifications and a type or type group. We may exemplify this difference ethnologically. A race of people may be divided into a number of types. There are common relationships and similarities which may exist throughout the race, but there may be any number of groups which are entirely different in their characteristics or characters. In the same way when we speak of spring scales we are speaking of a class or race, so to speak, of scales between the individual members of which there are certain similarities and to which a certain class of specifications are applicable. Yet, within this class, there exists any number of types. Thus the meaning of type approval, as applied, comes to signify the approval of a class or group, the individual objects of which are similar one to another in design, construction, size, and material.

We believe that the process of type approval is the most feasible method of regulation of new types of devices for the reasons already stated and additional advantages of the method. Through this plan there is produced a uniformity and consistency of effort and action which is important not only to the manufacturers but to the satisfactoriness of the enforcement itself. Instead of the question of compliance or noncompliance of a device with the specifications being left to the judgment and discretion of each and every inspector, it is determined by one office for the whole State. Any device which is passed upon and approved once is assured of approval throughout the State instead of being approved in one section and condemned in another on the same specifications.

If you please, I am not in accord with the opposition to the one-man system which was expressed here yesterday. I believe that it is necessary to have a certain amount of central control. Without it you have oftentimes a condition of chaos. It is true that those centralized powers should have a certain amount of restraining in-

fluence thrown about them. For example, in our work we approve or disapprove all weighing and measuring devices as to type, but our decisions are subject to reopening at the request of the manufacturers submitting the devices and may be carried beyond the chief of the weights and measures department to the State board of agriculture, which has advisory powers.

For these reasons Alabama has adopted and is using the type-approval plan. In order that you may know the character of the plan, we will read the sections.

Weights and Measures Regulation No. 4, adopted July 6, 1925, by the State board of agriculture

SECTION 1. The superintendent of weights and measures shall pass upon each type of weight and measure and weighing and measuring device manufactured, offered, or exposed for sale or sold for use or used in the State of Alabama and shall approve or disapprove of said type. The said superintendent shall approve each type of weight and measure and weighing and measuring device submitted for approval by any person if such type is so designed and constructed that it conforms to the specifications adopted by the State board of agriculture and industries [which are the same as the specifications of this conference] and 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 superintendent shall disapprove the same.

SEC. 2. The submission of a type may be by sample or by specifications if, in the best judgment of the superintendent, such specifications are adequate, or in such other manner as may be prescribed by the rules and regulations promulgated by the State superintendent of weights and measures.

SEC. 3. The word "type" as used in this regulation is defined as a class, the individual objects of which are similar one to another in design, construction, size, and material.

SEC. 4. When a type of weight or measure or weighing or measuring device is approved, the said superintendent shall issue a certificate to this effect to the person submitting such type. When a type is disapproved the superintendent shall notify the person submitting same of his decision, setting out the reasons therefor, and shall give such person an opportunity to be heard in support of his application for approval.

SEC. 5. From and after January 1, 1926, it shall be unlawful for any person to manufacture, offer, or expose for sale, sell, or give away for use in trade or commerce any weight or measure or weighing or measuring device of a type not approved in accordance with this regulation: *Provided, however,* That in case of weights and measures and weighing and measuring devices manufactured and ready for sale or in use in the State of Alabama at the time this regulation takes effect no approval of type shall be necessary: *And provided further,* That the type of a weight or measure or weighing or measuring device need not be approved if said weight or measure or weighing or measuring device is intended for shipment outside the State of Alabama, but if the said device shall in fact be sold or offered for sale for use in trade or commerce in the State of Alabama, then this proviso shall not exempt such device from the operation of this regulation.

SEC. 6. The superintendent of weights and measures shall register and give a serial number to each type of weight and measure and weighing and measuring device submitted and approved as provided by this regulation.

SEC. 7. From and after January 1, 1926, it shall be unlawful for any person to manufacture, offer, or expose for sale or give away, or to use in trade or commerce any weight or measure or weighing or measuring device which does not have stamped, cast, etched, or otherwise marked thereon the name of the manufacturer and the serial number of the approved type to which it belongs: *Provided,* That whenever the type of the device is such as to render it impracticable to mark it as required by this section the superintendent of weights and measures shall have the power to rule that such type need not be marked as required by this section.

SEC. 8. It shall be unlawful to mark in any manner upon any weight or measure or weighing or measuring device, the type of which has not been approved as required by this regulation, any design simulating a serial number provided by this regulation.

SEC. 9. All weights and measures and weighing and measuring devices manufactured, sold, offered, or exposed for sale for use in the State of Alabama or used therein shall be conclusively presumed to be intended for use in trade or commerce, unless it shall bear a plain, legible, conspicuous, and permanent statement to this effect, "Not legal for trade": *Provided, however,* That whenever the type of the device is such as to render such a mark impracticable the superintendent of weights and measures shall have the power to exempt such a type from the provisions of this section. It shall be unlawful to use in trade or commerce any device which is marked as described in this section.

SEC. 10. Any person who shall violate any of the provisions of this regulation shall be guilty of a misdemeanor, and, upon conviction thereof, shall be punished by a fine of not less than ten dollars nor more than one hundred dollars for each offense.

We have construed that it is necessary to have all devices type approved, regardless of whether devices of the same type have been sold previously to the requirement or not. This, of course, applied only to new devices sold after such requirement and did not affect devices already in use.

The submission of devices is by actual sample or by specifications and such other manner as may be determined for a proper examination of the type.

In the experience which we have had we are convinced that the plan fully perfected is an efficient method. It is one which will produce more accomplishments in proportion to the energy expended than any which we have been able to conceive. We credit any failure to fully meet the demands, which may have existed in Alabama, to the lack of proper facilities for putting the plan into full operation rather than to the inefficiency or failure of the plan itself. In so far as the plan is being carried out in our State we believe it to be solving the needs and demands which caused its creation.

There are, however, certain difficulties incident to the enforcement of such regulations. It is impracticable and too expensive to the manufacturer and State to undertake an examination by actual sample of all devices. Yet it is hard to determine whether or not such devices are in full compliance with the specifications by description only.

The strongest objection to the work resolves itself into that one which is old to all of us. The problem is the lack of uniformity of requirements among the jurisdictions concerned. The cause of objection is the expense to manufacturers, which finally accrues to users, due to the many conditions to be met under the varying requirements of the States. We do not hesitate to stand upon the principle that one State should not neglect or fail to progress because its neighbors are not progressive. At the same time, when forward steps are taken, it seems that there should be as much uniformity of requirements and action as is practicable for the efficient and effective remedying of improper conditions.

It is the opportunity of this conference to be of great service in the obtaining of this uniformity. Here we have the opportunity of acting as a clearing house, so to speak, in outlining and determining State policies, not for the purpose of embarrassing or interfering with the rights of States in the exercise of their powers as

States, but to the end of bringing about a mutual understanding of needs and the encouragement of the adoption of uniform efforts which may be necessary for the meeting of such needs. If the word "cooperation" has functioned in practice, we urge upon this conference the necessity for its exemplification in the matters before us.

Our conclusion from experience in type-approval work is that it is a necessary, practical, and feasible proposition and rightfully is a function of the States. However, we must consider the demand, which justly exists, in the exercise of this function. The just consideration of the industry connected with the production of devices requires more uniformity than has existed in the past. If we as States continue to lay clean hands of claim upon the retaining of what ordinarily would be our privilege to claim as States, it behooves us to face the demands which are at our doors and are rightfully, in principle at least, asking our consideration.

**PAPER OF GEORGE WARNER, CHIEF INSPECTOR OF WEIGHTS AND MEASURES,
STATE OF WISCONSIN**

Mr. President, in view of the position of my friend from Alabama, I feel that I should say at the start that I am absolutely opposed to any one-man control. I believe that the opinions of many are preferable to the opinions of any one man. I may also state at the outset that in presenting this paper I did not have in mind any other supervision or regulation than that confined to the State. I am heartily in accord with the suggestion of our president in his address that some plan might well be worked out to secure greater uniformity than can ever be secured by State action. But until some such character of regulation arrives I have something to offer to the individual States.

I assume that in every weights and measures jurisdiction there is some kind of supervision of types of weighing and measuring devices. Therefore, the question we are most concerned with is what particular kind or plan of supervision is best suited to our needs.

The Standard Dictionary gives one definition of type as being, "sample, model, representative or pattern." We must bear this definition in mind so as not to confuse the supervision under discussion with that of supervision of performance, stability, speed, or accuracy. I think it will be conceded that no matter what kind of supervision of type we have in effect in the State it will still be necessary to test the device for performance under field conditions. It, therefore, can not be successfully argued that supervision of type will have any material effect in reducing the number of inspectors or sealers in the field, neither will it materially reduce the cost of such field inspection or testing. I believe it would be a dangerous policy to maintain that because a device had been passed as to type by perhaps some central bureau of the State that it would be unnecessary for the inspector or sealer in the field to pay no attention to this particular phase of the work. I maintain that no matter how many approvals of type or how many numbers may appear upon the device it is still a good policy for the inspector or sealer to carefully examine it. The manner or form of approval of type would of necessity vary in the different States because of the fact that there

are probably at the present time no two States in the Union that have identically the same kind of weights and measures law.

Probably one of the most feasible plans that could be adopted for approval of type would be a bureau to which the manufacturer could submit his device, and, if such device was approved as to type, number or mark it so that the approval would be good throughout the entire jurisdiction. This bureau would in nearly all cases be an entirely new creation or a considerable enlargement of existing bureaus. For the above-mentioned reasons, it could not be claimed that the expense of operating the weights and measures department could be reduced by this plan; on the other hand, it appears that it would be increased at least to the extent of maintaining a new bureau or the expense of the enlargement of any existing bureaus. If, therefore, the expense of maintaining a department is increased the next question arises, What are the benefits to justify such increased expenditures? The experience of officials from States having such regulations will give us light upon these benefits. I might say that we have had some of those benefits.

Another plan of supervision, but not strictly approval of type, and one which a number of States use in a more or less modified form, consists of a central bureau where manufacturers may submit their devices for examination as to type and receive a report on same; or, through this central bureau, arrange to install their device at some convenient place in the field and have representatives of this central bureau examine and test the device under practical working field conditions and give a report on the device not only as to type but upon performance as well. The central bureau may, in either case, if it is deemed advisable, send copies of its report on the device to all of the sealers in the field or within the jurisdiction. The merits of this plan are many. It fosters a spirit of cooperation, inasmuch as it assists manufacturers and jobbers to get their devices right before being placed in commercial use, if, in fact, assistance is needed. If they are quite sure that their devices comply as to type, they do not need to submit them, and they can be sold direct to the trade. If a device sold direct to the trade does not comply, it will be condemned by the field sealer anyway, and the public will still be protected. Under this plan a number of evil practices are reduced to a minimum; for instance, a salesman can not exhibit a sample scale with a numbered approval upon it and greatly exaggerate the meaning of this approval to his prospective customer; again, the field sealer does not see any form of approval on the device and consequently realizes he must make a full and complete examination and test upon it—he can not pass responsibility. There is no divided responsibility, however; should he make an error, it will be discovered by other sealers in adjoining territories who are called upon to pass individual judgment upon similar devices. Thus we will have many sealers passing upon a device, and surely all can not make the same mistake.

To require that one person pass sole judgment upon a device is to place grave responsibility upon that person. We know that as individuals we make mistakes, and likewise we know that the companies making weighing and measuring devices make mistakes; therefore the fact that a device has a numbered approval plate upon it when it is offered for sale does not guarantee that the device is the same as

the approved sample or that it even complied with the specifications. If necessary, in the discussion that follows I can cite several concrete examples to prove the above.

**ADOPTION OF RESOLUTION IN RELATION TO FEDERAL APPROVAL
OF TYPE OF APPARATUS**

The CHAIRMAN. You will note that the next item is "Manufacturers' comments" on this subject. We have received written requests for participation by some of the manufacturers' representatives, and I will call on the first for discussion.

Mr. MARONEY. Mr. President, before calling on the industrial element of the conference to discuss this subject, and to bring it properly before us in line with some of the preceding speakers' recommendations, I move you, sir, that the president be empowered to appoint a committee which shall draft a bill to be presented in Congress next December that will give the Bureau of Standards the right to approve the type of and serialize weighing and measuring devices used in the United States.

Mr. MAHONEY. I want to second the motion.

The CHAIRMAN. Is there any discussion? [After a pause.] Those in favor of the motion say "aye," counterindicated "no."

(The motion was duly adopted.)

Mr. MARONEY. Something like 15 years ago this same discussion was brought here before the conference. I, with a number of others, was absolutely opposed to giving the Bureau of Standards that power. I will confess that we went to Congress and got in touch with the Committee on Coinage, Weights, and Measures, and, in fact, spent the evening with them. We were able at that time to kill such legislation. That was due, first, to the attitude of some of the officials in the bureau with which we were not entirely satisfied. Many felt that if that authority was conferred on the Bureau of Standards, they would not amount to much. But it has been brought before us by the State officials, that, in regard to types of weights and scales, there are no three States alike—to the best of my knowledge and belief, not only are there no three States alike but each individual State thinks and feels that it has something on the other fellow in the matter of education and qualifications. Personally, I do not believe that is so. I think that prerogative belongs to the Bureau of Standards, and I hope that the conference will be cognizant of the fact and see it, as I do, that the job of typifying the different types of weighing and measuring devices should be put in the hands of the Bureau of Standards.

**COMMENTS OF MANUFACTURERS ON REGULATION OF NEW TYPES
OF DEVICES**

REMARKS OF H. O. HEM, CONSULTING ENGINEER, TOLEDO SCALE CO.

Mr. President and gentlemen of the conference, it is a pleasure to address this National Conference on Weights and Measures. It has been my privilege, as a representative of the Toledo Scale Co., to attend these annual meetings for the past 12 years, and during that time I have been an interested observer of the developments in

weights and measures supervisory control throughout the country as brought out at these sessions.

The subject under discussion here as to the approval of type of weighing and measuring apparatus is a very important one, not only to the manufacturer of such equipment but also to every individual in this country. I take it that everyone familiar with the subject realizes the necessity of uniform specifications and regulations, so far as possible, in every State in the Union, as regards commercial weighing and measuring equipment, by means of which equipment quantity is universally determined.

Uniformity of specifications may be regarded as the basis of economies in the manufacture of any modern product, and, in fact, is essential to the securing of simplification in manufacture which results in the elimination of waste of either time or material by means of mass-production methods, which methods are absolutely unattainable without uniformity.

From the manufacturer's viewpoint, it is rather remarkable to consider the fact that in the making of one of the most important devices in the commercial world, be it either a weighing or measuring device, he faces the anomalous situation of being obliged to build these devices with variations as to construction and performance to meet the requirements of the different weights and measures jurisdictions throughout the country. In fact weighing and measuring devices are practically the only class of modern business equipment which comes within the scope of legal supervision in every jurisdiction.

With many weights and measures jurisdictions promulgating their own specifications for weighing and measuring devices, and these in many cases varying to such an extent that manufacture is seriously hampered, it is very clear to all that economical manufacturing methods can not be employed, and the ultimate user must pay the bill, as he always does, in the case of wasteful methods in the manufacture of any product.

In regular manufacturing processes, where every effort is made to follow an orderly routine from the receiving of the raw material to the shipping of the manufactured article, even a slight variation in construction detail deranges the manufacturing schedules, and every such derangement increases the cost of manufacture.

As has already been stated in the discussion before this conference, the United States is the only important country that has failed to handle completely the weights and measures proposition as a function of centralized government. When I speak of weights and measures I do not only mean the establishing of standards which must be used in every section of a country but also mean to include the standard commercial apparatus by means of which weighing and measuring is done in buying and selling. As I see the matter, the two propositions are inseparable.

In the case of weighing and measuring devices not used in trade—for examples, such weighing and measuring devices as are used in manufacturing processes or in laboratory work—and especially in the case of apparatus designed to solve special problems, reasons for Government regulation do not exist. In fact, in the case of special apparatus where only one device of a kind may ever be built, the

cost, inconvenience and delay incident to submitting such a device for approval by a Government agency would constitute an almost prohibitive handicap. What I have reference to here is that we are very often called upon to manufacture either a weighing or a measuring device which is special for a special purpose, and it would be too much trouble and effort to submit such a device for approval, particularly in view of the fact that such device was not used for either buying or selling but solely in manufacture. I think that such a device should be left out of Government control or any supervision because it would delay the work of serialization and also would throw a lot of additional work on the officials, which would not be of any profit.

Manufacturers are desirous of meeting the legal requirements, no matter how close or exacting those requirements may be, but it is their hope that those requirements will be uniform so that the manufactured product will be acceptable as to type and allowable tolerance in every section of the country. At the present time, as regards both weighing and measuring devices, certain types that are acceptable in one weights and measures jurisdiction will not be approved in another, either as to type or permissible tolerance.

So far as I am informed, there is ample constitutional authority to place this important matter in the hands of the Federal Government.

Thus far the bills presented on the subject in Congress, like many other proposals not thoroughly understood by the people at large, have failed of passage largely because of the failure of our congressional legislators, with few exceptions, to grasp the importance of the situation.

As the matter now stands, with various weights and measures jurisdictions in a position to enforce their own rules and regulations as to specifications, even though at variance with all others, the manufacturer of weighing and measuring devices in this country faces an unparalleled situation, and to some extent is obliged to regard the various sections of his own country as so many distinct governments, just as if he were manufacturing for various foreign countries. However, in building for any given foreign country he at least is sure that his weighing or measuring devices when once approved will be accepted throughout every territorial division of that particular foreign country.

Personally I am an ardent supporter of State rights as to local control of how weighing and measuring devices may be handled in commercial use, with particular reference to the police power of weights and measures officials, essential to the case, but, as I see the matter, based upon long experience and observation, the weighing and measuring device which is suitable for one division of this country should be acceptable in another, just as much so as our national currency.

It resolves itself to a simple case of dollars and cents, because any manufacturer can meet the varying regulations of any number of different bureaus by paying the resulting excess cost of manufacture, and in the final analysis, as stated before, the ultimate user must pay that needless excess cost.

REMARKS OF F. A. SEARLE, VICE PRESIDENT, LANDERS, FRARY & CLARK

Mr. President and delegates of the convention, I appreciate the opportunity of appearing before you. I also appreciate the necessity of being brief. This is a very large subject, and, with your permission, I will confine what little I have to say to that feature of it in which I and the concerns which I represent are particularly interested. Perhaps you ought to know that I speak for my company, Landers, Frary & Clark and for Clark-Jones & Sons, both manufacturers of scales; and also as the chairman of one division of the Scale and Balance Manufacturers Association of the country. Therefore, what I have to say can be confined absolutely to the question of scales.

Both of the concerns which I represent have been manufacturing scales for more than half a century, and I think I ought to say for all of the scale manufacturers whom I know—and I know most of them—that there is no demand made upon them for, nor do they seek to produce, any scales which are not accurate or which will facilitate fraud in any way. The object, the aim, of all of these manufacturers, in so far as I know, is to produce the best quality of weighing apparatus for the least money. The demand upon the manufacturers is for cheapness in price and at the same time for a scale which will do the work.

Competition which has developed scales which are not accurate or which are susceptible of being manipulated, is the competition in price and is not from any other demand, and so it seems to me that this whole subject of the regulation of type and of quality really can be divided into two parts. I think really that that part of the regulation which undertakes to provide a weighing device which can not be manipulated by those who desire to commit fraud is a very insignificant and very small part, probably comparable to the number of criminals there are to the whole number of the population of the country. If that number was very large the condition of the country would be hopeless. If the number or percentage of business men who are bent upon cheating and upon criminal intent was very large the state of business would be almost hopeless; so that we consider that regulations to prevent fraud are not of very great moment. We do, of course, concur in the regulations to make it more difficult for persons to manipulate the scales, but I do think I can say without contradiction that no scales can be made which can not be manipulated to give fraudulent weight by anyone who is determined to do so. For that reason I do not care to go further into that end of it.

But the principal thing which brought me here and which I want to lay before the conference is a very serious consideration: It is the growing tendency on the part of States not only to adopt their own requirements but to insist that each scale sold in their particular jurisdiction bear a statement to the effect that it does comply with those particular restrictions. Now, what does that mean to the manufacturer? It means that if this thing continues we will have offhand—each State requiring that the scale sold within its borders must carry its particular type and serialization brand—New York, Pennsylvania, Alabama, and others. If that continues we will have 48 of them and the problem of the manufacturer will be multiplied

to that extent. Each State would have its own particular type and serialization brand, which seems to be a movement directly contrary to the general direction of thought in these days, the thought of standardization. I had some little correspondence with one of the State representatives—he is a very fine gentleman, and the correspondence was exceedingly pleasant—in which I suggested the advisability of permitting in his State the sale of scales carrying the approved type of another State. The reply I got from him, very pleasantly, was to the effect that the scale probably would be all right, but that action would be outside his jurisdiction.

My suggestion—and this is what I would like to stand out as the main point to leave with you—is that some arrangement could well be made, perhaps, well within their authority, by some of the directors of the individual State bureaus now operating, which would permit them to allow within their borders the sale of a scale or balance of the approved number and type and serialization of some other State which has, as a part of its law, specifications such as are recommended by the National Bureau of Standards, and such as I believe are in effect in the District of Columbia. The District of Columbia has, I believe, requirements which are in substantial accord with the recommendations of the Bureau of Standards.

If that could be done, then we could manufacture our scales, put upon them the certification and serialization number of the State of New York, or of Pennsylvania, or of Alabama, provided those State laws contain specifications which are in accord with the specifications of the National Bureau, and sell them everywhere.

I would like to leave that thought, that possibility, that suggestion, as possibly showing a way out that is practicable, without waiting for legislation. The progress of legislation will be very slow. In regard to delegating authority to pass on scales to, or the enforcing of regulations by, any national bureau, I doubt very much if it will ever go into effect. I would say that probably the limit of authority in that respect would be in making requirements for interstate commerce. I think that it will never be given authority over the scales sold in intrastate commerce. I doubt if the 48 States or a definite number of them would ever permit it, so that we must seek something practicable, something workable, and my suggestion would be to merely point one way in which it may be worked out.

If you are patient with me for another moment, I made a note or two in listening to some of the other speakers, on which I would like to comment from the point of view of the manufacturers.

One of the speakers said that the principal cost was in the original furnishing of the sample scales and getting the approval of the commissioner of an individual State. That is the smallest part of the cost, gentlemen. The greatest part of the cost is in the manufacture. Each scale must be regulated after the dial is put upon it. We can not make the scales and after we have made and regulated them put the serialization and type number on them. That must be done before the scale is regulated. We can not make up a lot of scales and mark them just before shipment to the various States, simply because it is impracticable.

Please bear in mind that the original expense is the least, that the largest expense is in trying to comply with all these regulations.

May I say also that the ability and knowledge—which I say with some diffidence—with respect to scales and their function and their operation does not all lie in the administrative bodies of the States. The manufacturers must claim to have some of that knowledge or else they could not make scales, and that knowledge is being applied constantly to the improvement and simplification of scales which are offered for general use.

One of the gentlemen spoke of being greatly in favor of centralization of authority. He was speaking then of the authority within his own State and compared the passing upon the validity of a scale by some central authority in that State, with permitting that passing upon to be done by all the various sealers in the State, and he was quite right. In so far as I am concerned personally, I quite agree with him; but simply transfer that to the manufacturer's viewpoint. We have to satisfy not only the officials of that particular State but the officials of 47 other States in addition to that. Again we must make a scale satisfy all the inspectors and all the sealers of all the States.

I think I might state that manufacturers whom I know and with whom I am associated look upon the various inspectors and various sealers in the States as probably our greatest help, simply because there is no one in the community who is more anxious for accurate scales and accurate measuring devices than the manufacturers themselves. If it were possible for any one manufacturer to impress upon the trade that his scales were ever so much better than any one else's, if he could impress upon the sealer that the quality of his product was better than that of any other manufacturer, that would be worth an untold amount. The result is that all of the manufacturers are trying to make their scales as accurate and serviceable and fool-proof as possible. A scale is a machine, and no machine will operate indefinitely without care. You can not run an automobile, you can not wear a pair of shoes, without giving them care. A scale is a complicated machine, and it has a function to perform and it must be cared for, and no scale can be made that will not sooner or later show the effect of wear or accident or abuse. An intelligent sealer who is acquainted with the different makes of scales knows whether that scale has been worn out, has been neglected, or has been abused, and to the extent that he does know that he is a friend and an asset of the manufacturer who made that scale. I think we are all out for the same end. There is a difference of opinion, perhaps, as to the road leading to that end, but I can also say that any practicable means that will work for correct weighing and measuring apparatus will have the support of every reputable manufacturer of any of those devices in the country. I thank you.

The CHAIRMAN. If the Chair may intervene to amplify Mr. Searle's statement regarding the status of the District of Columbia, he will say that the District of Columbia is subject to the immediate jurisdiction of Congress, and Congress has passed a weights and measures law for the District. We are oftentimes asked by the District authorities for advice in relation to specifications, although the Bureau of Standards, as such, has no jurisdiction over the operations of the District.

The Federal Specifications Board specifications, however, are mandatory upon the District of Columbia government, the same as they are upon any of the departments of the Federal Government, and in the formulation of those specifications the Bureau of Standards takes a very active part.

Is Mr. Fredericks, of the St. Louis Pump & Equipment Co., present?

REMARKS OF SHERWOOD HINDS, VICE PRESIDENT, ST. LOUIS PUMP & EQUIPMENT CO.

Mr. President and members of this conference, it was impossible for Mr. Fredericks to be here at this time and he asked me to deliver the following message to you.

I wish to say at the outset that I am expressing only the view of one manufacturer of oil and gasoline storage devices, of the relation of the duties of sealers of weights and measures to the design and manufacture of oil-measuring devices. This relation I wish to sum up at the outset as follows:

It is their duty and province to prescribe the degree of precision requisite for public protection and not to prescribe how this is to be accomplished.

A manufacturer has other standards to meet. He has, with oils and gasoline, the standard of safety, which is even more important than accuracy of measure because an unsafe device can not be tolerated under any considerations, regardless of its accuracy. The manufacturer, therefore, has to reconcile sealers' and conference standards to underwriters' standards. He has also to reconcile their standards to manufacturing standards, shipping standards, etc., and in this reconciliation he must be and can be guided only by years of experience in successful manufacture of these devices. It is, therefore, obvious that sealers, with their many other duties, can not make a proper reconciliation of design to meet all these lines and they are naturally biased along one only—correct measure.

The manufacturer also has the buyer's as well as the seller's side of the marketing of oil to face, analyze, and successfully meet. We, therefore, feel that with these facts before us this conference and all other conferences of weights and measures officials should only state the object to be obtained and not the method of obtaining it.

Again, close circumscription of design must obviously kill the initiative of the engineering, designing, and experimental departments of manufacturers, and it is the inventive genius of these departments in the past that has made possible the thousands of satisfactory oil-measuring devices in use at present. Yet right to-day I know, for one manufacturer at least, that it is impossible and financially useless to attempt to design and build a gasoline-measuring device that will meet 50 per cent of the many and varied requirements of the hundreds of sealers throughout the country without special alteration for each locality, to suit the personal ideas of the chief sealer in that section.

The St. Louis Pump & Equipment Co., as well as other legitimate manufacturers, have in their experimental room new types of liquid-measuring devices for years ahead and are always designing and experimenting to keep years ahead of their customers' requirements.

Shall all this be thrown away because sealers shall say just how a device shall be built?

Seven years ago the engineers of the company I represent recognized that refraction would play an important part in the future success and adaption of gauged glass cylinders for measuring gasoline and at that time developed the meniscus marker. Surely it could not have been fair for this or any other conference of weights and measures officials to have said that all other manufacturers must use this same construction. Nor would it have been fair to say to my company that, since certain other manufacturers have not been able to develop a satisfactory marker assembly, you must now abandon your standard design and change to a questionable design embodying a certain size of cylinder of excessive length that is impractical to manufacture, impractical to build into the device, impractical for both the shipper and user to handle, and, after once being installed, impractical to clean on the inside, thereby destroying for all time clear visibility.

At present an oil company can not afford to buy devices made by reputable manufacturers for fear that in a couple of years they will be forced to throw them into the scrap heap because of adverse regulation. They would much rather put up with some cheap makeshift or homemade device and take their chances as to what may happen to it.

The gasoline marketers to-day have in use thousands of measuring devices that, according to the latest tendency of action of weights and measures conferences, must be scrapped as a total loss, and yet it has never been proved or shown that the public has not been faithfully and accurately served by these devices when the same have been properly operated, and no machine in the past, present, or future can be made in respect to which improper operation will not defeat its whole operation. And, again, it has not been shown that the new devices, alleged to meet all the sealer's requirements, will any more faithfully and accurately dispense gasoline to the buying public.

In closing I wish to ask, Why should gasoline devices receive such a large proportion of the time of weights and measures conferences as they seem to at present? It is said that sugar alone costs the average family more than its gasoline, and I am told that milady spends more for cosmetics for her boudoir than any "flivver-driving" husband spends for gasoline, regardless of how severe his case of wanderlust is. I myself saw a lady walk into a store and say something to the saleslady, who took a medicine dropper and measured a few drops of liquid into a small vial, which I supposed was a test sample. Imagine my surprise when the lady handed the saleslady 50 cents and walked out of the store entirely satisfied with her bargain. Yet I have never seen or heard, nor do I think it would be anything but the height of folly, to formulate a set of standards for the regulation of the manufacture and use of perfume-measuring eyedroppers. I thank you.

The CHAIRMAN. That is the extent of the prepared papers on this subject. It is getting late, and the chairman suggests that the rest of the discussion go over.

PRESENTATION OF GAVEL TO PRESIDING OFFICER

Mr. SWEENEY. Mr. Chairman, may I at this time arrest the attention of the conference to carry out a little honor which has been suggested to me by Sealer Tom Mahoney, of Chattanooga?

I have here in my hand a gavel which was made from a mountain laurel tree which grew on Lookout Mountain, which, as perhaps the great majority of the gentlemen know, was the scene of the greatest battle fought above the clouds during the Civil War.

Sealer Tom Mahoney speaks in very high terms of our presiding officer, but, being somewhat modest and knowing that, perhaps, I had a little more nerve than he, has suggested that at this time this conference, through Mr. Mahoney and myself, present to our highly honored and respected and worthy presiding officer this gavel. In the deliverance to him of this gavel we hope and trust that he may have the pleasure for a great many years in the future of wielding this over the conferences which are held under the auspices of the National Bureau of Standards.

Mr. President, at this time I find it a great pleasure to present to you this gavel.

The CHAIRMAN. I thank you, Mr. Mahoney and Mr. Sweeney, for this gavel, and I assure you it has been a pleasure to preside over the preceding conferences, and I hope that this beautiful instrument of torture, if you please, will never have to be used.

APPOINTMENT OF COMMITTEES, AND ANNOUNCEMENTS

The CHAIRMAN. The final item on the program for this morning is the announcement of committees.

As the committee on resolutions, the Chair will appoint H. A. Webster, of New Hampshire, chairman; Fred Benjamin, of Illinois; H. L. Flurry, of Alabama; S. T. Griffith, of Baltimore, Md.; and Charles M. Fuller, of Los Angeles, Calif.

As the committee on nominations, the Chair will appoint W. F. Cluett, of Chicago, chairman; Philip T. Pilon, of Connecticut; I. L. Miller, of Indiana; H. S. Jarrett, of West Virginia; and Allen W. Corwin, of Allegany County, N. Y.

Also, you will find before you copies of a circular descriptive of the Bureau of Standards, written in popular language, which may be of use to you in your trip around the bureau. The envelope also contains an index of the specifications of the Federal Specifications Board.

At this time there are available for distribution reports of the committee on specifications and tolerances on specifications and tolerances for lubricating-oil bottles and on modification of specifications for liquid-measuring devices, which reports will come up to-morrow.

I understand that the photograph of the group is to be taken at this time, immediately preceding lunch.

**FOURTH SESSION (MORNING OF THURSDAY, MAY 26,
1927)**

The conference reassembled at 10.15 o'clock a. m. at the Bureau of Standards, Dr. George K. Burgess, president, in the chair.

The CHAIRMAN. The conference will please be in order.

Before starting the formal program this morning I would like to compliment the conference on the interest that its work is arousing, as shown by the publicity it is receiving in the public press. We have this morning a four-column article on the first page of the United States Daily, in regard to the activities of the conference yesterday. One of the evening papers last evening carried a long editorial on the work of the conference; the other papers of Washington have also been carrying references to the work of the conference.

I want, moreover, to call attention to the pioneer work that David Lawrence, president of The United States Daily, did for us last evening. Some of you perhaps listened in on the radio last night and can appreciate that Mr. Lawrence carried into effect some of the advice he gave the members of the conference. He devoted his talk over the radio to the work of the conference, and probably some of the people back home heard what you people are doing while here. The stations hooked up to hear Mr. Lawrence's talk were as follows: WEEI, Boston; WTAG, Worcester; WEAJ, New York; WGR, Buffalo; WRC, Washington; WGY, Schenectady; WLIT, Philadelphia; WCAE, Pittsburgh Press; WMAQ, Chicago Daily News; and KSD, St. Louis Post-Dispatch.

If there is no objection from the members of the conference, in view of the fact that Mr. Lawrence has promised a copy of the talk, I would suggest that we include his talk in the proceedings of the conference.

[The text of this talk was as follows:]

**RADIO TALK DELIVERED BY DAVID LAWRENCE, EDITOR, THE
UNITED STATES DAILY, OVER "RED" NETWORK, WEDNESDAY,
MAY 25, 1927**

Millions of persons drive their automobiles up to a gasoline filling station, ask for a few gallons of gasoline, pay for the same, and drive away, seldom stopping to wonder if they really received full gallon measures. Millions of persons step into taxicabs every day in thousands of cities, drive a few blocks or a few miles, and never question the little meter which records the distance. There are skeptics, of course, but most people have a blind faith that somehow the law takes care of the fraudulent.

On what is that faith based and how far is it justified? I am prompted to discuss this question to-night because there is meeting

in Washington this week the Twentieth National Conference on Weights and Measures under the auspices of the Bureau of Standards of the Department of Commerce. Delegates are here from a large number of the States in the Union. And these men are the ones who endeavor to protect the public through the introduction of mechanical devices which make accurate weights and measures and through a system of inspection that reaches into the smallest cities and townships.

And yet the problems are constantly multiplying. The annual conference is a voluntary affair. There is nothing compulsory about it, but so great is the interest of all State officials in matching experience and exchanging ideas that each year sees some advance in the methods of insuring accurate measurements. Thus the conference this week is discussing mechanical devices, among other things, which will make it difficult for the taxi driver to say his meter is out of order. Then, there is the householder's difficulty with the measurement of dry goods in department stores. The delegates told of the experience of department stores with mechanical measuring yardsticks not merely to avoid short measurements to customers but to protect the stores against loss through overmeasurement. The problem of correct weight for ice was another subject on which a variety of suggestions were offered. Several cities are encouraging the installation of machines which cut the blocks of ice in large and small pieces, so that the measurement is not left to the eye of the ice chopper. Then there was some talk, too, on how to sell ice cream, as it has been claimed that the amount of swell or overrun—that is, the amount of air incorporated in the frozen product—could be regulated. One interesting item discussed is how large a so-called quart bottle should be in order that the motorist shall get a full quart of lubricating oil instead of a quart minus the amount that clings to the bottle.

Another angle of supervision of weights and measures was presented in a report of an investigation on the marked weight of hams and other smoked and fresh meats, the object being to insure the retail dealer or customer will not be asked to pay for the marked weight of a ham, for example, which is marked 15 pounds but which has shrunk 1½ pounds since the time when it was first weighed and marked.

Questions like these illustrate the far-reaching problem of weights and measures as it directly affects the individual, but this is only a small part of the work that must be done in large industrial and business operations. The scales used in weighing commodities like coal, oil, grain products, fruit shipped in baskets and containers, and the articles of general commerce must be accurate.

Delegates from the different States reported the progress which they have made during the past year and presented for the consideration of the conference special problems yet to be solved.

Many States have recently added to their laws on the subject of weights and measures for the purpose of strengthening the protection afforded to the purchasing public and to the reputable merchant in all matters involving weighing or measuring.

The Federal Constitution granted Congress the power to fix standards of weights and measures, but, curiously enough, the various States and cities have retained the function of enforcing equitable standards in their respective localities. Legally there is little doubt

that Congress could at any time pass laws requiring uniform standards and superseding State laws so far as articles used in interstate commerce are concerned. In fact, it has been claimed that Congress could take over the whole subject of weights and measures under the Constitution. And, indeed, some of the manufacturers who find it difficult and expensive to comply with the variety of State laws have suggested Federal regulations, but the enormous machinery of inspection and enforcement is so localized that the Federal Government has never felt the urge to undertake the task, especially since uniform laws are being sought by voluntary cooperation on the part of the States themselves. Thus 16 years ago at the annual conference here a model law was drafted which has since been adopted by 24 States. The conference which is meeting here this week may be called Federal coordination of State activities. The Federal Government, however, is being asked by the States to act for them in many instances in approving types of measurement, for the Federal Government retains here the actual authoritative measurement.

The primary standards of length and weight of the United States have not been seen by a great many people in this country because they are very carefully preserved in a special vault at the Bureau of Standards in Washington which is rarely opened; in fact, there are but three people at the bureau who know the combination and have access to the keys of the safe door which guards these standards.

Thus, if a measuring device is offered for approval or disapproval, the Bureau of Standards is ready to give its opinion to the State or city asking for the same. The bureau here is a sort of clearing house of information for the departments of weights and measures in the 48 States. Research bureaus and testing devices are maintained here.

So it is becoming evident each year that the Federal Government is cooperating with the States in standardizing the types of machine used in weights and measures and in exchanging information over the new problems that arise each year. But the work of enforcement of the law and inspection is being left to the States and cities. The problem of fraud is not always the primary question. In many instances short weights or overweights are due to carelessness or inadequate measuring devices. The weights and measures official is as interested in protecting the dealer from loss as he is in guarding the consumer against fraud. The fact that a mechanical device exists at the filling station, for instance, which you know can be inspected helps to build faith in the measurements we receive. It may not be a spectacular activity of the Government to guard weights and measures, but it is of far-reaching importance in the daily life of the Nation.

The CHAIRMAN. I would like to make another announcement. The Bureau of Standards within the next month expects to issue the third edition of the publication which is a compilation of the laws of all the States of the Union relating to weights and measures, together with the Federal laws of particular interest in this connection. It is a comprehensive volume and will undoubtedly be of very considerable use to members of the conference in their work.

DEVICES FOR DISPENSING GREASES AND SIMILAR PRODUCTS

By CHARLES M. FULLER, *Sealer of Weights and Measures, City and County of Los Angeles, Calif.*

In dealing with the subject of grease "guns" and dispensers I am going to speak briefly: (1) On conditions as they were found in the field; (2) on the reason why many of the early types, which were found in use, were faulty, causing complaints to be made to the department of weights and measures; (3) on the changes that are being made in these early types to insure greater accuracy and a correct indication of delivery; (4) on new devices which are now being developed.

You must take into consideration the fact that our experience is limited to those devices which are in use in California. Also, that this is a new subject that has never been taken up at the conference; that we have therefore been unable to receive any outside aid or assistance from the experience of others; and that while we feel that we have made a good beginning, there is still a tremendous amount of work and experimentation to be accomplished.

Two early types of grease dispensers were found to be generally in use. There was the plunger type, in which the plunger was actuated either by a rotary crank or by a plunger rod which was pulled up and forced down. The main trouble encountered with these devices was due to the ease with which they could be operated at a fast rate of speed, not allowing sufficient time for the chamber to fill completely and causing a short delivery of grease. Steps have been taken with these types to insure a proper filling of the chamber by providing all of them with rotary cranks, which makes it possible to slow down the speed of operation through gears, and by placing a smaller outlet nozzle at the end of the hose.

The majority of these devices were supposed to deliver a certain definite amount of grease per stroke. While some of them were equipped with an adjustment for controlling the length of the stroke, thereby increasing or decreasing the amount of delivery, none of them were provided with an indicator or means of showing the amount delivered. There was also an air-operated rotor type of grease dispenser which had no means of adjustment to take care of various weight greases.

Various complaints were made to our department; in some cases customers were charged for an amount of grease greater than the crank case or differential could possibly hold; in other instances, gears of automobiles had been ruined through being dry within a very short time after the case was supposed to have been filled. These complaints were adjusted, and in every instance the trouble was found to be due to a faulty delivery from the grease dispenser.

Actual tests made by our department showed a variation on a delivery supposed to be a pound, ranging from one-half pound short on a fast operation to one-half ounce over on a very slow operation. In the latter test a few minutes interval elapsed between the raising

of the plunger and the lowering of it to make delivery, a condition that would probably not occur in actual operation to a customer.

In addition to making arrangements for providing a crank-and-gear mechanism for the lever type of grease gun, manufacturers are also bringing out indicating devices which can be placed on equipment now in use, at a very small expense. Recent developments in grease dispensers have done away with manual operation, compressed air being used. There are three general classifications:

1. The rotary meter type, in which the adjustment is taken care of, either by a direct control of the size of the measuring chamber or by means of a so-called "by-pass."

2. The plunger or cylinder type, in which the adjustment is controlled by the length of the piston stroke. Here, again, we have both the single and double cylinder models. In the case of the double cylinder one chamber is filling while the other is discharging.

3. The air-displacement type, in which a definite amount of air, registered on a sensitive air gauge, displaces a definite amount of grease.

In general, we may state that the manufacturers are working to satisfy the requirements for grease-dispensing devices that will deliver accurately and consistently a definite amount of grease, and that the amount delivered shall be automatically shown on an indicator or gauge.

Many problems remain to be dealt with. Shall grease be sold by liquid measure or by avoirdupois weight? If it is sold by weight the equipment must be adjusted whenever a change is made from one grade of grease to another.

You in the East have extreme conditions of temperature to deal with which we do not have to combat on the coast.

I place the entire matter in your hands as a subject that is worthy of our serious consideration and efforts, and trust that by the time of our next conference we may have sufficient data to enable us to formulate complete specifications and tolerances for these devices.

**REPORT OF COMMITTEE ON SPECIFICATIONS AND TOLERANCES
ON SPECIFICATIONS AND TOLERANCES FOR LUBRICATING-OIL
BOTTLES, PRESENTED BY F. S. HOLBROOK, CHAIRMAN**

Mr. Chairman and gentlemen, you are all familiar with the glass bottles which are being used throughout the country in the dispensing of lubricating oil to automobile engines. Up to this time no regulations for such bottles have been promulgated by the conference, and in very few of the States have such regulations as yet been devised.

This is an excellent opportunity, then, for the conference to act before various States have set up nonuniform requirements, and adopt a code which will be satisfactory to everyone, to the end that we may have uniform requirements in the various States. If this is accomplished the result will be that manufacturers making satisfactory types of bottles will be able to market them everywhere without objection.

The committee has given the subject detailed consideration in meetings which have been held, beginning last Friday, and has developed and recommend the code which is now in your hands.

Respectfully submitted.

(Signed)

F. S. HOLBROOK, *Chairman*,
W. F. CLUETT,
A. W. SCHWARTZ,
C. M. FULLER,
I. L. MILLER,

Committee on Specifications and Tolerances.

DISCUSSION OF ABOVE REPORT

Mr. HOLBROOK. The proposed code, which will now be read, was distributed, as you will remember, at yesterday morning's session.

The first specification is as follows [reading]:

1. Bottles used for the sale of lubricating oil shall be made of clear, uncolored glass, and only in sizes heretofore specified under the heading "Liquid capacity measures." They shall be made to contain their indicated capacities at a temperature of 20° C. (68° F.), and they shall not be subdivided.

The CHAIRMAN. What is the pleasure of the conference? If there is no objection, we will take it up in the usual manner, section by section. This is the first section which has now been read. Is there any comment?

If not, we will pass to the second section.

Mr. HOLBROOK [reading]:

2. Each bottle shall have its capacity clearly blown or otherwise clearly and permanently marked in or on the side of the bottle, and in or on the side or bottom the name, initials, or trade-mark of the manufacturer thereof.

The CHAIRMAN. Is there any comment on section 2?

Mr. CUMMINGS. Mr. Chairman, I would like to ask if the manufacturers of bottles have been consulted in the preparation of the specifications?

Mr. HOLBROOK. We got in touch with several of the companies who were known to manufacture these bottles, in March, and suggested to them that a code of specifications was about to be prepared, and that we would be glad to have comments upon any points which should be covered in the code, and suggested that they advise us. In so far as possible all manufacturers known to be making these bottles were notified so that the comments might be representative of the entire industry. We have had some correspondence with these firms, and some weeks ago their representatives were invited to attend this conference and to participate in this discussion. In addition to that, we issued a general invitation to the industry through the association of bottle manufacturers, advising of this conference and of the necessity or advisability of having delegates here. Whether representatives of glass bottle companies are here as a result of our invitations, I do not know. None have approached me with any suggestions.

Mr. CUMMINGS. About a year ago, Mr. Chairman, representatives of one of the large bottle manufacturers called me up with reference to this conference and asked me whether or not it would be of any importance for his company to be represented here. I suggested

that he get in touch with Mr. Holbrook, who could tell him more definitely about that relation. If they did do that I suppose they have been taken care of.

Mr. SWEENEY. Mr. President, I find that in some stations bottles are used merely as a means of transportation. They have a sealed pump from which they measure oil into the glass bottle and they use the bottle as a container. Now, would the acceptance of these specifications eliminate the use of that bottle as a container if the operator says that he does not use them as measures?

Mr. HOLBROOK. These specifications are limited to bottles used in the sale of lubricating oil. A bottle used merely as a container would not, I think, fall under that heading. However, I would like to propound a question: If you found a bottle in a filling station which was short of actual capacity would you care to leave that bottle there, even if the filling-station operator said that it was used as a container and not as a measure? Such bottles about a filling station would afford a wonderful opportunity for fraud inasmuch as the individual sales of lubricating oil can not be supervised by inspectors of weights and measures. Bottles such as are required by these specifications would serve the purpose of containers to transport the oil from the pump to the car, as well as any others. In other words, I think it would be extremely dangerous to allow bottles not conforming to the specifications around a service station even upon the statement of the operator that they were to be used merely as containers.

Mr. CUMMINGS. Mr. Chairman, one of the leading oil companies of the country, in an effort to prevent substitution, uses two kinds of bottles. One type of bottle is used in their own stations and has the company name blown in the bottle with the words "Contents, one quart." The other bottle they supply to stations buying their oil, where there may, perhaps, be substituted some other oil in, those bottles on a refill. In that case they do not put their name on. All those bottles are intended to be used as measures.

Mr. HOLBROOK. These specifications merely require that each bottle shall have its capacity clearly blown or otherwise clearly and permanently marked in or on the side of the bottle, and in or on the side or bottom the name, initials or trade-mark of the manufacturer.

Mr. CUMMINGS. But, Mr. Chairman, reverting back to section 1, I would like to suggest an amendment which might clarify the situation by adding the words "as measures" after the words "bottles used," so that the section will read:

SECTION 1. Bottles used as measures for the sale * * *

Wouldn't that remedy the situation?

(The proposed amendment was seconded.)

The CHAIRMAN. The motion is to insert the words "as measures" after the word "used" and preceding the words "for the sale of lubricating oil" so that it reads:

Bottles used as measures for the sale of lubricating oil * * *

Are you ready for the question?

(The question was taken and the motion was lost.)

The CHAIRMAN. Is there further discussion on section 2?

Mr. TOWNSEND. Mr. Chairman, I would like to ask whether all of these specifications are intended to be retroactive—whether they are intended to apply to equipment in the field and now approved by the sealer—or whether they would apply only to equipment bought after a fixed date. If the latter is true then I think it would be well to require that a date be blown into the bottle so that the sealer might determine that this bottle was bought after the ruling was put into effect. The question in my mind is simply this: We assume that these specifications are good and we adopt them; will this serve to condemn the investment in bottles in filling stations throughout the United States, an investment which has up to this time been made at least with the knowledge of the sealers?

A DELEGATE. On account of breakage, few of the old bottles would be in use after a short period.

Mr. HOLBROOK. I think before this code is finally adopted that it should be indicated what portion of the code is to be retroactive, if any, and what portion of the code is not to be retroactive. Certainly no bottle should be removed from use—this is just an example—because it does not have the name, initials, or trade-mark of the manufacturer on it. I think that goes without saying. On the contrary, I think if a bottle were several ounces short, for instance, it should be removed from use, regardless of the investment in it. In other words, ordinarily specifications which are aimed distinctly at short measure should be retroactive, because it is obvious that bottles not conforming ought never to have been allowed in use in any event.

On the contrary, specifications of a regulatory nature, to identify manufacturers making bottles or something of that sort, should never be retroactive, because to make them so would result in the destruction of property without any really good purpose being subserved. So, at the time that these specifications are being discussed, it would seem to be perfectly reasonable to decide what part of the specifications should be retroactive and what part should not be retroactive.

Mr. SWEENEY. Mr. President, under the Massachusetts law if bottles of this type are in use they would have to be treated as measures and tested by the local departments; they would be sealed if found correct and complying with specifications, and if found to be otherwise, why, the only method of procedure would be to destroy them. I assume that the various sealers in the field would put some identifying mark on these bottles. I would like to hear something along that line from somebody here who has had some experience with bottles. I do not want to delay the acceptance of the specifications, but I think it might be well to consider that point.

Mr. HOLBROOK. That lies in the jurisdiction of the various departments. It is the idea of the committee that these bottles should be tested.

Mr. MARONEY. In answer to the question of the gentleman from Massachusetts: In Connecticut we have a gentleman's agreement with the milk dealers. We have a well-known and reliable manufacturer who has somewhat of a monopoly, and his trade-mark is in the bottom of that bottle. He agrees to build a bottle that will not be incorrect, and puts his trade-mark on it, and he stands back of it.

Mr. HOLBROOK. The reason it is considered that it may be necessary to test these bottles individually is that it would be very difficult, without a special law on the subject, to bond the manufacturer and allow him to put the word "sealed" upon the bottles in the manner frequently employed in the case of milk bottles. The laws upon the subject of bonding and sealing by the manufacturer usually are limited to milk bottles, and, therefore, without a special law, it seems that in many States it will be necessary to test these bottles individually. However, of course, a State might reasonably obtain a law applicable to lubricating-oil bottles, similar to such laws applying to milk bottles, in which case it would be perfectly reasonable to test them by selecting representative samples from a large number and depending upon those samples to demonstrate whether the bottles are satisfactory or are not satisfactory.

To return to the question of what portion of the specifications should be retroactive, I think that in specification No. 1 the words "of clear, uncolored glass" should be nonretroactive. The remainder of that sentence, which includes all sizes which we regularly recognize, should be retroactive. Similarly, I think the remainder of the specification, "They shall be made to contain their indicated capacities at a temperature of 20° C. (68° F.), and they shall not be subdivided," should be retroactive also, because that touches upon the question of accuracy and also touches upon the question of a subdivided measure, which type, under the specifications of this conference, has never been allowed.

Taking up the second specification, the words, "Each bottle shall have its capacity clearly blown or otherwise clearly and permanently marked in or on the side of the bottle," seem to be a fundamental requirement which might well be retroactive. The remainder of the specification, "and in or on the side or bottom the name, initials, or trade-mark of the manufacturer thereof," should certainly be nonretroactive, as it is largely regulatory in its nature.

Mr. TOWNSEND. Mr. Chairman, I did not expect to delay the conference, but the point involved is a point of extreme importance to manufacturers. I have attended these conferences for a number of years and I have always found them reasonable.

Now, the question is whether or not it is useful to make any of these specifications retroactive or whether the mere bald statement that bottles which do not contain the full amount should be condemned, would be sufficient. The question is of a sealer condemning a bottle because it is of one color glass or another or because it has or does not have some trade-mark on it—those are requirements that the manufacturer or purchaser of the equipment could not have known down to this date. The thing I am trying to bring out is that we receive many good ideas—we have new people come in to these conferences and they add to the knowledge of the conference—but this idea of changing specifications every so often, is discouraging to the equipment manufacturer; he has no way of knowing, when he manufactures an article which is perfectly satisfactory to-day, whether at the next meeting you might not pass a specification which will in fact condemn the previously approved article.

Mr. HOLBROOK. I am perfectly in accord with the speaker and think we should be extremely careful in making any specifications

retroactive, but I think probably the speaker will agree with me that short-measure bottles should not be tolerated at any time.

Mr. TOWNSEND. I certainly do.

Mr. HOLBROOK. Not because it is a matter of specification but because short measure should never be tolerated.

Mr. TOWNSEND. That is correct.

Mr. HOLBROOK [reading]:

3. Bottles shall be provided with a clearly defined graduation line blown or otherwise clearly and permanently marked in or on the bottle, and extending at least halfway around it, which indicates the correct capacity, and with the words "Fill to line" or a similar or suitable inscription clearly and permanently marked in or on the bottle and clearly referable to this graduation line. This line shall be in no case more than 0.10 inch in width and the bottom edge of the line shall define the top of the meniscus of the water which is used in the test of the bottle. This graduation line shall be placed so that it is at least one-fourth inch below the bottom of any metal top when this is screwed firmly into place. The capacity of that portion of the bottle above the bottom of the graduation line shall be at least 3 cubic inches.

Mr. CUMMINGS. Mr. Chairman, I would like to inquire whether the last sentence means that there should be at least 3 cubic inches capacity from the bottom of the graduation line to the bottom of the metal top or to the top of the bottle?

Mr. HOLBROOK. To the top of the bottle.

Mr. BELLIS. Suppose a bottle would hold a quart, but only when filled above the graduation line, and the merchant who was selling the oil filled the bottle regardless of the graduation line; would there be anything to hinder him from using such a bottle if he delivered a quart of oil? I had that matter up with the State department, and also took it up with the local judge and he said that as long as a man gives a full quart of oil you have no case.

Mr. HOLBROOK. I think that is a narrow ruling. If a bottle has a graduation line on it and purports to hold a quart up to that graduation line, it would appear that you have a short measure if it does not hold a quart up to that line, because certainly the purchaser could not demand that the bottle be filled above that line.

Mr. BELLIS. If a purchaser took it to court would he have a case?

Mr. HOLBROOK. The purchaser certainly would not have a case for a short-measure delivery if he got his full quart of oil, but it seems to me that the official who leaves bottles in service which are short measure to the graduation line is condoning short measure, inasmuch as the purchaser can only check the fact that the bottle is filled to the capacity line as marked on the bottle. Let me cite a parallel case: Suppose a man had a short quart measure and he told the sealer, "I know the measure is short and so I draw a little bit more and throw it in." Now, if he uses a measure in that way and the purchaser got a full quart it seems that the purchaser would have no cause of action; but the official certainly should condemn the measure because the supervision necessary to determine that the man always did throw in a little more could not be exercised. No official could supervise to that extent. Similarly, action should be taken with a bottle which purports to hold a quart up to an indicated point but does not.

Mr. SWEENEY. Mr. President, I think, in answer to the question of the gentleman, that even though the man delivered the correct

amount, still in using such a bottle he would be amenable to the law for using a false measure.

A DELEGATE. Mr. Chairman, if an inspector found that 15 ounces on a scale actually indicated a pound, would he be satisfied with the seller's statement that he gives an ounce more than is indicated? Such a scale would be condemned. It is perfectly reasonable that it should be condemned.

Mr. HOLBROOK. I think that is a case directly in point. A merchant could give 17 ounces, as indicated by the scale, and the purchaser would have no right of action for a short delivery, but the officials would have considerable difficulty with apparatus like that. [Reading:]

4. When a bottle is equipped with a spout, this shall be so constructed that free and unobstructed drainage is provided. This specification shall be construed to require that there be an effective air vent in the spout and no shoulder or other obstruction tending to result in a trapping of the liquid being delivered. The spout shall not be over 6 inches in length, measured from the point of contact with the top of the bottle to the tip of the spout.

The reason for specifying the length of spout is that it would be dangerous, from a standpoint of accuracy of delivery, to have too long a spout, for the reason that the more surface there is in a spout the more liquid it tends to retain; this amount is of importance in the case of a liquid of high viscosity such as lubricating oil. [Reading:]

Tolerances.—The tolerances to be allowed on all bottles used for the sale of lubricating oil shall be in excess only and shall be the values shown in the following table: There shall be no tolerance allowed in deficiency.

Capacity of bottle	Tolerance	
	Drams	Cubic inches
2 quarts.....	12	2.7
1 quart.....	8	1.8
1 pint.....	6	1.4

These tolerances have been arrived at by selecting for each size a range identical with the range of tolerances on milk bottles of the same size. However, instead of distributing the range equally above and below the exact capacity, as in the case of milk bottles, the tolerances for these bottles have been fixed in excess only. For instance, on quart-size milk bottles, tolerances of plus or minus 4 drams are allowed; thus two bottles within tolerance may differ from each other by 8 drams. By the terms of these tolerances also, two quart-size lubricating-oil bottles within the tolerance may differ in capacity by a maximum of 8 drams, but in this case the smaller of the two must hold not less than 1 quart while the larger may hold 1 quart 8 drams.

Now, the reason why the tolerances are in excess only is the same reason that I have mentioned in connection with the last specification, namely, the nature of the substance for which these bottles are to be used. It is going to be a matter of the extremest difficulty to require a delivery of 57.75 cubic inches of lubricating oil to the quart out of one of these bottles even though the bottle actually holds a

full quart. As you all know, a considerable amount of oil is retained in the bottle after a reasonable drainage time has been allowed, and we have determined by experiment the value of these amounts for several grades of lubricating oil. The committee debated long and seriously the question as to whether these bottles should be made to contain a quart or to deliver a quart of lubricating oil, under certain standard conditions. The difficulty of enforcing a requirement that a bottle be oversize discouraged the committee from recommending that these bottles be made to deliver rather than to contain. By limiting the spout length, by making the tolerance entirely in excess, and in other ways, an attempt is being made by the committee to secure the delivery of a quart of oil, as nearly as may be, when a quart is ordered by the purchaser from equipment of this character.

Mr. CUMMINGS. Mr. Chairman, I would like to inquire what the committee agrees on as a reasonable time for drainage?

Mr. HOLBROOK. Well, the committee, as will be noted in the report on liquid-measuring devices which will come up this afternoon, is convinced that 10 seconds is a reasonable time for drainage from a gasoline pump. We are inclined to believe that an oil bottle may be drained somewhat longer than 10 seconds, because both the operator and the purchaser can see this oil which has not drained out of the bottle. Perhaps 15 seconds may be allowed in many cases; but in case a man desires 2 quarts and this is delivered from two 1-quart bottles it is probable that the drainage time will be even less than 10 seconds in the case of the first bottle in any event. In certain cases, of course, we recognize that these bottles will be upended in the intake tube in the crank case, and the operator may occupy himself in putting water in the radiator or distilled water in the battery or in dusting off the wind shield, etc., in which case the drainage period may run up to 30 or 45 seconds, or perhaps even a minute.

As the conference seems to be interested in that subject, I would say that we have made an investigation of the manner in which lubricating-oil bottles drain, and I have had the results put upon a lantern slide. We can throw it upon the screen and show exactly how that drainage takes place.

The CHAIRMAN. Would you like to see this slide?

(The members of the conference expressed a desire to see the slide. Consequently it was thrown upon the screen and described. See fig. 5.)

Mr. CUMMINGS. Could you tell us the length of the spout used in those tests?

Mr. HOLBROOK. About $5\frac{3}{4}$ inches. The oils used were furnished by our lubrication section, and the tests were made with the oil at 70° F. These were standard grades, representing light, medium, and heavy oil. Perhaps they were somewhat lighter than those usually encountered. I will have on my desk shortly the bottle which we used in the experiments. It was a bottle which was about 8 inches high, shaped much like a milk bottle, except that it had a somewhat higher shoulder. The diameter of the bottle at the capacity line was about $1\frac{3}{4}$ inches. It was about $2\frac{1}{2}$ inches wide at the top where the spout was attached, and the spout was slightly less than 6 inches long. During this experiment this bottle was first put at an angle of 30° with the vertical and was then upended vertically while the drainage was going on.

The curves do not depend upon one set of observations; each curve represents the average values of three sets of observations. The results were all taken by weighing methods.

Mr. CUMMINGS. In preparing the specifications did the committee consider limiting the diameter of the neck of the bottle or consider the possibility of the interchangeability of spouts?

Mr. HOLBROOK. In view of the discussion of the subject at the last conference, it is probable that you have in mind the question as to whether the tops used on these bottles also fit Mason jars. The committee found three or four different types and all the tops fitted the Mason jars. In other words, as far as the committee can see, practically every lubricating-oil bottle mold would have to be changed if a regulation were to be enforced to the effect that the top provided for lubricating-oil bottles should not fit Mason jars.

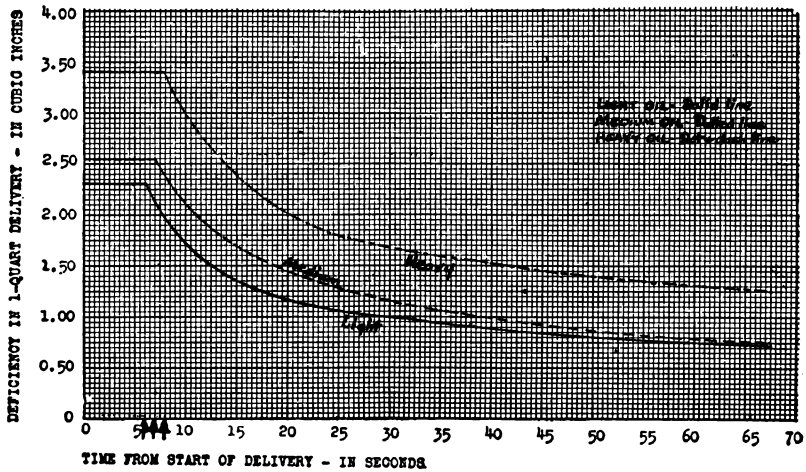


FIG. 5.—Chart illustrating drainage characteristics of a bottle delivering lubricating oils

Your committee could not see that it was a reasonable specification, from the weights and measures standpoint, to compel these bottle manufactures to make a bottle of a different shape because some other glass container happened to have the same diameter of top as the present bottles. In the opinion of the committee, the only way to eliminate the Mason jar from use as a measure is to condemn it whenever you find it in the field, and to proceed, after sufficient warning has been given, to prosecute any man who insists on using a Mason jar in lieu of a lubricating-oil bottle. The Mason jar does not comply with the specifications; it is not marked as to capacity; it has no graduation line; in short, it is not a measure. But it seemed to us entirely indefensible to say to the manufacturers of lubricating-oil bottles: Inasmuch as this bottle is made in such a way that it takes the same top as a Mason jar you must change the design of this bottle.

The question has been asked if there would be any difference in the drainage time of a short thick jar and a long slender one. We

made the tests with only one type of bottle. The delivery might vary somewhat from the results found, but I do not think it would be very materially different.

The CHAIRMAN. Gentlemen, these specifications and tolerances are before you for action. What is your pleasure?

Mr. CLUETT. I move the adoption of the specifications and tolerances as read.

(The motion was seconded.)

Mr. TOWNSEND. Mr. Chairman, I do not know whether I have a right to make an amendment or not. I am a guest, a manufacturer.

The CHAIRMAN. It is perfectly in order for you to make a suggestion and if a delegate wishes he can make a formal amendment.

Mr. TOWNSEND. Then the suggestion that I would make would be that the committee on specifications and tolerances be empowered to state what portion of these specifications will be retroactive and what will not, and the date on which these specifications are to become effective.

The CHAIRMAN. Does any delegate desire to make the amendment?

Mr. BULSON. Mr. Chairman, I would make that motion.

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

The CHAIRMAN. The question is now on the motion to adopt the specifications and tolerances as amended.

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

CITATION BY WEIGHTS AND MEASURES OFFICIALS OF IMPORTANT COURT DECISIONS IN THEIR JURISDICTIONS

(At this point the delegates were called upon to report to the conference the citation to and a brief description of important weights and measures cases decided in courts of record during the year, the request for the preparation of this material having been made previously by correspondence. Delegates who were not prepared with this information were invited to submit it by mail for inclusion in the record.)

This program number was inaugurated last year. See Report of Nineteenth National Conference, pp. 68-71.)

(The following case was reported.)

MARYLAND

State of Maryland *v.* The Jefferson Coal Co.

Case in the superior court of the State of Maryland, a court of record. Short weight in the delivery of coal by the ton. The defendant company was purporting to deliver 2 tons of soft coal. The delivery was found to weigh only 1,860 pounds to the ton. Inasmuch as coal in Maryland is required to be sold by the long ton of 2,240 pounds, the delivery was short 380 pounds per ton, or 760 pounds on the delivery. The defendant was convicted and fined \$522.35.

TRANSMISSION DRIVE FOR TAXIMETERS

The CHAIRMAN. We will proceed to the subject, "Transmission drive for taximeters." You have been notified that reports will be

received from all delegates and manufacturers who have had experience during the past year with transmission-drive taximeters. I will recognize anyone who wishes to speak on this subject.

REMARKS OF JOHN W. WEIBLEY, MANAGING DIRECTOR, PITTSBURGH TAXIMETER CO.

Mr. Chairman, during the past year the transmission drive for taximeters has received more attention on the part of cab operators than ever before for the reason that during the past year almost every manufacturer of automobiles has adopted the four-wheel brake as standard equipment. The old-style star-and-band transmission for taximeters is not nearly so efficient on such cars, and for this reason operators have been looking for some relief to get greater efficiency in the driving of their taximeters. Two large operators in this country have had some experience, in a large way, and I have written both of them asking them if they would advise me on this subject, and with your permission I would like to read what they say.

The first letter is from I. S. Scrimger, general manager, Detroit Cab Co., Detroit, Mich. [Reading:]

THE DETROIT CAB COMPANY,
Detroit, Mich., May 11, 1927.

Mr. JOHN W. WEIBLEY,
Treasurer, Pittsburgh Taximeter Co.,
532 Duquesne Way, Pittsburgh, Pa.

DEAR JOHN: Relative to the Twentieth National Conference on Weights and Measures at the Bureau of Standards in Washington, D. C., May 24 to 27, beg to advise that—

First, my experience in the cab business dates over a period of 19 years. The first meter used was the Jones taximeter, afterwards absorbed by the American Taximeter Co., and later your meter—have just forgotten the year we started to use the Pittsburgh meter.

Second, up to the time we purchased and installed Buick cabs, our meters were driven from the right front wheel. Our first Buick vehicle went into service September 3, 1925, and was installed with the transmission drive. The only objection made to this drive by Captain Austin of the Detroit police department, was a possible slippage. There isn't any comparison in these two drives—right front wheel and transmission—as to maintenance. I have seen as many as 35 or 40 cabs in the shop at one time with broken cables when the weather was freezing. Up to the present time we have not had a broken cable with the transmission drive due to freezing weather. We have had some breakage due to wear and tear, which is, of course, to be expected.

Third, we have never had any complaints from the public on the transmission drive, nor have we had any complaints from the drivers on this style of drive. From my long experience operating cabs, I think the transmission drive is the ideal drive. The possibility of the driver disconnecting from the front wheel is taken away when the drive is from the transmission, and we have never been able to discover any slippage of note or to find that our taximeters on slippery streets were registering a larger amount. The possibility of slipping with the ballon tire that is being used to-day is negligible.

I am quite sure that if some of the gentlemen who are to attend the conference in Washington could see the successful operation of the transmission drive in our service, they would all be sold on this proposition. I feel quite sure, too, that Captain Austin has changed his mind about this style of drive.

Yours very truly,

THE DETROIT CAB CO.,
By I. S. SCRIMGER, General Manager.

The second communication is from Walter S. Laird, president of the Yellow Cab Co., Pittsburgh, Pa. [Reading:]

YELLOW CAB Co.,
Pittsburgh, Pa., May 12, 1927.

PITTSBURGH TAXIMETER Co.,
530 Duquesne Way, Pittsburgh, Pa.

GENTLEMEN: With reference to your inquiry about our experience with transmission drive for taximeters, we wish to advise as follows:

In the past 17 years we have been in business we have had experience with practically all the different kinds of taximeters of American manufacture, namely, Pittsburgh, American, and Ohmer. Our cabs have been equipped with taximeters ever since we started in business, either with one or the other of these different kinds of meters.

The transmission has been of a type known as the star-and-band type. We can not recall that there was any material difference in the efficiency of this type of drive as furnished by the three manufacturers. In other words, to the best of our knowledge, the star-and-band drive as produced by the Pittsburgh, American, or Ohmer was substantially the same.

When we first started in business the star gear was made of iron, which caused more or less clicking and was generally unsatisfactory for this reason. This star gear was later replaced by a star gear made of fiber, which eliminated the noise to a large extent, but we found that fiber gears wore out more quickly. The wearing and breaking of the fiber star gear and cable has always been a source of considerable annoyance to us by reason of the fact that it usually occurs some time during the progress of a trip; and when the taximeter would fail to register, then the driver would be obliged to guess at the correct amount of the fare. If the driver guessed low the passenger was satisfied, but if the driver guessed high the passenger was dissatisfied and then more than likely made a complaint to the company. In every case we promptly made a refund, as it is our policy to always give our passengers the benefit of the doubt. We imagine, however, there were many times strangers rode in our cabs who did not know what the fare would be, and if they were overcharged the chances are we never heard of it.

About a year ago we first heard of the transmission drive, but did not take much interest in it because we feared that a taximeter driven from the transmission might cause the fares to register higher and give us a lot of complaints. However, in line with new developments, we made investigation of this matter and decided to try out some of these on some new cabs which we put in service. Last summer, after the first trial, we found that this type of drive was very much more satisfactory, and on all new cabs we have had since that time we have used this type of taximeter drive.

We are operating approximately 400 cabs. Of this number to-day we have 176 cabs equipped with transmission drive. These cabs were equipped last summer and autumn and went all through the past winter with only three broken cables, something entirely unknown in the history of our business, as during the winter months it is a common thing to have very many cabs turn in in one night with frozen cables, causing a great loss of efficiency and great dissatisfaction on the part of our patrons. However, we can not recollect a single case of complaint of overcharge by reason of the transmission drive on any of our taxicabs.

Another difficulty the transmission drive eliminates as compared with the old star-gear drive is that so far there has been no means of star-gear drive which can not be pried out of gear with a jack handle in case a dishonest driver wished to do so, in which case he could tell his passenger the meter was not operating, and if the passenger were a stranger and did not know the rates, a charge of most any amount could be made. With the transmission drive this is practically impossible, as all parts of the drive are encased in cables and all joints sealed, thus making it impossible for the driver to tamper with it without being detected.

We are thoroughly convinced that this is the one and only method of driving a taximeter. We believe that with the large tires now used by all taxicab companies that the slippage is a negligible matter, and that the benefit to the public with this type of transmission drive for taximeters is far superior to the old type of star-and-band drive.

Yours very truly,

WALTER S. LAIRD, *President.*

It would seem, gentlemen, that the public interest would be served better by this new type of drive for taximeters. The cab operators all over the country are deeply interested, and they ask why something is not done toward getting laws changed in such cities as New York, Boston, and Chicago, where the laws require that the taximeters must be driven from the front wheel of the cab.

Naturally it is not our business, as manufacturers, to go and have the laws changed, but we are perfectly willing to cooperate with the operators if that is in the public interest. The lawmakers of these cities do not change laws easily, and let me say it is usually with a great deal of opposition that they do develop, but, if the public interest can be served by a more efficient drive, and this one is more efficient, and we have been mistaken about a loss due to slippage, we should know about it. I should like to suggest, if it is in order, that the United States Bureau of Standards conduct a test here in Washington. I am sure one or more of the cab companies here will cooperate by having mileage indicators installed on the same cabs with these instruments attached to the transmission and a careful record kept to determine the actual slippage, if any. Then when the report is made you can definitely determine if the public interest suffers by a transmission drive for taximeters.

If such tests were conducted, next year when you assemble you could be told the actual facts, and I am sure that then you would be better qualified to give accurate information on the subject.

The CHAIRMAN. This is a recommendation for serious consideration upon this subject. Speaking for the Bureau of Standards, I can say we undoubtedly would be very glad, indeed, to attempt to cooperate with the parties interested and concerned, and we hope to carry out such an investigation and report back to the conference next year.

REMARKS OF W. H. BAKER, ATTORNEY, OHMER FARE REGISTER CO.

Mr. Chairman, after listening with great interest to the discussion of Mr. Weibley, of Pittsburgh, I wish to say that this year we have conducted a number of experiments and tests on the transmission drive for taximeters and I think that our tests verify the letters that Mr. Weibley read.

We failed to find any considerable variation between the old star-pinion drive and the transmission drive. At first, when the subject was under discussion some time ago, I was afraid that when the automobile encountered a bump it would affect the registration of the taximeter. But we failed to find that true with balloon tires—which are used almost universally on taxicabs to-day. Again, in the old days, when we drove our automobiles out on some muddy hill and got stuck, there was considerable slipping and the wheels might spin many times before we got them out. But as a general rule to-day we do not use taxicabs to take joy rides in the mud, and it would be extremely seldom that there would be any slippage from that cause. On the ice-covered streets there might be some slippage, but the taxicabs always use chains in rainy weather and when the streets are covered with ice. They use chains, not in order to cause the taximeter to register correctly, but in order to insure

the safety of the passengers, but incidentally that does prevent the wheels slipping.

I think the letters Mr. Weibley read bear out the statement that there is no material variation on account of the wheels jumping off the ground on account of a bump, or on account of slippage. I think slipping is actually compensated for by the wheels sometimes dragging when you put on the brakes. The actual variation would be very, very small. And the transmission drive is a much simpler installation. It does not require as long a cable; the danger of its getting wet and freezing is virtually eliminated. There seems to be no opposition whatever to the transmission drive other than that caused by the fear of slipping, which does not seem to be borne out by test. We are in favor of a transmission drive wherever the city authorities will permit such a drive to be used.

Mr. AUSTIN. Mr. Chairman, in Detroit we are operating with the transmission drive. One of the salient features which has encouraged the use of the transmission drive has been the trouble experienced in the past of having to retest meters many times a year, due to the breaking of the taximeter cables—that is a very common occurrence in the wintertime on the old star-pinion front-wheel drive; the cables would get wet, freeze up, and snap many times during the winter season. The transmission drive eliminates that; and otherwise, generally speaking, the transmission drive is far superior in its working to the front-wheel drive.

Mr. HOLBROOK. Mr. Chairman, I have just received a letter from one of the cab companies in the city of Washington expressing a willingness to cooperate in any investigation that we desire to make along the lines suggested.

HOW THE PUBLIC IS EDUCATED IN BALTIMORE

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

(At this point Mr. Griffith illustrated the manner in which he presents the subject of weights and measures to audiences in his city, such as business associations, clubs, and various other organizations. He exhibited a number of lantern slides pertaining to the work of his division and talked extemporaneously explaining the slides and describing this work in general terms.)

NOTES ON APPARATUS FOR TESTING HEAVY-CAPACITY SCALES

By H. M. ROESER, *Bureau of Standards*

The time is here when the necessity of providing adequate testing service for heavy-capacity weighing machinery is urged upon us not only for the purpose of protecting the public from fraud or losses but also as an economic service to the owners. It is true, as I believe most of you will admit, that at the present time there is a demand from the owners of heavy-capacity weighing machinery for testing service aside from the tests made for the general protection of the public. That this must be so is evident to anyone who has a proper conception of the rôle weighing machinery plays in modern business as an accessory to competent accounting methods. Naturally and

properly demands are made upon you and us for the service, because our mutual primary excuse for existence is in order that uniformity of standards may be provided and maintained.

The requirements for an outfit for testing motor-truck scales are most exacting. Such an outfit must be capable of carrying a maximum of standard weights, must have minimum initial operating and maintenance costs, must have a maximum cruising range, and maximum flexibility of movement. These are the principal demands. There are other secondary ones, less exacting perhaps, but the nature of which are such that to meet them to a reasonable degree will require the study and execution of a great amount of detail to evolve what may be universally acceptable.

Test requirements, road conditions, and handling equipment limit the amount of standard weights that can be handled effectively and economically to 5 tons or 10,000 pounds. This is one-fourth the capacity of the standard, or conventional, motor-truck scale, and is the amount which your formal methods of test require to be concentrated in successive order over each main-lever load pivot. To gain low initial cost it is necessary that stock mechanical equipment be used for transporting and handling, since it is axiomatic that specially designed equipment is extraordinarily expensive. This will in turn be reflected in minimum maintenance costs and probably tend to minimum operating costs. Equipment which requires special skill or training to operate must of course be avoided.

To my mind, the most important factor in operating cost, or, in fact, in the reduction of the cost per test to the ultimate minimum, is the size of the test-weight units. It is unnecessary to tell you that the cost of testing 20-ton motor-truck scales with 50-pound test weights is prohibitive on account of the exceedingly great amount of time and labor involved. I have noticed in the descriptions of equipment previously designed for this and similar purposes that 500-pound units are extensively used. This is a long step toward cost reduction, but it is neither far enough nor as far as can be gone without sensibly increasing handling inconvenience. On the assumption that little more time or inconvenience is required to handle a big weight than a little one if the proper equipment is used, handling time and costs are reduced almost in the inverse ratio of the size of test units. My intention or desire, then, is to use as large test weights as possible, and after study of the problem, I have concluded that 2,500-pound units may be feasible.

Further study of the problem leads to the certain conclusion that at least two types of equipment should be recommended—one for a city of considerable size where weighing locations are concentrated, space is cramped, and the necessary cruising range of the outfit is not extraordinarily large; the other for a county, State, or other civil subdivision where weighing locations are distributed, where great cruising speed and range are important considerations, and yard space generally free. Diagrammatic illustrations of these have been prepared which show their general nature and the methods of handling and manipulating the test loads.

The first mentioned of these types employs the ubiquitous tractor as a source of motive power. The test weights are carried in the trailer

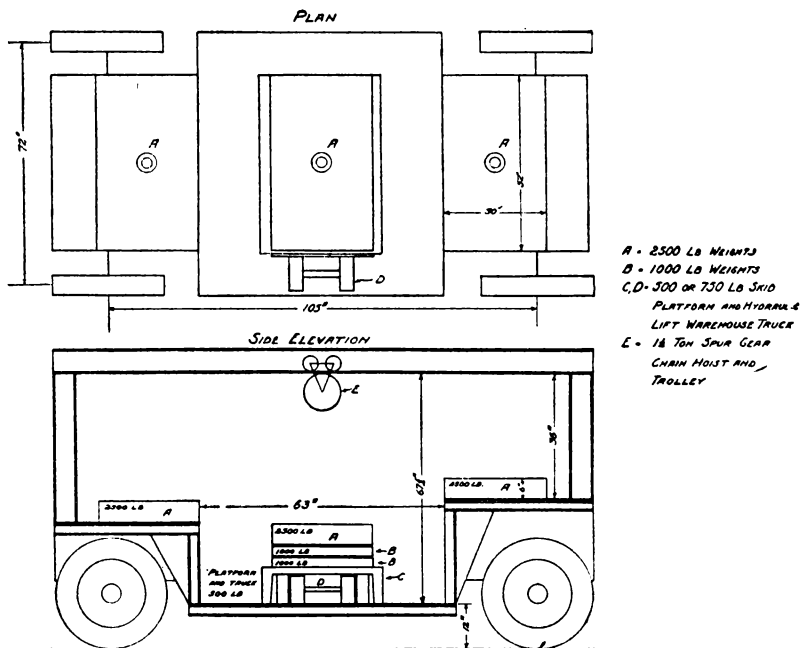


DIAGRAM LAYOUT
 MOTOR TRUCK SCALE TESTING OUTFIT
 CARRIER AND HANDLING UNITS
 10,000 POUNDS TEST LOAD

FIG. 6

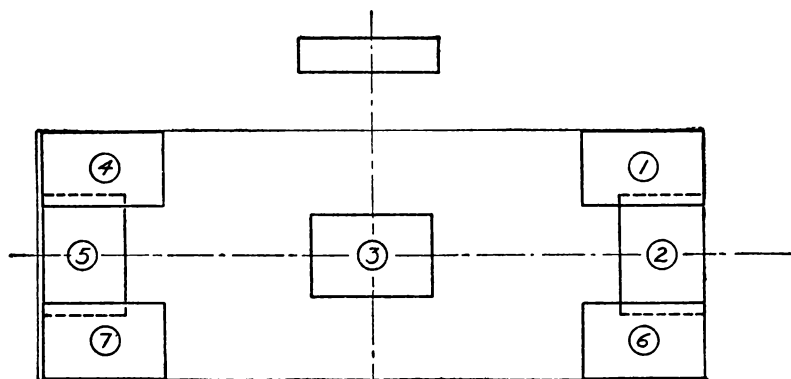


DIAGRAM OF TEST LOAD SPOTTING
 24x9' MOTOR TRUCK SCALE DECK

FIG. 7

(shown in fig. 6) having a low central portion and inclosed by sides which when let down from the top form a gangplank. While being transported one 2,500-pound weight is carried over each axle, and 5,000 pounds, consisting of a 2,500-pound weight, two 1,000-pound weights, and a 500-pound hydraulic lift warehouse truck and skid platform, is carried in the central portion. A 1½-ton spur gear chain hoist, running on an overhead I-beam trolley, is used for handling the 2,500-pound weights on and off the portable truck. When making a test, the outfit can be set at any convenient place in the immediate vicinity, the sides let down, the weights loaded on the truck, lowered down the gangplank, and taken to the scale by the tractor.

Test-load manipulation on the scale is shown in Figure 7. The loads are moved to the different spots in successive numerical order by means of the tractor and a drag line. The movement from position 1 to 2 and from position 4 to 5 is manual and consists simply of taking hold of the tongue and swinging the truck around at right angles.

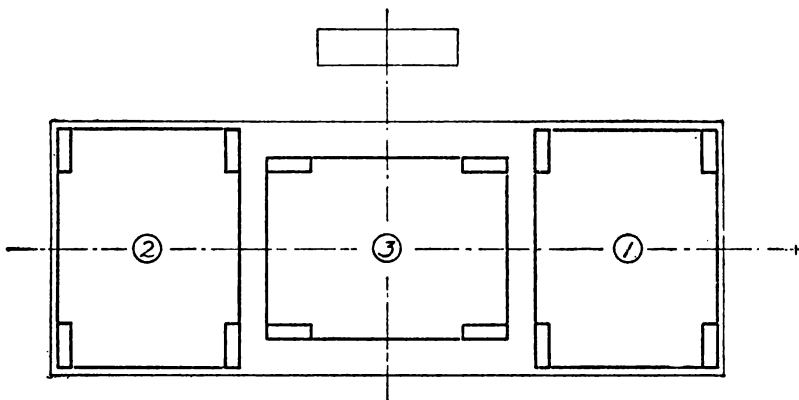


DIAGRAM OF STRAIN LOAD SPOTTING
24x9 MOTOR TRUCK SCALE DECK

FIG. 8

How the trailer may be used in applying a strain load to the scale if clearances permit is shown in Figure 8. The trailer may be set on the scale in position No. 1 and weighed or balanced off. The test load can then be pulled into it with the tractor and the known increment in load weighed. It may then be shifted to positions Nos. 2 and 3 with the tractor.

This type of outfit has the features of low first cost and low operating and maintenance costs. All parts are stock mechanical equipment and may be operated with ordinary labor. It has the greatest possible degree of mobility in cramped quarters and yet its cruising possibilities are sufficient for city service. The weights are of a standard form and the lifting accessories of common design. Labor of handling weights is reduced to a minimum since in making a test only two weights must be shifted on and off the truck and neither of these need be lifted more than an inch. This is practically all the manual labor that would be involved in making a test.

For routine service I am convinced that this type of outfit would yield the lowest possible cost per test.

The second type of outfit (see fig. 9) is on the order of the conventional motor-truck outfit. The test weights and secondary methods of transportation are the same as in the tractor and trailer type. An I-beam trolley carrying a spur-gear hoist is used for handling the weights. In order to keep the outfit from being top heavy, the trolley is not overhead but is about level with the breast of a man standing on the floor of the body. This arrangement will also give greater convenience in pushing weights in and out of the car while suspended from the hoist. The movement of weights in and out of the car will be attended with some difficulty if the truck is

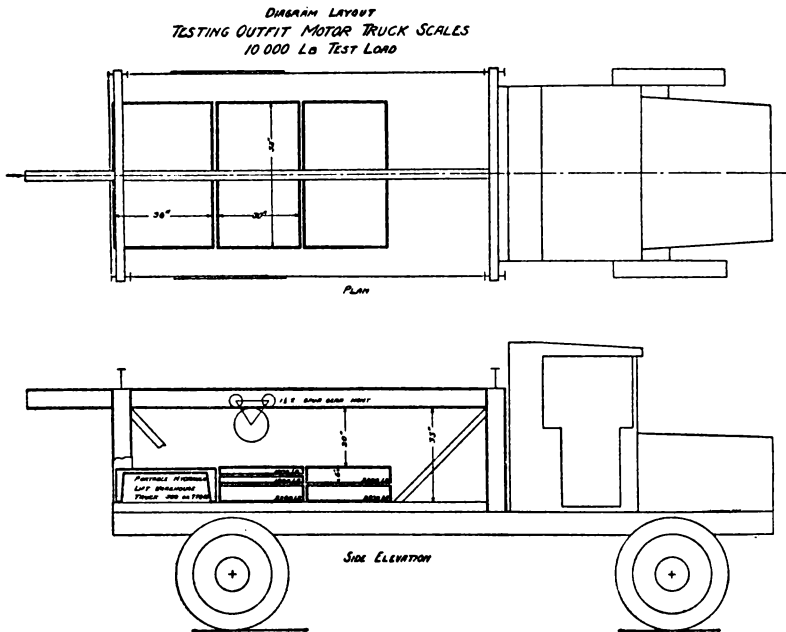


FIG. 9

standing on ground inclined along its longitudinal axis. It is not improbable that a geared trolley block or other means of racking the hoist will have to be provided. Also, in order to keep down weight, the I beam may be fixed in position so that it projects over the end of the body instead of being movable in and out, as in some designs in use.

The effective use of such an outfit as this will require more time per test, more freedom of space about the scale, and better conditions generally than the tractor and trailer type. More manual labor will also be required. It has, however, greater cruising range, in fact as much as may be required, greater speed, and independence of movement, and should be recommended where these last-named requirements are dominating.

Upon beginning a test, the truck may be backed up to the scale platform and the portable weight deposited directly upon the deck

in one of the regular positions shown in one of the illustrations. The test load may be shifted about on the scale platform, using the truck and a drag line, some suitable form of winching apparatus, or a gear arrangement on the test load itself. Strain loads may be applied by use of the test weights and the truck in appropriate combination or by depositing the test weights along the scale deck and straddling them with a truck load of coal. The weights are not so thick as to interfere with a differential housing.

As stated previously, these plans are submitted as ideas for a verdict of common opinion as to correctness of principle. Detailed design will require much time and expense, and I think it well to spend considerable time in circumspection before setting out upon it. These things are too costly for experimentation. It is an economic necessity that we guess right the first time.

DISCUSSION OF ABOVE PAPER

The CHAIRMAN. Is there any discussion of Mr. Roeser's paper?

Mr. FLURRY. I want to ask if it is possible that we may have a copy of those specifications from the bureau for use in Alabama? At the present time we contemplate putting on at least one or two truck outfits within the next six or eight months and we are now facing the problem of getting correct specifications.

Mr. ROESER. I will furnish you with general specifications covering the types of those accessories that have to go into the equipment. We have not had the time to go into the detail of the structure and design.

Mr. BRIGGS. We have had experience in testing livestock scales with 2,500-pound weights and with 1,000-pound weights, and our experience has been favorable to the 1,000-pound weights. The 2,500-pound weights are a little heavy to handle, and in attempting to move them about it requires elaborate machinery, so that, as a matter of fact in the cases I have in mind, it was found easier to handle three 1,000-pound weights than it was to handle one 2,500-pound weight. The concerns that have put in 1,000-pound weights were entirely satisfied with them.

Mr. ROESER. The general idea that I was working on is that it takes two and one-half times as long to load up the same amount of load in 1,000-pound units as it does to handle 2,500-pound units, and time is a deciding factor in making these tests.

Mr. BRIGGS. I might make it clear by stating that the 2,500-pound weights were handled by a device having a metal carrier and hoist, requiring from three to five men to handle it, whereas to handle the 1,000-pound weights is a simple proposition. They are handled by means of light two-wheeled carts, which are felt to be an improvement over the device for handling the heavier weight. At first they had very heavily built carts, but the lighter carts, when built to meet an emergency, were found to be very satisfactory and one man can handle a 1,000-pound weight with ease when the heavy elaborate carts have been disposed of. With these light two-wheeled carts they carry the weights from scale to scale; they haul them sometimes a quarter of a mile. This might fit in with the scheme. The weights used are simply cubical weights. They are good weights

no matter where you want to use them, and Mr. Roeser might make up a scheme where you could use them in his plan. I just mention it for what it is worth.

Mr. SWEENEY. Do I understand, Mr. Roeser, from your testing of scales, that you ignore the test of scales with loads of less than 1,000 or 2,500 pounds?

Mr. ROESER. No; not necessarily. My talk was centered about the kind of outfit necessary to get a 10,000-pound load on the scale and move it around. The main weight units would naturally be 2,500 or 1,000 pounds each.

Mr. SWEENEY. Do you think that is more practical than having a specially built 2 or 3 ton capacity truck and carrying 3,000 pounds of 50-pound weights? Wouldn't you get the same results that way?

Mr. ROESER. No; you would run up the cost of your test too high. You would have practically the same investment tied up in handling facilities in either case, but the test per scale would cost considerably less with the outfit I have proposed, and you would have a considerably better test. I think you should have an outfit that takes the least time to make the test; otherwise you are wasting somebody's time.

Mr. BRIGGS. If the scale is in condition, an inspector can test it in an hour; if not, he can not. This applies to livestock scales generally, where they weigh carloads one day and perhaps the next day weigh a 60-pound lamb. There is no quick process by which you can test scales. The more I see of scales the more I am convinced that you must put heavy loads on them to know what they will do with heavy loads. If it takes five hours or two weeks, you must do it. Now, ordinarily, if a scale is in good shape and maintained properly, you can test it in an hour, but I do not believe in most parts of the country you can get through in an hour.

Mr. SWEENEY. I myself speak from the experience I have had. We assume that the scales that we have are in fairly good condition.

Mr. BRIGGS. Mr. Sweeney, livestock scales are used not only for the heavier weighings in which Mr. Roeser is interested but also for weights of 100, 200, and 300 pounds. I think livestock scales should have more time put on them; but with proper equipment you can test a livestock scale under special requirements which exist as a consequence of weighing small loads, in an hour. Generally it will take more time. Sometimes you will not get through in a day.

Mr. SWEENEY. You approve of a test with loads from 100 pounds up to 2,000 pounds, don't you?

Mr. BRIGGS. Some of the scales they have I think run fractionally to 2,000 pounds capacity. It depends on the type. Probably six loads will give a fair average; but if there is some slight defect in the mechanism, which is out of order, it means a loss of a day's work or more.

When you weigh a small animal like a small lamb on a large scale—the price runs normally from 10 to 14, 15, 16, and 17 cents a pound—in order to protect the producer, you should have that scale carefully tested. In order to do that, we would want six shots—100, 200, 300, 400, 600, 800, and then 950 pounds—but that has to be varied.

Mr. FOSTER. Mr. President, I just want to say that Mr. Roeser's paper on this subject is very timely. Mr. Flurry has expressed a

desire on his part to have some knowledge on this matter. At our convention last summer the matter was taken up and the executive committee was instructed to propose some legislation whereby our State department could be equipped with something of this character, and it was felt all along the line that this was a thing that we must give attention to. The remarks we have heard have been very enlightening, as it would be the best method to pursue. Our legislative program went over to next year, so that we could get the cooperation of the highway department who are interested in weighing heavy trucks passing over the highways, and their idea was to establish master scales throughout the State to be of use to the sealers in the immediate locality. We are all coming to it and must meet the situation.

Mr. KELLEY. Mr. Chairman, I consider this testing of scales one of the most important subjects that has come up before us. It is not only important to us but to the people back home. We can never, unless there is some special effort made, get the information to them. There isn't a man on the floor who does not recognize that in the testing of heavy-capacity scales we are up against a stumblingblock. The men who are interested in the inspecting of scales in some localities realize the futility of the tests when they go out with 400, 500, or 2,000 pounds of weights and test 20-ton scales. Yet when we go back to our home government and go before the committee who have the deciding of the money we are to spend, we know we go against a blank wall, because they do not understand the necessity. Now it has gotten to the point where the various departments which are going to carry on this work must have something different in testing heavy-capacity scales if they are to carry it on properly. I have come to the conclusion that the only help we have is the Bureau of Standards, and I would suggest that this bureau get out an exhaustive bulletin pertaining to this subject and in that put all these remarks from gentlemen on this question, together with the specifications. Then we could take something back to these people and say, "This is recommended by the Bureau of Standards, and has been adopted by all the progressive cities of the country; it is no scheme of mine, but it is the result of the experience of men developed in the years of testing heavy-capacity scales, assisted by the technical men of the bureau." It is something that every community and business man would heed; and then I would show them how insignificant our test is.

Why we are continually up against it in our work. I have in mind one particular series of tests I had to make of three scales of 20-ton capacity each, two in large business places and the third in a coal yard. We went with 2,000 pounds of weights and found no appreciable error anywhere, and yet when we ran a load of coal over those three scales and checked up there was a difference of several hundred pounds disclosed. I stuck to it until I found that one of the scales was located where a pond had been filled with cinders, with the result that one of the supports of that scale had been sinking. Now, an ordinary load would not disclose any error. You had to put on a heavy load to find it. Attention was directed to the scale because the coal company failed to check up against the barge loadings of coal coming in.

So I say that this is one of the most important things that has been brought up. The time has come when we must use heavy weights. But when we go back there they say, "We can not stand the expense," and they cut it out. There must be some drastic action on the part of the bureau to help us out on the matter.

The CHAIRMAN. Is there any further discussion? It is quite evident that it is highly desirable that satisfactory specifications be drawn up. Possibly that will go a very long way toward stabilizing the practice.

Now, you remember that at the close of the session of yesterday morning we were discussing the subject of methods adopted for regulating new types of devices and we had finished the discussion of the written communications of the manufacturers. I stated there would be an opportunity for further discussion, if desired. Does anyone wish to talk further on that subject?

(No further discussion was had.)

ADOPTION OF AMENDMENTS TO MODEL LAW ON WEIGHTS AND MEASURES

Mr. HOLBROOK. In a new publication for weights and measures officials which we are preparing there will be reprinted the model law on weights and measures of this conference. In reviewing that carefully we have found several provisions which are thought to be susceptible of improvement and, in accordance with our regular practice, we desire to propose these amendments for your action thereon.

The changes proposed are, in substance, as follows:

An amendment is suggested in section 1 in relation to standards of weights and measures. The present wording of the law seems to require that when new standards are procured the old standards as well as the new standards will be the standards of the State. This seems not to be good practice. It would be preferable to provide that when a new standard approved by the Bureau of Standards is provided, the old standard will be displaced and the new standard will be the sole standard for the State. This change can be accomplished by changing the word "and" in line 3 and line 5 to make it read "and/or."

In section 2 there is a requirement in the law to the effect that the office standards shall be used in making all tests submitted to the office. There is much work submitted to the office for which the working standards rather than the office standards should be used because the full requirements for accuracy are met by the working standards. Under such conditions the use of the office standards is to be discouraged. This change can be accomplished by adding the words "or working" after the word "office," at the beginning of the last sentence in the section. This section should also be amended by eliminating the requirement to the effect that office and working standards should be sealed on each annual test, since this would eventually cause deterioration in the standards.

Now, somewhat more important than the above are the changes which are submitted in sections 3, 12, and 13 to include in the law "tenure-of-office" provisions; in other words, it is thought advisable to stiffen up the civil-service requirements throughout the law.

Provision is made in section 3 that the deputy superintendent of weights and measures be appointed by the superintendent of weights and measures and hold office during the term of office of such superintendent. The result of such a provision is that both men go out of office at the same time. That is very unfortunate. After consideration, it seems better to have the deputy superintendent of weights and measures appointed under civil-service rules in the same manner that the inspectors are appointed, so that when the head of the office retires the deputy will hold over and the office will continue to be supplied with an officer having a knowledge of the technical work required. When the superintendent and deputy go out at the same time and a new superintendent and deputy come in both have to acquire the necessary knowledge and a period of inefficiency probably will result. Therefore, the amendment of section 3 is suggested to provide that the deputy superintendent be appointed by the regular appointing power under civil-service rules, to hold office for an indeterminate period.

By the terms of the provisions of section 12 the county superintendent is under civil service "when such board exists." When such board does not exist it is provided that he shall be appointed for a term of five years. The situation is well covered where a civil-service rule is now in force and effect. The amendment suggested is to the effect that where civil-service rules are not in force and effect the official shall be appointed for an indefinite term and shall not be reduced in salary or dismissed from office without due cause, and only after charges of incompetency, malfeasance in office, or some other like cause are proven. Certainly nothing is so detrimental to the work as frequent changes in personnel. Yet, as the matter now stands, as soon as an official learns his job and can perform his duties efficiently a change in the political complexion in the county may result in his removal. Usually an entirely unqualified man is appointed in his place and—even in the case of a man who wants to train himself in the work—he must have a long period of training before he is of any considerable value to the community. We suggest the same amendment in section 13 relating to the city official.

By the terms of section 27 it is provided that "sealers of weights and measures" shall not be required to seal all milk bottles under certain circumstances. In case other officials, such as State deputies, are required to seal in some cases or jurisdictions, these officials should also be exempted from the duty of sealing under similar circumstances by words which are appropriate in the various forms of the law.

The next amendment is a very important one. We suggest that a new section be added to the model law specifying that 128 cubic feet of cordwood shall constitute a cord and that 2,000 pounds shall constitute a ton.

Those standards are not fixed in the present model law, although it is felt that they are standards that should be fixed in every State.

Mr. CLUETT. Mr. Chairman, I move the passage of the proposed new section and also the adoption of the other changes spoken of by Mr. Holbrook.

(The motion was seconded.)

Mr. CUMMINGS. Mr. Chairman, our Massachusetts law provides that, in the case of coal, 2,000 pounds avoirdupois shall be the standard for the ton, "except when sold by cargo." Practically all corporation and municipal contracts are based on the long ton. I would suggest that we amend the wording proposed by adding the words "except when sold by cargo." I move that amendment.

Mr. HOLBROOK. I do not see why cargo should be exempted there. The idea in this is simplification. If everyone knows that the ton is 2,000 pounds everyone can proceed safely on that basis. I would not be in favor of the exception proposed because if the short ton is used for all purposes the whole matter is very much simplified and there is less probability of mistakes and misunderstandings. This is suggested for the model law of the conference to be adopted in States which have not, as yet, satisfactory weights and measures laws. Of course, it affects no laws that have heretofore been adopted by State legislatures. We have had debates on this in the past. I had hoped that Mr. Roberts, of the District of Columbia, would be here when this came up. The District of Columbia uses the long ton for coal by virtue of an act of Congress, but there is no question that, in general, the long ton is going. It has been eliminated almost everywhere. Even where required by law it is not always used. In Delaware, while 2,240 pounds is specified as a ton of coal, it is not used in trade because coal is sold in 2,000-pound units, and the term "ton" is not employed in the transactions.

Mr. FLURRY. In the revised laws of our State, 2,000 pounds is specified as a ton for coal mined, and in the sale of coal also it is taken to mean 2,000 pounds, but I think we should have to take care of the customary practice in the steel industry.

Mr. MARONEY. Mr. Chairman, I have had some experience in the buying of coal in my State, and I would say that in placing bids for coal if the long ton is specified they make the price accordingly; for a 2,240 ton they make the price 12 per cent higher than for a short ton.

The CHAIRMAN. Is Mr. Cummings's amendment seconded?

(The amendment was seconded.)

Mr. CUMMINGS. Mr. Chairman, I wish to withdraw the amendment.

(The second to the amendment was also withdrawn.)

The CHAIRMAN. I think we all understand that the object of this model law is to guide legislative action in the various jurisdictions, to the end that uniformity may be secured in the weights and measures laws of the country. The function of this conference is, after all, to arrive at uniformity in so far as we can by voluntary agreement. Are you ready for the question on the adoption of the proposed amendments?

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

(At this point, at 12.50 o'clock p. m., the conference took a recess until 2 o'clock p. m.)

**FIFTH SESSION (AFTERNOON OF THURSDAY, MAY 26,
1927)**

The conference reassembled at 2.18 o'clock p. m., George Warner, first vice president, in the chair.

**VISIBLE DEVICES FOR INDICATION OF FULL DELIVERY, AND
DRAINAGE PERIOD OF LIQUID-MEASURING DEVICES**

By F. S. HOLBROOK, *Bureau of Standards*

Mr. Chairman and gentlemen, when the report of the committee on specifications and tolerances on modification of the specifications for liquid-measuring devices is considered later in the afternoon, there will be called to your attention visible devices of two sorts. One sort is a visible device attached or designed to be attached to liquid-measuring devices of the piston type to indicate when the system is full of liquid; the other type of device is an auxiliary visible indicating device designed to be attached to liquid-measuring devices of the visible type to indicate when complete drainage has occurred—when full delivery has been made. Consequently, it may be of interest to the delegates, when these things are being considered as a matter of specification, if they have in mind the different types of these devices which are now on the market. Therefore, this number has been included in the program.

To make the presentation as nearly complete as possible, we wrote out to our entire mailing list of manufacturers of liquid-measuring devices and asked them to submit to us cuts and pictures of devices of their manufacture, especially those falling within the second class mentioned. A number of companies responded; others did not. The cuts and pictures received and a few additional ones at hand were put upon lantern slides, and it is now intended to show you these slides in order that you may take a bird's-eye view of everything that is on the market and thus have the various devices in mind at the time the specifications are being considered.

Now we will look at these devices. I will try to be very brief in my descriptions; if any with which you are familiar are omitted you will know that the manufacturers did not submit them in accordance with our request.

(At this point there were shown, by means of 24 lantern slides, 16 types of auxiliary visible indicating devices, manufactured by various manufacturers, 10 different companies being represented. Some of these are regularly incorporated as a part of the liquid-measuring devices sold; some are "extras" which will be incorporated when specially ordered; while others are accessories and are sold separately for installation upon liquid-measuring devices already in use.

The devices shown fall into two general classes: The first class are intended for use upon the standpipe of piston-type devices and

are designed and constructed to indicate when the system is full of liquid and ready to operate, and thus to disclose faults, such as leaky valves, which allow the measured liquid to leak back into the underground tank and thus partially empty the system. The second class are devices intended for use adjacent to the delivery valve of visible liquid-measuring devices, and are designed and constructed to indicate when measured liquid continues to pass through the discharge valve after the liquid disappears from sight in the glass measuring chamber or, in the case of a nominal delivery such that it does not cause the liquid to disappear from the chamber, then after the time that the liquid apparently ceases to fall in such chamber; in other words, such devices are designed and constructed to furnish an indication of the completion of the delivery of the measured liquid.

In general, the devices pictured and explained were of the types of those contemplated by the first and third specifications presented later in this session by the committee on specifications and tolerances. (See pp. 102 and 108.)

The second portion of this paper will be devoted to the results of a study made by the bureau to determine the characteristics of the drainage period of visible liquid-measuring devices.

We all know that when a visible liquid-measuring device is making a delivery of liquid, at first the pipes are full of liquid. When the delivery has been nearly concluded there is a sudden breakdown from full flow to partial flow, and at a certain indeterminate time after the delivery is commenced all the gasoline, as measured by the device, has been delivered. What we are interested in is the varying rates at which the pump delivers the liquid at various periods near the completion of the delivery. This subject is also a timely one, since drainage periods are involved in some of the specifications which will be presented for consideration in the report of the committee, already mentioned.

(At this point there were shown by means of lantern slides, 12 charts, several of which are reproduced herein, each of which graphically indicates the characteristics of the drainage period of a liquid-measuring device. (See figs. 10-12, pp. 98-100.) A general explanation of the method of plotting these charts is as follows:

Distances measured horizontally from the left-hand side of the chart represent the number of seconds elapsing after the opening on the delivery valve on nominal 5-gallon deliveries of gasoline. Distances measured vertically from the base line of the chart represent the deficiency in cubic inches on these 5-gallon deliveries. The solid lines sloping downward and to the right show graphically the speed of delivery of the gasoline when the delivery of the 5-gallon quantity is nearing completion. Each separate line (denoted by a characteristic emblem, such as a cross, square, circle, etc.) represents an individual test. The first group of emblems at the upper left-hand ends of the solid lines represents: (1) In case the liquid could last be seen in the glass measuring chamber of the liquid-measuring device, the disappearance of liquid in this chamber, or (2) when the liquid could be seen in an auxiliary visible device located adjacent to the delivery valve, then a characteristic change in the indication of this device, usually a very sudden drop in the level of the liquid in

the glass window or tube, or (3) when the delivery was such that gasoline was still in sight in the glass measuring chamber when the delivery was complete, then the time at which the delivery broke down from a solid stream to a partial flow at the delivery valve, which time was coincidental with the apparent cessation of the fall of the liquid in the measuring chamber.

The arrows on the horizontal line at the base of the chart indicate the number of seconds after the opening of the valve that the change in the character of the delivery took place. The arrows on the vertical lines at the left-hand side of the chart indicate the amount of the measured quantity which remained undelivered at the time of this change in the character of the delivery. The dotted line extending upward from this first group of emblems indicates the average normal speed of delivery of the gasoline up to this time.

The effect of incidental errors in the nominal 5-gallon delivery of the liquid-measuring device has been eliminated by the expedient of considering the amount of gasoline which had actually been delivered by the device at the conclusion of a 60-second period after the delivery valve was opened, to be an exact 5-gallon quantity. The group of emblems located adjacent to the 60-second point represent the actual errors of the deliveries made, the points being plotted on the same vertical scale as the other deficiencies. However, as suggested above, the graphs are plotted as though the error at 60 seconds were zero in each case, thus making all of them directly comparable.

It results from the method of plotting the graphs that the more nearly vertical the line representing the delivery, the faster the gasoline is being delivered; the more nearly horizontal the line, the slower the gasoline is being delivered. It will be seen that the delivery is very rapid up to the time at which the gasoline disappears, or the main flow breaks down to a partial flow; that the speed of delivery then slows down at varying rates for the different devices, during the successive periods of time included in the observations, until at the end of the 60-second period the rate of delivery is almost zero; that is, the amount being delivered is negligible.

The types investigated are classified as follows: "Eye-measure" type, 5-gallon capacity, four (Nos. 2, 9, 11, and 12); sliding delivery-tube type, 10-gallon capacity, two (Nos. 7 and 10); adjustable overflow-tube type, 10-gallon capacity, two (Nos. 4 and 5); adjustable overflow-tube type, 5-gallon capacity, one (No. 3); special types, 10-gallon capacity, two (Nos. 6 and 8); "eye-measure" type, 10-gallon capacity, one (No. 1).

The delivery characteristics of each liquid-measuring device represented by a graph (see figs. 10, 11, and 12) are briefly summed up below:

Device No. 1.—Two determinations were made; the liquid disappeared from sight in the glass measuring chamber 22 seconds after valve was opened, 21 to 23½ cubic inches of gasoline remaining undelivered; at the end of 3 seconds after this time about 1 cubic inch of gasoline remained undelivered; at the end of 8 seconds about one-half cubic inch remained undelivered; the actual errors on 60-second deliveries varied from -3½ to -7 cubic inches.

Device No. 3.—Three determinations were made; the liquid disappeared from sight in the glass measuring chamber 21 seconds after valve was opened, 13½ to 20 cubic inches of gasoline remaining undelivered; at the end of 4 seconds

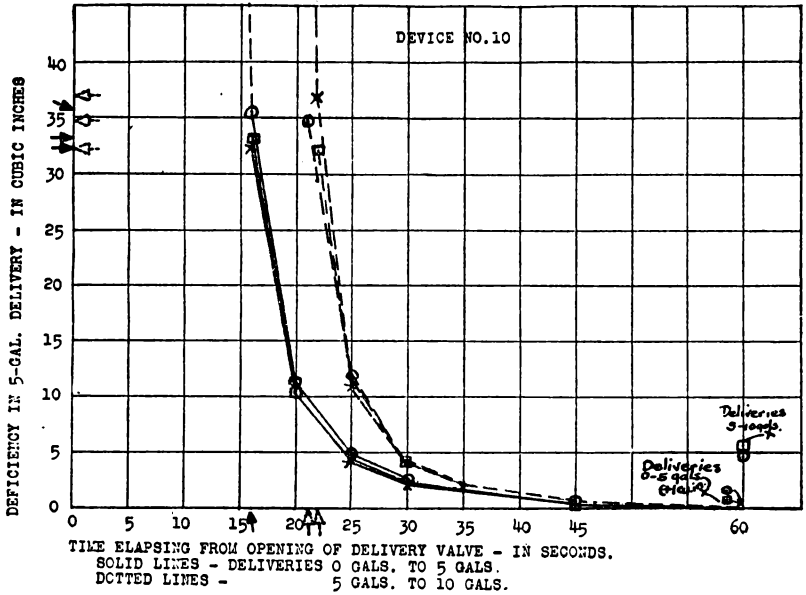
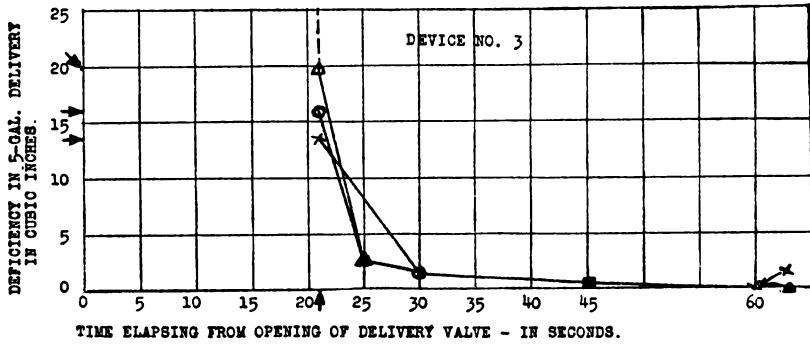
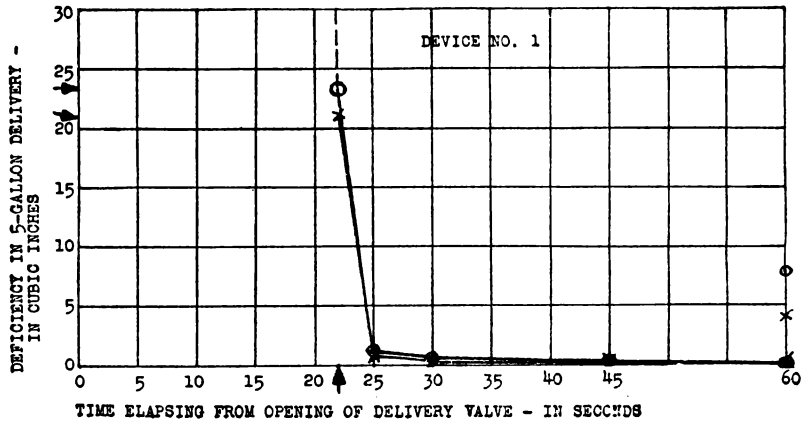


Fig. 10.—Charts illustrating drainage characteristics of certain liquid-measuring devices delivering gasoline

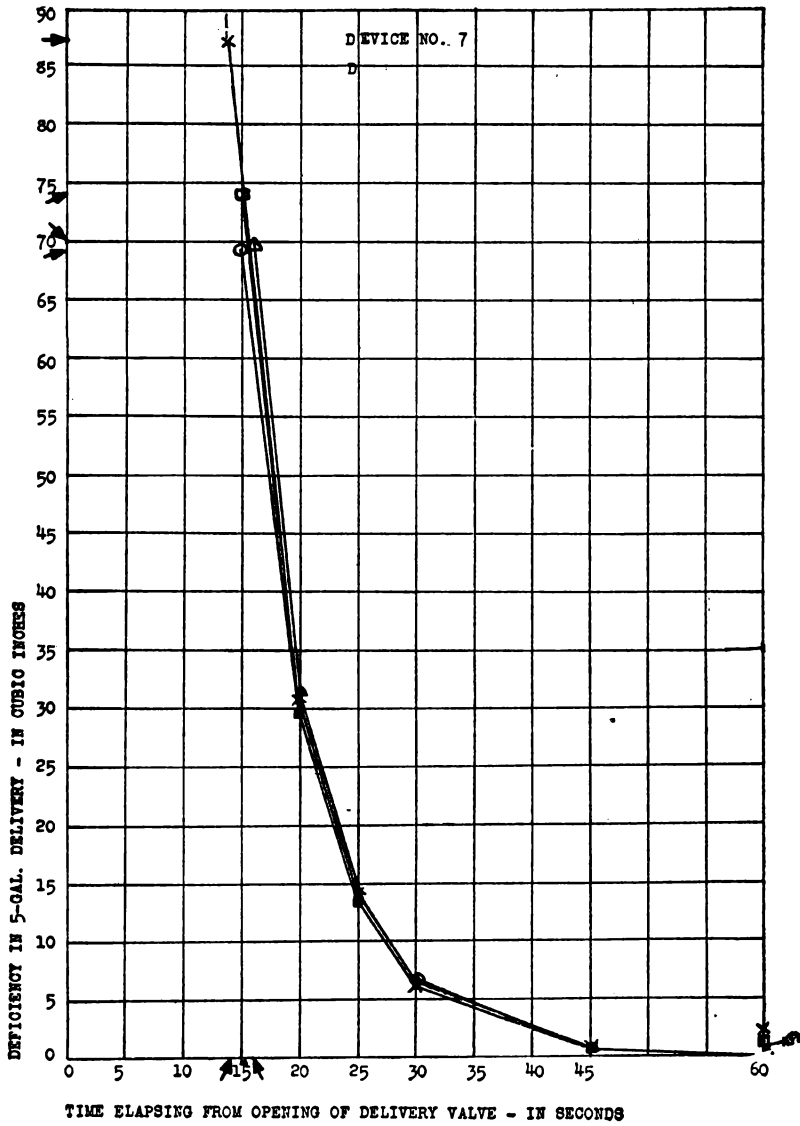


FIG. 11.—Chart illustrating drainage characteristics of certain liquid-measuring devices delivering gasoline

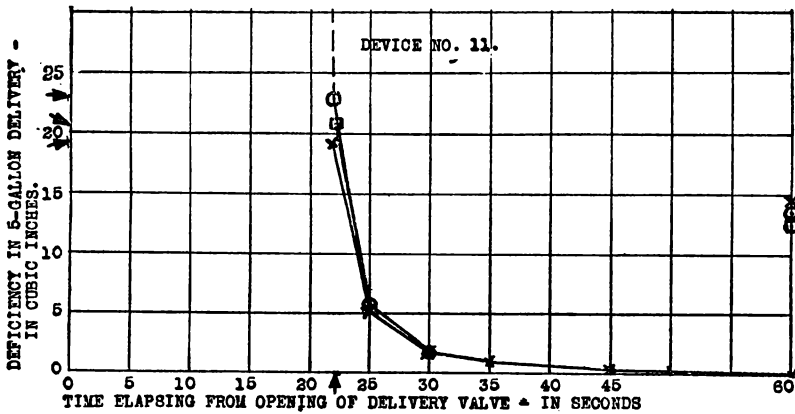
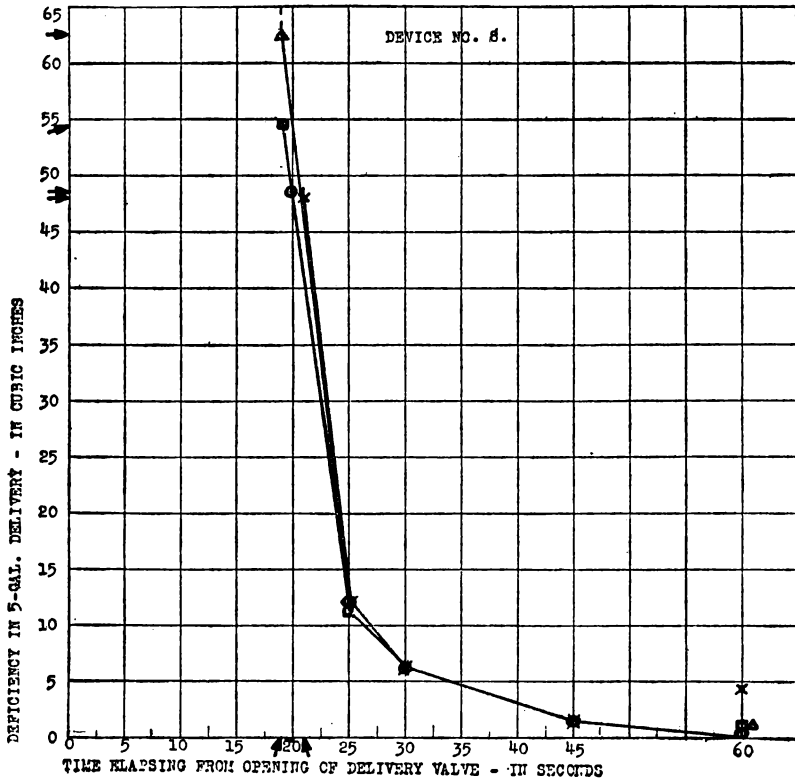


FIG. 12.—Charts illustrating drainage characteristics of certain liquid-measuring devices delivering gasoline

after this time $2\frac{1}{2}$ cubic inches of gasoline remained undelivered; at the end of 9 seconds $1\frac{1}{2}$ cubic inches remained undelivered; the actual errors on 60-second deliveries varied from 0 to +1 cubic inch.

Device No. 7.—Four determinations were made; the characteristic indication in the "sight glass" occurred 14 to 16 seconds after delivery valve was opened, $69\frac{1}{2}$ to 87 cubic inches of gasoline remaining undelivered; at the end of 10 seconds after this time about 14 cubic inches of gasoline remained undelivered; at the end of 15 seconds 7 cubic inches remained undelivered; the actual errors on 60-second deliveries varied from $-\frac{1}{2}$ cubic inch to $-2\frac{1}{2}$ cubic inches.

Device No. 8.—Four determinations were made; the characteristic indication in the "sight glass" occurred 19 to 21 seconds after delivery valve was opened, 48 to 64 cubic inches of gasoline remaining undelivered; at the end of 9 to 11 seconds after this time about $6\frac{1}{2}$ cubic inches of gasoline remained undelivered; the actual errors on 60-second deliveries varied from $-\frac{1}{2}$ to -4 cubic inches.

Device No. 10.—Six determinations were made, 3 each on deliveries from 0 to 5 gallons and from 5 to 10 gallons, respectively. In the first-mentioned series the liquid apparently ceased to fall in the glass measuring chamber 16 seconds after valve was opened, $32\frac{1}{2}$ to $35\frac{1}{2}$ cubic inches of gasoline remaining undelivered; at the end of 9 seconds after this time about 5 cubic inches of gasoline remained undelivered; at the end of 14 seconds $2\frac{1}{2}$ cubic inches remained undelivered; the actual errors on 60-second deliveries varied from +1 to $-2\frac{1}{2}$ cubic inches. In the second series the liquid disappeared from sight in the glass measuring chamber 21 or 22 seconds after valve was opened, 32 to 37 cubic inches of gasoline remaining undelivered; at the end of 8 or 9 seconds after this time about $4\frac{1}{2}$ cubic inches of gasoline remained undelivered; at the end of 13 or 14 seconds $2\frac{1}{2}$ cubic inches remained undelivered; the actual errors on 60-second deliveries varied from -5 to -6 cubic inches.

Device No. 11.—Three determinations were made; the liquid disappeared from sight in the glass measuring chamber 22 seconds after valve was opened, 19 to 23 cubic inches of gasoline remaining undelivered; at the end of 8 seconds after this time about 2 cubic inches of gasoline remained undelivered; at the end of 13 seconds 1 cubic inch remained undelivered; the actual errors on 60-second deliveries varied from $-12\frac{1}{2}$ to $-14\frac{1}{2}$ cubic inches.)

DISCUSSION OF ABOVE PAPER

The ACTING CHAIRMAN. The subject is open for discussion.

Mr. BETTS. Mr. Chairman, how do you account for the fact that some of the pumps discharge a larger percentage of the total delivery than others, up to the time of the breakdown of the full flow to partial flow; what is the reason for it?

Mr. HOLBROOK. I think it is largely a matter of construction. Some pumps have a very simple discharge line. An "eye-measure" visible device may have just a short piece of straight pipe between the point at which the liquid escapes from the cylinder and the delivery valve. On the contrary, the delivery lines on some pumps are not so simple and direct. The "sliding delivery-tube" devices, for instance, deliver through a sliding tube, which necessarily goes into a well below the pump; the gasoline must go down through this tube and then return up around it before reaching the delivery valve. Naturally, on account of the longer travel of the liquid and the bends in the line, there is more friction. The liquid must also level itself off in that device because the well is always full of liquid. Those factors probably have something to do with it.

Mr. OSBORN. Why was it that those pumps which delivered a large percentage before the breakdown yet required a long time to complete the discharge?

Mr. HOLBROOK. All were drained the same length of time—60 seconds. The last cubic inch or so of gasoline comes slowly in any event because this is drainage off the sides of the chamber.

Mr. PORTER. Were all these tests made without the hose being attached to the pump?

Mr. HOLBROOK. Yes.

Mr. PORTER. Would the pump also have to be tested without the hose if the specification were adopted?

Mr. HOLBROOK. No; because the specification is so worded that this is not required. If you will pardon me for the delay, I will point that out later.

Mr. PORTER. Would you mind telling how many of those pumps were of the eye-visible type and of the piston type?

Mr. HOLBROOK. I will give a résumé of the types included in the investigation.

(This list is given heretofore. See p. 97.)

**REPORT OF COMMITTEE ON SPECIFICATIONS AND TOLERANCES ON
MODIFICATIONS OF SPECIFICATIONS FOR LIQUID MEASURING
DEVICES, PRESENTED BY F. S. HOLDBROOK, CHAIRMAN**

The committee on specifications and tolerances recommends the addition of three specifications to the code of specifications for liquid-measuring devices and the amendment of one specification already included. The proposed wording for these additions is already in your hands.

No numbers have been assigned to the specifications proposed. It is intended that they be inserted at appropriate places in the present code and numbered accordingly.⁶

Respectfully submitted.

(Signed)

F. S. HOLBROOK, *Chairman*,
WM. F. CLUETT,
CHAS. M. FULLER,
A. W. SCHWARTZ,
I. L. MILLER,

Committee on Specifications and Tolerances.

DISCUSSION OF ABOVE REPORT

Mr. HOLBROOK. The first specification reads as follows [reading]:

Specification No. 5-a.⁷—Device to indicate when system is properly filled. All liquid-measuring devices other than those of the visible type, shall be equipped with a device which will indicate whether or not the system is properly filled before a delivery is begun. This specification shall be construed to prohibit a check valve in the discharge line in such a position that the partial emptying of the system would not be disclosed.

At this time the committee desires to suggest the following amendment: Add the following words at the end of the specification:

but not to prohibit a manually-operated valve in the standpipe.

These additional words are suggested to prevent any misunderstanding. They will permit the familiar globe valve desired by the underwriters.

⁶ The numbers afterwards assigned to these specifications when incorporated in the conference code for liquid-measuring devices, have been inserted in the text of this report for convenience of reference.

⁷ This specification was assigned this number when incorporated in the conference code of specifications for liquid-measuring devices.

I think that you are all familiar with what this specification will involve. At the present time we have a large number of devices of the piston type on the market which are not equipped with a so-called "sight glass." A sight glass on a piston pump has never, up to this time, been required by our specifications. This specification requires that piston-type pumps be equipped with visible devices to indicate that the system is properly filled before delivery begins.

Now, before we go any further on this, let me suggest that in view of the importance of the changes suggested and in view of the fact that the manufacturers saw these specifications for the first time yesterday, and have not had an opportunity to study their pumps in connection with them, the committee desires strongly to recommend that these specifications be not put into force and effect before July 1, 1928. If these are adopted we will have an opportunity during the year to ascertain what the effect will be upon the devices on the market and the manufacturers will be afforded all the time that they need to make any necessary modifications in their designs. We think that is only fair to the pump manufacturers.

I also suggest that they be reviewed by the next conference before they go into effect.

Mr. MARONEY. Mr. Chairman, may I ask why there is an objection to a check valve?

Mr. HOLBROOK. For the reason that when you put a check valve in a standpipe you destroy the advantage of the visible device mounted thereon, because even though the liquid leaks back from the cylinder, if the check valve in the standpipe is tight and working properly the standpipe will remain full and there will be no indication that the system is not full. It is felt that if a check valve is put in the line the advantage of the visible device is offset.

Mr. TOWNSEND. Mr. Chairman, I would like to know if it is the intention, if and when this specification is adopted and made effective, to make this retroactive to pumps put into the field prior to the adoption?

Mr. HOLBROOK. The committee has made no recommendation as to that. This specification might be made retroactive inasmuch as it merely requires an attachment to the pump. However, I think that if this course were to be taken, enforcement should be placed very far in the future so that all manufacturers would have an opportunity to develop and put on the market their own particular types, and so that the pump owners would have plenty of opportunity to procure these devices for their pumps.

Mr. TOWNSEND. Does the secretary realize that this would probably involve an expenditure in the neighborhood of \$15,000,000?

Mr. HOLBROOK. No.

Mr. TOWNSEND. I think a demonstration would prove that. In the past 38 years piston-type pumps have been made, and I think it is safe to assume there are probably 3,000,000 such devices in the field at present. I think it is also safe to assume that it would cost approximately \$10 apiece to put these attachments on these pumps, including the traveling expenses of men to go to the pumps and make the installation. If those figures were true, it would involve an expenditure of \$30,000,000; if half true, it would mean an expenditure of \$15,000,000; if one-third true, it would mean \$10,000,000.

I would ask the secretary also to consider this fact, that the millions of pumps now in the field have been put there with the approval of the sealers. They have been made by manufacturers who were trying to meet and did meet the specifications as they existed. They were bought by people who had every right to feel that they were investing their money safely in the pumps. If those facts be considered, it would be unjust and unfair to force an additional expenditure of from \$10,000,000 to \$30,000,000 on the man who in good faith and in cooperation with your sealers has invested his money in such equipment.

There is a further fact that I would like to have considered. Manufacturers of gasoline pumps must of necessity make, and want to make, the best pump they can, and the buyer of gasoline pumps wants to buy the best he can according to his judgment. There is no source of information available as to what constitutes the best in these things either for the manufacturer or the buyer, except the rules that you gentlemen yourselves have laid down. If a specification of this kind should be made retroactive, it would be extremely discouraging to the pump manufacturer and to the buyer of equipment.

I believe that you gentlemen will agree that there is no man in this room who can release his imagination and picture the type of pump that will be in existence 10 years from to-day. Pumps change to meet changed requirements. Personally this particular specification is one in which the company that I represent has no interest. We make no pumps that would require these attachments. But the principle involved is of very great importance to the company I represent. I can assure you that we are doing everything that we possibly can to meet your specifications, and I believe on that basis that we are entitled to the position that if we meet your specifications once with that equipment it should not be subject to condemnation so long as it performs the function for which it was designed. I agree that such equipment as short measures should be condemned absolutely.

I take this opportunity to talk on a subject I have thought of for the past eight years, since I have been attending the conference. I have seen the faces in the conference change year after year—new men come in with new ideas. The pump manufacturer has always wanted to cooperate, but the business of the pump manufacturer has become almost a burden. We have come to the point in our industry where we are almost compelled to make 48 different types of pumps. We make a pump and ship it into the field and see that it receives the approval of the sealer. Then the sealer is likely to come back next month and condemn that pump. I say that is unfair—it is unreasonable, and this is a reasonable conference. I have been in these conferences for eight years and I know they are reasonable conferences and that the men here intend to be reasonable just as the pump manufacturers do. I hope that we will not assume that we in this conference are able to say that this is the last word, that in detail we must make a pump in this fashion and then quit. This is the reason why I bring this to your attention. If we start setting up detailed methods of construction of gasoline pumps we say in effect that from this time on there is to be no progress in the making of gasoline pumps. Now to amplify that let me say there is a State—I do not know whether it is

represented or not—but the State of Ohio has said to the manufacturers that they must make a gasoline pump with certain markings and of a certain shape and form. Now, gentlemen, I submit to you that that sort of regulation is against the very interests that you are trying to protect.

There was a day when great progress was made in civilization and a man named Aristotle came along and wrote down all the thoughts up to that point, and if anybody wanted a question answered they never investigated but took the book and saw what Aristotle had written on the subject; when that book was written civilization went into what we call the Dark Ages and did not come out until somebody questioned those statements. If we at this time say a pump must be made in a detailed fashion you say to the engineers at my laboratory, "You can not think on that pump; you can make no progress beyond that point—that is the law."

When it comes to the question of making this specification retroactive we do a thing which has never been done in the history of the world successfully. Laws have been passed, millions of them, but not one law has ever been passed and made retroactive. It is an impossible system of law in accordance with the regulations. I do not believe that this body of men who are smart—and you are smart—are smart enough to pass laws which are so all-seeing that they represent the end of progress. Nor do I think we can start over and say to the pump manufacturer and to the buyer of pumps: "This thing that we permitted you to buy and install, although measuring accurately, can not be used unless you spend \$10 more on it." It isn't reasonable that that should be done.

Mr. HOLBROOK. I think that position is very well taken and as a rule this conference does not desire retroactive specifications, as I pointed out this morning, except when the specification is directly tied up with short measure, or with something which should never have been allowed in any event, as in the case of a short-measure bottle, a bottle that could never hold the proper amount; such a bottle should never have been allowed; if it has not been destroyed it should be destroyed.

The question as to whether or not any of these specifications should be made retroactive was left with the conference. The committee noted no recommendation along this line, with the idea that the matter would be settled on the floor.

With the consent of the committee, I suggest that all these changes now being proposed be limited to apply only to new devices and to go into effect July 1, 1928, and that all pumps which have been installed prior to that time may continue to be operated in the same manner as at present, so long as they deliver correctly.

Mr. HINDS. Mr. Chairman, I would like to ask a question. Is it true that an old pump which can be operated by an oil company in one location may be relegated to the scrap heap when it is moved from that particular location?

Mr. HOLBROOK. No; I would say that the specifications follow the pump, regardless of its location.

Mr. HINDS. The reason I spoke of this is that in the State of Ohio that very thing has been done. I know of a number of pumps which so long as they remained at one place were all right, but when they

were moved they were scrapped. It is not fair to require one oil man to have devices which another is not required to have. I would like to ask that question.

Mr. HOLBROOK. The question answers itself. The regulations should be uniformly applied. Moreover, as far as I know, it has never been contemplated by this conference that the removal of a device from one place to another would change its status in respect to specifications or regulations.

Mr. ECKELS. Mr. Chairman, I am probably the only representative from Ohio. It is understood that some pumps can not be moved; but these are pumps such that they are too easily manipulated. It has been entirely up to the county sealer of the county or city sealer of the city to say whether a pump can be moved or not. The oil company can take the matter up with the sealer and can move it to another place provided the pump is all right and they will have the right kind of people to operate it. In my own experience I gave one company permission to move three pumps. They agreed to make them come as close as possible to compliance with the specifications. I did not go to see them in their new location right away, and they had installed them without making the adjustments necessary in accordance with the agreement. Why should we not have rules to require people to do the right thing? Not later than last January one of our larger oil companies installed four pumps in one of our towns. I condemned all four of them. The superintendent came down and I had him hold the hose and I beat him out of one-half gallon of gas. Why is it not necessary to have some rules and regulations? I think Ohio has one of the best codes in existence to-day, and the pump companies in our State are cooperating with us to the letter and want to make their pumps right.

Mr. TOWNSEND. Mr. Chairman, I did not know a gentleman from Ohio was here. I want to give you a statement, if you will permit me to do so, of at least one pump manufacturer concerning the conditions in the State of Ohio, which have come largely out of what I would call a retroactive complex.

Our company for a year and a half did cooperate with the sealers in the State of Ohio, and during that time made 15 different kinds of pumps at the request of four different officials in the State of Ohio. Those pumps were sent successively into the State and successively were first approved, next condemned, then changed, then approved, then condemned.

Now the situation came down to this point: We asked the State of Ohio to tell us what kind of a pump they wanted and stated that we would build it for them. We have down to this date been unable to receive any written statement from any official in the State of Ohio advising us that if we would build a pump so-and-so, they would approve it. No; they have said, "If you build a pump so-and-so we will approve it temporarily." As a matter of fact, in the list of pumps which they have sent out which are approved for temporary use, you will find Fry's name mentioned; but conditions got so bad that we took the position that we could not afford to take money from customers for a pump to be shipped into the State until after the 1st day of July. We took that position openly and wrote letters to all our clients in the State; and Fry withdrew from the State of

Ohio. As a result we got fine letters from some of our good competitors. They said, in effect, "Mr. Townsend, you have done a good thing." All we were trying to do was to force the State of Ohio to do what they ought to do.

On the other side of the picture I have heard statements made, "You better look out; Fry was kicked out of the State of Ohio." Now, Fry is not kicked out of any State, but Fry will not do business in any State where Fry can not find out in advance what standards of construction will be approved. Now, that is the basis of the retroactive actions I am talking about. We can ship hundreds of pumps into the State of Ohio, but on June 30 we have no assurance that the money that our customers have invested in these pumps will not be lost.

Now, in the State of Ohio there are many pumps that are being changed to meet the temporary specifications. No man has the assurance that if he changes a pump it will not be condemned on June 30.

Now, I bring no criticism for your State. I have a very high opinion of the State; it is a good State, but it is an awfully poor State for the pump manufacturer because of the retroactive complex. It is costing the oil industry and the pump industry hundreds of thousands of dollars because of this very thing I am talking about.

The ACTING CHAIRMAN. The very things we are considering may correct the things that Mr. Townsend speaks about; our object is to effect uniformity throughout the country.

Hearing no objection from the other members of the committee, I assume that all the provisions under consideration are recommended by the committee to be nonretroactive and to become effective July 1, 1928.

Mr. FOSTER. Mr. President, I would like to say a word in reference to changing a pump from one location to another. I have been told a few moments ago that 10 years from now there would be none of the pumps now in use in existence. We have taken the stand that where a pump is taken in, rebuilt, and changed to a new location it should be made to meet the specifications. I do not think that as a rule the specifications should be retroactive. But if the pump is remodeled, overhauled, and rebuilt, as many have to be after two or three years, I do not think it is any hardship on the oil company or the user to require that it be brought as nearly up to date as possible.

Mr. CUMMINGS. As a matter of fact, in Massachusetts we have compelled them to register a change of location. Mr. Foster might condemn a pump in Springfield; then the district manager of the oil company might transfer the pump to some small town where the sealer did not have a great deal of experience and attempt to put that over. It has been necessary for us to promulgate a regulation that in the case of a movement of a pump it would be considered as a new installation.

Mr. HINDS. All I want to say in regard to retroactive regulations is that a man might better throw away his pump and buy a new one than to attempt to have it changed; and other pump manufacturers will bear me out on that.

Mr. FLAHERTY. Mr. Chairman, I move the adoption of that specification as recommended by the committee.

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

Mr. HOLBROOK [reading]:

Specification No. —.⁸ Marking of meters. All meters shall be legibly marked to show their maximum discharge rates under normal conditions of installation, and the minimum discharge rate and the maximum and minimum working pressures for which they are intended to be used. In the case of a meter installed for use in the dispensing of liquid at retail the maximum value of the minimum rate shall be 10 gallons per minute.

The committee now recommends that the words "and minimum" be omitted from the specification.

Mr. HAM. Mr. Chairman, does that apply to meters attached to visible discharge pumps?

Mr. HOLBROOK. It does not refer to those; the public is not interested in them. This refers to all meters which determine the amount of gasoline delivered.

Mr. HAM. I would suggest that you change the wording to make that unmistakable.

Mr. PORTER. Why not use the words, "All meters which constitute the sole measuring and indicating means of a liquid-measuring device * * *"?

A DELEGATE. "All meters for the sale of liquid," might describe them.

Mr. HOLBROOK. If you desire to pass this specification with instructions to the committee to devise wording to limit this specification to meters used to determine the amount of liquid delivered, excluding totalizing meters, the committee would be glad to work it out.

Mr. CUMMINGS. I move that this be referred back to the committee for rewording.

(The motion was seconded.)

Mr. FLURRY. Mr. Chairman, I would object to any amendment which included the words "the sole means," as such a wording might embarrass us when brought up for legal construing in court, which is the final place where cases go when questions arise in enforcement, by preventing the supervision of some meters which are intended to be covered by this specification. There might be other means of indication provided, which would cause this definition to be inapplicable, even though the meter was the principal means.

The ACTING CHAIRMAN. Mr. Cummings's motion to refer this back to the committee for rephrasing is before us. The thought is that the committee report whenever it is convenient.

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

Mr. HOLBROOK. The next specification is as follows [reading]:

Specification No. 21-a.⁹ Auxiliary visible indicating devices. Whenever a liquid-measuring device of the visible type is so designed and constructed that measured liquid continues to pass through the discharge valve for an appreciable time (three seconds or more) after the liquid has disappeared from sight in the glass measuring chamber, then the device shall be equipped with an auxiliary visible indicating device, adjacent to the discharge valve, and so constructed that it will indicate when any portion of the measured liquid has not been discharged through such valve at the time of the closing thereof: Provided, however, That

⁸ This material was incorporated in Specification No. 8 of the conference code of specifications for liquid-measuring devices.

⁹ This specification was assigned this number when incorporated in the conference code of specifications for liquid-measuring devices.

in the case of any nominal delivery which is such that it does not cause the liquid to disappear from the chamber, the time interval mentioned above shall be measured from the time that the liquid apparently ceases to fall in such chamber.

Such auxiliary visible indicating device shall be so designed and constructed and so located and disposed that its indication is conspicuous and that, during the operation of the liquid-measuring device, it is clearly visible to and readable by the customer from any position which he may reasonably be expected to assume during such operation.

Thus far the specification is to the effect that when such a device is required by its terms to be employed it must comply with certain conditions. The committee is of the opinion that these conditions should be met whenever a device purporting to give indications of the character described is incorporated in the construction, regardless of whether or not its incorporation is mandatory. To this end the committee recommends the addition of a sentence to the specification already read, reading as follows:

Whenever an auxiliary visible indicating device designed to indicate drainage of liquid and/or completeness of delivery shall be employed, whether or not it is required by the terms of this specification, it shall comply with all the above requirements.

This specification, in brief, provides that when liquid continues to flow through the discharge valve for more than three seconds after it disappears from sight in the visible chamber, the pump be equipped with a visible device of the character of those which have been shown in lantern slides, adjacent to the hose and designed to indicate drainage.

Mr. HINDS. Why include the words "by the customer from any position which he may reasonably be expected to assume during such operation?"

Mr. HOLBROOK. They are intended to require that this indication be a reasonably prominent one. While it is obvious that the customer can see the indications in the glass bowl from a great many more positions than he could see this indicator at the delivery valve, nevertheless if he is sufficiently interested to watch these indicators they should be positioned so as to make this reasonably easy.

Mr. TOWNSEND. Mr. Chairman, I would like to know whether or not this specification, if adopted, will be retroactive.

Mr. HOLBROOK. Under the committee recommendation, none of these will be retroactive and none will take effect before July 1, 1928.

Mr. TOWNSEND. I thank you.

Mr. MARONEY. Mr. President, in view of the fact that there is some objection to them, I would like to suggest an amendment, to strike out the words "from any position which he may reasonably be expected to assume during such operation." The customer should get into such a position as to enable him to see that he is getting what he is paying for.

(The motion was seconded.)

Mr. PORTER. Mr. Chairman, I would like to say that a device that can be seen from a reasonable angle gives the purchaser ample opportunity to see what he is getting, and it should not be necessary to have one on both sides of the pump.

Mr. HANNA. I would support Mr. Maroney's suggestion. The present wording is very dangerous. I believe every experienced sealer will say without hesitation that if a man will get out of his

car when making a purchase of gasoline and pay attention he is reducing his chances of being defrauded, but if he sits in the car and does not watch the operation he is encouraging fraud.

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

Mr. HOLBROOK. The next specification is as follows [reading]:

Specification No. 21-b.¹⁰ Time allowed for completion of delivery. All liquid-measuring devices shall be so designed and constructed, or so calibrated, that they will deliver into the hose correctly any nominal quantity which they are designed to deliver, within a period of 10 seconds after the main flow of liquid has ceased.

The main flow shall be construed to cease: In the case of a device of the piston type at the completion of the upward stroke of the piston; and in the case of a device of the visible type, at the time of the disappearance of the liquid in the glass measuring chamber: Provided, however, That in the case of any nominal delivery which is such that it does not cause the liquid to disappear from the chamber, the time that the liquid apparently ceases to fall in such chamber shall be used in lieu of the time of the disappearance of the liquid: And provided further, That in the case of any liquid-measuring device equipped with an auxiliary visible indicating device such as is described in specification No. 21-a, any conspicuous change of indication in this device, such as a sudden drop in the level of the liquid, occurring after the major portion of the delivery has been completed, shall be used in lieu of either of the indications mentioned above.

All tests and calibrations shall be made on the basis outlined above; that is, the delivery valve shall be closed, or the operation of the liquid-measuring device otherwise discontinued, at the termination of the period of time mentioned above, and the amount which shall then have been delivered shall be taken as the full delivery of the device for the nominal quantity being delivered.

The word "correctly" in the first paragraph is intended by the committee to mean "within the tolerances for devices in use," and the committee includes in its recommendation that those words be substituted for the word "correctly," so that there may be no misunderstanding.

This specification has been written following the investigation on drainage periods, the results of which have been presented in the delivery curves which have already been shown in lantern slides. (See figs. 10-12.)

Now, to answer a question which was asked some time ago by Mr. Porter as to whether the removal of the hose will be required during such a test as is contemplated by this specification. In our opinion, this will not be necessary. For the sake of obtaining the time-of-delivery characteristics of the pump for the purpose of constructing the curves shown, it was considered very necessary to intercept the liquid as near the valve as possible, and the hose was removed. But the specification merely requires that the liquid shall have been delivered to the hose at the conclusion of the time interval specified. When the delivery valve has been held open for a period of 10 seconds after the indication mentioned has taken place, then all the liquid which will be delivered by the pump will have been delivered into the hose. Then, naturally, the hose will be completely drained before the measurement is taken. Therefore, it does not seem necessary to remove the hose in the case of a commercial installation. If it were required that the hose be removed, it would add

¹⁰ This specification was assigned this number when incorporated in the conference code of specifications for liquid-measuring devices.

very considerably to the time that the sealers would have to spend on the testing of the pump.

Mr. MARONEY. May I ask the secretary if he is referring to kerosene, gasoline, or any other liquid?

Mr. HOLBROOK. I think it will refer to any liquid normally sold through liquid-measuring devices.

Mr. MARONEY. I assume that everyone in this room knows that in various stores throughout the country there are liquid-measuring pumps which are used in the sale of linseed oil, molasses, and various other liquids, and the 10 seconds allowed for completion of delivery is not enough for some of these commodities, because of their density and viscosity.

I would suggest that we improve this specification by making it apply to certain kinds of liquids only.

Mr. HOLBROOK. The purpose of the specification would be sufficiently subversive, I believe, if the specification should be limited to apply only to the delivery of gasoline and kerosene and other similar liquids. Perhaps "motor fuels" would cover the various liquids intended to be included.

Mr. MARONEY. Mr. Secretary, perhaps something could be incorporated in regard to the viscosity and density of liquids to be included which would cover it. I am merely looking for information and am not trying to be antagonistic.

Mr. TOWNSEND. Mr. Chairman, may I ask why you selected 10 seconds instead of 15, 20, or 25?

Mr. HOLBROOK. We selected it on data taken in many sections of the United States—in the city of Washington and in adjacent territory in Maryland, and in the cities of Richmond, Philadelphia, Chicago, and Los Angeles—and if I fail to give credit to anyone who cooperated I hope he will remind me. These data were taken by a number of people, and it was determined to be a fact that the average operator would not hold open the delivery valve on a pump which had a self-closing valve, for more than 10 seconds. As a matter of fact, we have records of gasoline deliveries in which the valve was closed two seconds after the liquid disappeared, and we found many instances where it was closed from three to nine seconds after the gasoline disappeared. Also, it has been expressed to me by several manufacturers that they think the average delivery is cut off before 10 seconds have elapsed, but we allow 10 seconds in order to be liberal. In this age of speed everything is being done in the shortest time possible, and to expect the operator to stand there with his hand up in the air, holding the valve open after the indications are that the main flow of liquid has ceased for a considerable time, is expecting too much of the average operator.

Mr. TOWNSEND. I am merely asking information. This is a new subject to me. Did you find that any of the pumps in common use comply in their present form with this 10-second requirement?

Mr. HOLBROOK. Yes; the great majority of them that we have tested comply with it. That is indicated by the curves shown. The curves showed that on several pumps only 2, 3, or 4 cubic inches were left in the pump at the end of five seconds after the main flow of liquid had ceased. I think that 10 seconds is, perhaps, longer than the valves will be held open on many deliveries, especially in the

case of pumps which are constructed in accordance with the underwriters' requirements, having a self-closing valve. While in the city of Washington we found that valves were very often left open more than 10 seconds, this was on account of a special condition with which you are familiar—self-closing valves are not allowed in the city. The result is that a practice has grown up among the operators to insert the hose nozzle in the fill pipe of the tank of the car, open the delivery valve, and allow it to remain open until after the drainage and removal of the hose from the tank of the car; but this is impossible in the case of most pumps. But even here we found in a number of instances that both the operations—allowing the device to empty, and draining the hose—occurred within 10 seconds after the liquid had disappeared in the glass measuring chamber.

Mr. TOWNSEND. That is a fine explanation. There is another point—the one Mr. Maroney brought up. We are also interested in the manufacture of visible devices for dispensing oils. I assume that you have made no experiments on lubricating oil, and you would not recommend the application of this specification to those devices when measuring other liquids than gasoline?

Mr. HOLBROOK. I am perfectly satisfied, with the consent of the committee, to limit this to devices which are delivering motor fuels. I think that is fair to all, and if it is satisfactory to the conference and the committee I will move that as a recommendation of the committee.

Mr. HANNA. A short time ago a question was asked of the secretary as to the number of the various types of pumps upon which these conclusions were drawn. There was one sliding discharge-tube pump used on the whole series of charts. The rest were either eye-measure pumps, as I gathered, or were of the overflow type. We have drawn a conclusion based on eye-measure and overflow pumps. I might say that of the eight largest manufacturers of gasoline pumps to-day, seven of them are concentrating their entire future sales on the sliding discharge-tube type of pump which is in most cases equipped with the sight glass on which is this wording, "Full measure is completed when this glass is empty." Delivery is never completed until the glass is empty. I might say if it becomes necessary to calibrate a pump so that correct measure will be delivered under the terms of this specification, it will be necessary on all sliding discharge-tube type of pumps to overcalibrate those pumps to a considerable degree. I think in that type it will be necessary to overcalibrate 10 to 15 cubic inches. It only takes 1 or 2 cubic inches of liquid to show, when it accumulates in the sight glass. Suppose you serve a person from such a pump—we will assume that the operator holds the valve open 10 seconds and we will say he has delivered the exact measure. Within five seconds the sight glass is full again, and the customer wants to know, if he has been given full measure, why the glass is not empty.

Mr. HOLBROOK. At least one sliding delivery-tube pump will comply with this specification. We tested two of this type. One did not comply. One complied within the time limit. Now, the recommendation has been based upon this state of facts: As a rule the sight glass is entirely full until the major portion of the liquid has been delivered. There is then a sudden drop of liquid in the sight glass

until there is but a small stream of liquid flowing through it. Under the terms of the specification that condition is allowed to continue for 10 seconds. In the opinion of the committee, by that time the operator and the purchaser will both have lost interest in the sight glass. A conspicuous change of the condition of delivery has occurred in the sight glass, namely, a sudden dropping in the surface of the liquid. If the valve is held open for 10 seconds after that time, in the opinion of the committee the sight glass has performed its function in so far as the customer is concerned, and the customer will no longer be interested in watching that sight glass to see whether it gradually refills.

Mr. KELLY. Mr. Chairman, I am particularly interested in that addition made regarding the tolerances. I have perhaps some peculiar ideas regarding tolerances. I know that there have been issued from time to time by the State departments and by the Bureau of Standards tolerances and variances for guidance of the officials. The use of these tables has been a very serious question in my mind. I realize that a great deal depends on judgment, and a great many of these problems are decided properly or improperly upon the judgment of men based on actual experience. We do not expect, where we find a slight variation, to condemn the pump, but we do expect that when a man from the pump company or the oil company adjusts it it will be as near absolutely correct as is possible. That always has seemed to me to be the correct method.

I do not think that question of tolerances should be stressed at all. We are law-enforcement officers, and I do not believe in stressing tolerances so that these pump companies and service men get the idea that they can go out and adjust pumps merely to be within the tolerances. That is the way I feel about it.

I would like to ask what particular reason there is for including here those words "within the tolerances of devices in use."

Mr. HOLBROOK. It is the opinion of the committee, and I think of the weights and measures fraternity in general, that exact measuring is an ideal which can never be procured and that delivery within the tolerances is all that can be required of any device.

The theory of tolerance is that it shall be small enough so that no manifest injustice is done the purchaser or the seller when the delivery is within that degree of accuracy. All of our deliveries from liquid-measuring pumps are taken to be correct when within the tolerance provided. The consensus of the manufacturers, I think, is that the tolerances are none too large. They are about one-half of 1 per cent. That means that if the tolerance is complied with, a purchaser or seller will not lose more than 1 cent in \$2.

Mr. RADFORD. Mr. Chairman, in regard to tolerances, I would like to say that with gasoline at 20 cents a gallon if the customer is cheated out of a maximum tolerance of 7 cubic inches, that would amount to about 6 mills on a 5-gallon purchase. I think that we are setting up a tolerance here that is pretty strict, and I do not believe it is possible to get to an exact point of accuracy. In fact it looks pretty rigid to me when everything is considered.

Mr. FOSTER. Mr. Chairman, I am interested in this tolerance proposition. A man buying gasoline does not know whether he is getting full measure or not, but if you should go to the filling station and

attempt to adjust a pump with a maximum error equal to the tolerance in excess the operator would ask you, "What do you expect me to do? Do you expect me to give away this gasoline." You have a liberal tolerance of 7 cubic inches on 5 gallons, but the operator does not intend to give you that much over. On the contrary he will not object if the delivery is that much short. It is a question of which one gets it, and the operator does not hesitate to take it.

Mr. HANNA. In this specification the words are used, "The main flow shall be construed to cease: In the case of a device of the piston type at the completion of the upward stroke of the piston." Now, it occurs to me that a piston pump does not complete its delivery until the piston reaches the bottom.

Mr. HOLBROOK. The main flow ceases when the piston reaches the top of its stroke. The dribble flow resulting when the piston is being returned can always be completed within 10 seconds.

The ACTING CHAIRMAN. The second committee amendment to the specification to limit this specification to apply to "motor fuels only" is also included in the question of adoption.

(A motion was made and seconded that the specification, as amended by the committee, be adopted, and the motion was agreed to.)

The ACTING CHAIRMAN. If there is no objection we will revert to the specification in relation to meters. The secretary is prepared to offer a proposed modification.

Mr. FOSTER. There is some confusion in the interpretation of specification No. 8¹¹ of the general code in so far as it refers to the rate of flow of meters. The maximum and minimum discharge rates are required to be in the ratio of at least 4 to 1. Ordinary retail devices do not usually operate under as wide a range as that, even though the meters themselves are so designed.

Mr. HOLBROOK. If the meters will deliver accurately within that range there will be no difficulty.

Mr. FOSTER. In the case of a meter designed to deliver a maximum of 40 gallons and a minimum of 10 gallons, for instance, with a low pressure it might be impossible to furnish 40 gallons per minute to the meter even though it was designed to take care of it.

Mr. HOLBROOK. In that case the inspector would test it at the maximum speed at which it would deliver and also at the minimum rate for which the meter is designed.

A MANUFACTURER. If it were possible to include what you have just stated into the specification, I think it would help both the manufacturers and sealers. You have well explained it, and everybody I have talked to here understands it, but I do not know that people on the outside understand it.

Mr. HOLBROOK. The committee could incorporate a note, but could not modify the wording of the specification.

An interpretation of the specification is as follows: A certain meter under normal conditions is so designed and constructed that it

¹¹ The text of that paragraph of specification No. 8 referred to is as follows: "Normal speed of operation' shall be construed to mean that range of operating speeds which may reasonably be employed in ordinary commercial usage; in the case of meters used for the purpose of determining the quantity of liquid delivered to an individual purchaser, this shall mean operation within the limits of the discharge rates customarily specified by the manufacturer for the particular type of meter under test: Provided, however, That the maximum and minimum discharge rates so marked shall be in the ratio of at least 4 to 1."

will operate to deliver from 40 gallons per minute to 10 gallons per minute. The meter is then marked 40 gallons maximum and 10 gallons minimum. That complies with the specification that the maximum and minimum rates shall be in a ratio of not less than 4 to 1. In a particular installation, perhaps one in which the supply pipe has a number of bends, or when there is a small head of liquid, the meter might not deliver more than 30 gallons per minute. The inspector should always inspect the meter at full flow, whatever that flow happens to be, and see to it that it delivers correctly at that flow. He should then test it for the minimum flow as marked on the meter. If the maximum flow as marked on the meter is not attained the actual ratio at which the meter may be tested may be only 3 to 1, for instance.

A DELEGATE. Mr. Chairman, may I ask Mr. Holbrook to state just what he means by "maximum value of the minimum rate shall be 10 gallons per minute"? I do not quite grasp what that means.

Mr. HOLBROOK. The meter manufacturer is required to state on his meter two things in regard to rate. He guarantees that his meter will deliver correctly at a maximum flow, say 40 gallons per minute, which should be the maximum amount of liquid that can be passed through the meter under normal conditions with the valve wide open. He then specifies a minimum flow at which he guarantees that his meter will be accurate within the tolerance. That may be 10 gallons per minute. This specification requires that that lower figure in the case of meters installed for service-station use shall not be greater than 10 gallons per minute. The reason for the requirement is that retail meters will often be operated at 10 gallons per minute in practice, since automobiles are built which will not take gas faster than about 10 gallons per minute. Therefore, the maximum value of the minimum rate of flow stated shall be 10 gallons per minute. A service-station owner can use a meter which has a marked minimum flow of 5 gallons per minute, but he may not install a meter which bears upon its face a statement that it will deliver accurately no smaller quantity than 15 or 20 gallons per minute.

Mr. CLIFFORD. Mr. Chairman, the committee suggested an amendment to the second specification considered, to limit it to "motor fuel." Why not say "quantity of motor fuel" in this specification instead of "quantity of liquid"?

Mr. HOLBROOK. Because that particular specification was the only one which was intended to be limited solely to motor fuel.

Mr. FOSTER. Mr. President, in the case of a delivery of 10 gallons per minute, that would be at the rate of 5 gallons in 30 seconds. We very frequently find that an automobile will not take it as fast as that. Therefore, in Massachusetts we extend the time to require meters to deliver correctly, 5 gallons in 90 seconds. Did the committee take those conditions into consideration?

Mr. HOLBROOK. Yes; the committee took that factor into consideration in establishing the ratio of 4 to 1. A meter may be guaranteed to deliver 40 gallons per minute and 10 gallons per minute. That is a ratio of 4 to 1. It need not be guaranteed to deliver gas accurately at a lower speed than that. Now, we thought that 60 seconds for 10 gallons was a slow enough rate. In the curves which we showed this morning it was indicated that various liquid-measuring devices

in use at the present time will deliver 5 gallons in from 13 to 25 seconds (not considering the drainage period), and 5 gallons in 13 seconds is about 23 gallons per minute. We considered that the average car would take gasoline at 15 to 20 gallons per minute without any difficulty. There are some makes of cars on the market which require that gas be furnished at a somewhat lower speed than that, but we considered that nearly all cars would take 5 gallons in 30 seconds, or at the rate of 10 gallons per minute.

A DELEGATE. There are some on the market which will not take over 3 or 4 gallons per minute.

Mr. FOSTER. Our experience has been that when the flow is cut down you get considerable overmeasure, especially when you extend it to more than a minute for 5 gallons. I have gotten as high as 80 to 90 cubic inches excess on a 5-gallon delivery. The meter manufacturers have considered it for a considerable length of time and have not been able to arrive at a satisfactory conclusion. It would be much better to fix 5 gallons as the minimum, as there are many cars that will not take gasoline even as fast as that. When you get toward the end of the delivery the operator slows down the delivery in order that he may stop on zero and this also always operates against the oil companies.

Mr. CLIFFORD. May I state the matter as we understand it? We are to mark our meters to show the minimum and the maximum flow, the ratio between the minimum and the maximum to be at least 4 to 1. For instance, if we establish a rate of 5 gallons per minute as the minimum at which the meter will be operated, then within the range from 5 to 20 gallons per minute it must deliver within the tolerance. This meter, under a particular set of installation conditions, as on account of low pressure available, may not deliver more than 15 gallons per minute. However, it would measure within the tolerances should the quantity be increased to 20 gallons per minute. The ratio of 4 to 1, in that particular instance, will simply not be realized in practice. It is not the intention of the specification to require a test at one-quarter of the 15-gallon maximum realized in that particular case because the minimum of 5 gallons has been properly established. Under the terms of the specification adopted last year, the tolerance in deficiency only, shall apply if the rate drops below the minimum flow fixed. Now, if the customer gets more than he is entitled to—a delivery in excess of tolerance—at a rate of less than 5 gallons per minute, the device is not to be considered inaccurate by the sealer on that account. You are looking after the public, seeing to it that the customer is not short measured by the service-station operator, who can protect himself and does. I think this conference had in mind in adopting the specification providing for a normal reasonable rate a range within which measuring devices must comply within the tolerance; beyond that the vendor can take care of himself because he has direct operation of the device. The minimum rate is fixed by the amount stated by the manufacturer. The maximum is variable, and will depend upon the variable pressure at the point where the meter is installed.

Mr. FOSTER. Mr. Chairman, the maximum may only be delivered when a higher pressure is employed than can possibly be obtained

at a filling station. Now, is it permissible to make a delivery at the maximum rate possible to get from that particular station and then apply a test at the 4 to 1 ratio based on this obtainable maximum?

Mr. HOLBROOK. The meter manufacturer can not predicate what the condition at that station will be. The meter manufacturer may make a meter which will deliver 40 gallons per minute under what might be termed normal conditions of installation. If the operator cuts down the pressure to a very low figure the manufacturer will not be advised of that fact and can not protect himself.

Mr. FOSTER. Mr. Secretary, you understand that all meter stations are not operated on air or on a hydraulic system. We have a so-called electric rotary pump operation and various kinds of operations by which fluids are forced through the meter. I have several meter stations in Springfield and they have different kinds of devices to operate the flow of liquid through the meters—hydraulic or electric rotary pump systems and all these others that come along and have come along in previous times. Our experience is, if you have a minimum discharge of 10 gallons per minute, that you do not hit our condition at all. If it were cut in two—5 gallons per minute—I could come very much nearer hitting the mark than I can at the present time. The so-called electric rotary pump system will deliver 5 gallons in 28 seconds, to be exact; the hydraulic will deliver in 30 to 35, and air about 25. Now these flows must be reduced in order to accommodate the cars and not overflow the tank, and also the operator slows up at the end of the delivery, so as not to have an overflow. When he checks up he finds that he has been giving away gas. He certainly is; that is the truth of the matter. If you extend the time of delivery very much you may get 50 to 60 cubic inches overmeasure on 5 gallons.

Mr. HOLBROOK. It would seem unfortunate to specify too low a minimum rate which might put the meter manufacturer at a disadvantage. I am looking for information and am very much surprised to hear of cars that will take gas at not more than 4 or 5 gallons a minute.

Mr. FOSTER. You must not lose sight of the fact that it delivers at a greater pressure when it goes from the nozzle of the meter than from a visible pump, which might make a difference in the action of the liquid going into the tank. I presume that this will be adopted tentatively, and we will have an opportunity next year to take another crack at it.

Mr. HOLBROOK. It is the committee's opinion that this whole report is offered to go into effect on July 1, 1928, which necessarily means that it may be modified by the next conference.

Mr. FOSTER. In my files in the office I have any number of tests made in these meter stations and have tabulated the exact time that is required to deliver 5 or 10 gallons, whatever the time may be, and the results of it.

Mr. HOLBROOK. It would be helpful to the committee to have something of that nature. The committee is entirely aware of the fact that meters are inclined to give overmeasure when the flow is throttled down too much, but we should control the conditions so that reasonable accuracy will be attained at any speed at which the meter can reasonably be expected to be operated.

Mr. PORTER. You suggested a few moments ago that if we made a smaller minimum than 10 gallons the maximum flow could not be over four times the minimum. I question that interpretation of it.

Mr. HOLBROOK. If I said that, I misspoke myself. I meant that if 10 gallons was established as the minimum then 40 gallons would be the other end of the 4 to 1 ratio. Of course a higher ratio can be established if desired. I have seen ratios specified as high as 10 to 1.

This whole question can be readily cleared up if Mr. Foster will offer an amendment reducing the figure for the maximum value of the minimum rate given here, and thus bring it before the conference for decision. If the conference believes this figure should be reduced, there is no reason why it should not be cut down.

Mr. FOSTER. That is the reason for all this discussion. This is the place to correct it, and with the permission of the Chair I will offer an amendment that the figure "10" be stricken out and "5" be substituted therefor.

Mr. CUMMINGS. I second the motion.

Mr. HINDS. Mr. Chairman, the tendency is to restrict and circumscribe; that has been my experience in pump manufacturing, and I have been out in the field. I know all sides. You circumscribe the manufacturers and users to such an extent that it is almost impossible to build apparatus which can be sealed according to the regulations, and the manufacturers and the sealers must stretch it a bit, and that comes from these regulations. The only effect of the tolerance as given or the specification as written now is that, if there is any error, the customer is benefited. If you operate any pump at 5 gallons per minute, it is not so good when it comes to accuracy. A delivery of 5 gallons in one minute is not a normal operation, and these specifications, I think, should cover normal and not abnormal operations; and as long as abnormal operations result in a customer getting overmeasure there is little likelihood of such unusual operations continuing, because there is little danger of an oil company giving anything away.

Mr. FOSTER. If a meter comes into Massachusetts and can not deliver as represented we will not seal it. We are not antagonistic. We are trying to help the industry; and if we are overstepping the mark, I am sorry. Our experience in the field has been that a filling station will not or can not deliver, under any circumstances, 40 gallons a minute. There is no use trying to put that speed into effect. Now we are trying to get something that can be practically used in the filling station, and I am willing to stand on my amendment and let the conference decide what it wants to do.

(The question was asked.)

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

Mr. HOLBROOK. I move that after the first two words of the specification, "All meters," there be added the words "used for the purpose of determining the quantity of liquid delivered to an individual purchaser," so that the specification, including also Mr. Foster's amendment and the committee amendment proposed at the time that the specification was first read, will read as follows:

All meters used for the purpose of determining the quantity of liquid delivered to an individual purchaser shall be legibly marked to show their maxi-

imum discharge rates under normal conditions of installation, and the minimum discharge rates and the maximum working pressures for which they are intended to be used. In the case of a meter installed for use in the dispensing of liquid at retail, the maximum value of the minimum rate shall be 5 gallons per minute.

Mr. TOWNSEND. Mr. Secretary, take the case of a visible pump, which has a meter in the pedestal, not visible to the customer, which is for the purpose of recording the total quantity of liquid delivered through that pump so that the owner of the station can check up his operator. Would this specification, as here worded, apply to this meter?

Mr. HOLBROOK. Inasmuch as such a totalizing meter is not used for the purpose of determining the quantity of gas delivered to an individual purchaser, but for the purpose of recording the total number of gallons delivered to a number of purchasers, it certainly would not, within the purview of the amendment.

Mr. BETTS. Mr. President, there seems to be confusion in the minds of the manufacturers, and of inspectors also, in regard to the specifications drawn up at the national conference. I believe every sealer in the country would profit by having that explanation, but only a few, who are here, will be conversant with the interpretation that we have just had. I would like to support Mr. Porter and I would like to suggest that the amendment suggested be amended by substitution of the descriptive words "which are the sole dispensing and indicating means" instead of the wording which has just been read.

The ACTING CHAIRMAN. I will ask the secretary to explain the amendment he has proposed.

Mr. HOLBROOK. In order to eliminate the totalizing meter on pumps from the purview of the specification and in order to make it absolutely clear what particular meters are meant, the committee suggests the following words:

All meters used for the purpose of determining the quantity of liquid delivered to an individual purchaser shall be, etc.

It seems to me that language can not be misunderstood. I do not think there is any question but what that limits it to the meters which we have under consideration.

The ACTING CHAIRMAN. The question now before you is the adoption or rejection of the specification with the several amendments proposed, as read by the chairman of the committee.

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

The ACTING CHAIRMAN. A motion is in order to adopt the committee report as a whole, as amended.

(A motion was made and seconded that the report of the committee, as amended, be adopted.)

Mr. TOWNSEND. Mr. Chairman, may I suggest that an amendment be made that these specifications when adopted be not retroactive beyond the date that they become effective.

Mr. HOLBROOK. That recommendation has been incorporated in and is a part of the committee report.

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

**ADOPTION OF RESOLUTION ADVOCATING UNIFORM ACTION IN
THE APPROVAL OF TYPES OF APPARATUS**

Mr. FLURRY. Mr. Chairman, we have a resolution here, received from Mr. Maroney, which has received the majority indorsement of the resolutions committee. It reads as follows:

Resolved, That it is the sense of the Twentieth National Conference on Weights and Measures, in conference assembled in Washington, D. C., May 24 to 27, 1927, that weighing and measuring devices which conform to the specifications and tolerances adopted by the National Conference on Weights and Measures and recommended by the National Bureau of Standards for adoption by the States should be approved as to type for commercial use in every State in the United States.

Mr. FLAHERTY. I move the adoption of the resolution as read.

(The motion was seconded, the question was taken, and the resolution was adopted.)

(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 o'clock p. m., the conference adjourned to meet Friday, May 27, 1927, at 9.30 o'clock a. m.)

SIXTH SESSION (MORNING OF FRIDAY, MAY 27, 1927)

The conference reassembled at 9.40 o'clock a. m., at the Raleigh Hotel, Dr. George K. Burgess, president, in the chair.

MODIFICATION OF SPECIFICATION FOR GLASS GRADUATES

Mr. HOLBROOK. The committee on specifications and tolerances has a very minor change to suggest in the code of specifications for glass graduates.

It is provided by specification No. 7 of this code that on duplex, or double-scale graduates, a clear space shall be left between the ends of the main graduation marks on the two scales, and that this space shall conform to certain values specified in a table which follows.

These spaces are as follows: On duplex graduates with a circumference at the graduation mark up to 5 inches, one-eighth inch; from 5 to 10 inches, one-fourth inch; and more than 10 inches, three-eighths inch. Those figures were given as an approximation; it really never was intended that those lines should be accurately that distance apart. A tolerance on these spaces is now requested, and, since this is reasonable, we suggest that on a circumference of graduate at the graduation mark of up to 5 inches the distance between ends of main graduation marks be allowed to be from one-eighth to one-fourth inch; from 5 to 10 inches one-fourth to one-half inch; and on more than 10 inches three-eighths to five-eighths inch.

(A motion was made that the proposed amendment be adopted; the question was taken, and the motion was agreed to.)

MARKED WEIGHTS AND SHRINKAGE OF HAMS AND OTHER WRAPPED MEATS

PAPER OF J. H. MEEK, DIRECTOR, DIVISION OF MARKETS, STATE OF VIRGINIA

Mr. Chairman and members and visitors of the conference, a complaint was made to the State office of weights and measures that retailers were selling hams to consumers by the weight marked on the wrappers at the time they were packed, even though they actually weighed as much as 21 ounces less than when marked. Sealers of weights and measures were asked to check the weight of hams found in retail stores and report the actual net weight compared with that marked on the wrappers. Reports on 518 hams were received. The total weight when packed as marked on the wrappers was 4,497 pounds and 8 ounces. The total weight when checked by the sealers was 4,379 pounds and 6 ounces. This made a shrinkage of 118 pounds and 2 ounces, or an average shrinkage of 2.63 per cent for the total 518 hams.

Thirteen hams, or 2.51 per cent of the total, weighed 5.40 per cent more than the weight marked on the wrappers; 11, or 2.12 per cent,

weighed exactly the same; 241 hams, or 46.52 per cent of the total weighed, had a shrinkage of 2 per cent or less; 132, or 25.48 per cent of the total, had a shrinkage of from 2 to 5 per cent; 90, or 17.37 per cent of the total, had a shrinkage of 5 to 10 per cent; 25, or 4.82 per cent of the total, had a shrinkage of 10 to 15 per cent; 4, or 0.77 of 1 per cent of the total, had a shrinkage of from 15 to 20 per cent; while 2, or 0.38 of 1 per cent of the total, had a shrinkage of over 20 per cent. One had a shrinkage of 27 per cent. A shrinkage of 2 hams was reported as 16 ounces without the weight being given.

Upon request of the State office and as a matter of experiment the shrinkage on 4 hams was kept by a packer in Richmond. It was found to be 2.64 per cent per week, or an average of 0.38 of 1 per cent per day. A representative of a large retail store in Richmond who cures his own hams kept a check on the shrinkage of 3 hams. It was found to be 4.76 per cent per week, an average of 0.68 of 1 per cent per day. These hams had just come out of smoke and were not wrapped. A large packer, the Richmond city office of weights and measures, and the State office of weights and measures, each took a ham of the same weight on the same day and kept record on the shrinkage. The shrinkage of the ham kept in the State office, where it was warm and dry, and that of the one kept by the packer was found to be exactly the same—4.76 per cent per week, an average of 0.68 of 1 per cent per day. This shrinkage is also the same as that of the hams kept by the retailer. The one taken by the Richmond office was kept under glass, and the shrinkage was found to be 2.72 per cent per week, an average of 0.39 of 1 per cent per day.

In view of the fact that the Virginia law authorizes the State office to fix the tolerance for shrinkage but does not give authority for prescribing the method of marking packages, a regulation fixing the tolerance for weight of hams, bacon, and smoked or cured meat products, effective June 1, 1927, has been issued, with a statement in regard to the regulation suggesting uniform methods of marking, etc. The regulation is as follows:

Authority: Acts of the general assembly 1926, chapter 145, section 20, page 250.

It shall be unlawful to keep for the purpose of sale, offer or expose for sale, or sell any commodity in package form unless the net quantity of the contents be plainly and conspicuously marked on the outside of the package in terms of weight, measure, or numerical count: *Provided, however*, that reasonable variations or tolerances shall be permitted and that these reasonable variations or tolerances and also exemptions as to small packages shall be established by rules and regulations made by the superintendent of weights and measures: *And provided further*, that this section shall not be construed to apply to those commodities in package form the manner of sale of which is specifically regulated by the provisions of other sections of this act.

The words "in package form" as used in this section shall be construed to include a commodity in a package, carton, case, can, box, barrel, bottle, phial, or other receptacle, or in coverings or wrappings of any kind put up by the manufacturer, or, when put up prior to the order of the commodity, by the vender, which may be labeled, branded, or stenciled, or otherwise marked, or which may be suitable for labeling, branding, or stenciling, or marking otherwise, making one complete package of the commodity. The word "package" shall be construed to include both the wholesale and retail package.

Acting upon authority given by the general assembly to establish variations or tolerances for the shrinkage in weight of commodities in package form

offered for sale, the tolerance for the shrinkage in weight of hams, bacon, smoked or cured meat products, when packed, wrapped, or sold in paper or closed packages, is fixed at 2 per cent of the net weight when packed. The wholesaler or packer must sell such meat products with a statement plainly stamped or written upon the container showing the net weight when packed.

Hams, bacon, and smoked or cured meat products which have had a shrink of more than 2 per cent of the net weight when packed, must be reweighed and marked plainly and conspicuously with the net weight at the time they are sold to the consumers in closed packages.

It is my belief that the State should have authority to prescribe the methods of marking, but, since we do not have this authority, a statement was made to accompany the regulation. It follows:

Investigation shows that many packers' wrapped hams being sold in Virginia weigh from 8 to 12 per cent less when delivered to the consumer than when they were packed and the weight marked on them. Some hams have been found to weigh 20 per cent less when offered for sale to consumers, while a large portion handled under favorable conditions quickly after being wrapped have less than 2 per cent shrinkage. A 2 per cent tolerance is found to be reasonable compared with that fixed by other States, and practical when meats are properly handled.

Consumers are entitled to know, within a reasonable tolerance, the net weight of hams and other things when they buy them. Those who produce, sell, or deal in country-cured hams fix the price on actual net weight. Therefore, unless the packers' hams that are wrapped are sold on the same basis, country-cured hams are in unfair competition with the packers' wrapped hams.

In order to meet these requirements the following suggestions are made: That packers wrap the hams, bacon, smoked or cured meat products just before shipment, mark or label in plain printed words "NET WEIGHT WHEN PACKED ——— POUNDS — OUNCES, WEIGHT OF WRAPPER — OUNCES." The packers' mark should be placed in such a position that a mark by the retailer as large and as conspicuous as the packers' mark can be placed immediately under it. The figures showing the weight of wrappers should be printed, the figures showing the net weight of the hams should be preferably stamped, or by all means written with pen and ink if not stamped, with figures close enough to the last word preceding that another figure can not be put in to raise the mark, as: 2 ounces being raised to 12 ounces by putting a 1 before the 2. In case there is some shrinkage before the hams are shipped by the packer or wholesaler, he should reweigh them, deduct the weight of the containers or wrappers, and bill the purchaser for actual net weight when delivered or shipped.

The retailer should purchase hams, bacon, smoked or cured meat products from the packer or wholesaler only on the basis of net weight at the time of delivery or shipment. He should always reweigh the meat when received. If there is a greater shrinkage from the weight when packed than a tolerance of 2 per cent, each package when sold by the retailer must be reweighed and marked to show the actual net weight when sold. The mark showing the net weight should be placed immediately below (within 3 inches of) the packers' mark when packed, and should be plainly and as conspicuously placed as the packers' mark, preferably stamped. Small labels could be secured with the words "NET WEIGHT WHEN SOLD, POUNDS — OUNCES —." This can be ascertained by actual weight and deducting the weight of the wrapper.

Consumers are urged to see that hams, bacon, smoked or cured meat products are labeled accurately by the packers, wholesale and retail dealers as set forth above, and report any violations of the requirements of net weight within 2 per cent, to the local sealer of weights of measures, local Commonwealth's attorney, or this office.

This regulation and statement have been given considerable publicity in the papers as well as distributed among the sealers, packers, consumers' organizations, and secretaries of chambers of commerce. Representatives of some of the larger packers and chain stores have requested additional copies and report that they are instructing their employees to abide by the regulations and carry out the suggestions.

PAPER OF GEORGE F. AUSTIN, SEALER OF WEIGHTS AND MEASURES,
DETROIT, MICH.¹⁹

Mr. President, ladies and gentlemen of the conference, there can be no doubt that information concerning shrinkage in the different kinds of meat under varying conditions and temperature is essential to the efficient conduct of a weights and measures department, because it is a well-known fact that complaints of short-weight meat from the packer or wholesaler are often referred to the local bureau of weights and measures. They are called upon to investigate and decide whether the packages are properly marked and if there is a real shortage from the marked or billed weights of the products, and where discrepancies occur, to take proper action to bring about a correction, which often results in prosecution.

In cases where the meat in question has been shipped from one city to another and possibly five or six days have elapsed since the date of shipment, the officer is invariably informed by the packer or wholesaler that the apparent difference in weight from the marked or billed weight is the result of the natural shrinkage or evaporation of the product during transportation and subsequent storage.

At this stage of the investigation, if the officer has no authentic information concerning meat shrinkage, he is unable to successfully contradict the statement, and not only fails in furnishing a proper supervision over the subject for the protection of the public but lays himself and his department open to the ridicule of the dealer, who may be trying to take advantage of his lack of knowledge on the subject.

Regulation 29 of the United States Department of Agriculture, relating to marking the quantity of food in package form, requires that food in package form must be plainly and conspicuously marked in terms of weight, measure, or numerical count on the outside of the covering or container usually delivered to the consumer. I quote from the regulation, as follows:

(i) The following tolerances and variations from the quantity of the contents marked on the package shall be allowed:

(1) Discrepancies due exclusively to errors in weighing, measuring, or counting which occur in packing conducted in compliance with good commercial practice.

* * * * *

(3) Discrepancies in weight or measure due exclusively to differences in atmospheric conditions in various places and which unavoidably result from the ordinary and customary exposure of the packages to evaporation or to the absorption of water.

Discrepancies under classes (1) * * * of this paragraph shall be as often above as below the marked quantity. * * *

Paragraph (3) necessarily involves the question of meat shrinkage, yet, so far as I am aware, no advice has been given as to the amount of shrinkage to be allowed, making it necessary for the investigating officer to figure out his own salvation in each particular case.

With this thought in mind, I set about gathering information on the subject by personally selecting and weighing 19 samples of fresh and smoked meats, storing them under different temperatures, and then carefully reweighing them each 24 hours through a period of

¹⁹In the absence of Captain Austin this paper was read to the conference by George F. Austin, Jr.

time. And while I realize that it would be very difficult to fix a definite and accurate schedule for shrinkage in meats, on account of the many and constantly changing conditions in the various processes of curing, cooling, and shipping, yet I trust that the following compilations of my investigation may prove interesting and of some value to the members of this conference.

Smoked ham, skinned, wrapped, stored in temperature of 34° F.

Hours in storage	Weight		Shrinkage	Per cent
	Lbs.	oz.		
0	12	15¼		0.00
24	12	15	¾	.36
48	12	15	¾	.36
72	12	14¾	1	.48
96	12	14½	1¼	.60
120	12	14½	1¼	.60
168	12	14¼	1½	.72
Increased weight of wrapper				1
Actual shrinkage, ham				2½

Smoked ham, skinned, wrapped, stored in temperature of 80° F.

Hours in storage	Weight		Shrinkage	Per cent
	Lbs.	oz.		
0	13	5		0.00
24	13	3¾	1¼	.59
48	13	3	2	.94
96	13	1½	3½	1.64
120	13	¾	4¾	2.00
Increased weight of wrapper				1
Actual shrinkage, ham				5¼

Fresh ham, skinned, unwrapped, stored in temperature of 34° F.

Hours in storage	Weight		Shrinkage	Per cent
	Lbs.	oz.		
0	13	2¼		0.00
24	13	1	1¼	.59
48	13	½	1¾	.83
72	13	¼	2	.95
96	12	15¾	2½	1.19
120	12	15½	2¾	1.31
168	12	14¾	3½	1.66

Fresh ham, skinned, unwrapped, stored in temperature of 80° F.

Hours in storage	Weight		Shrinkage	Per cent
	Lbs.	oz.		
0	12	5½		0.00
24	12	3	2½	1.27
48	12	1	4½	2.28
96	11	14¾	6¾	3.42
120	11	13½	8	4.60

Smoked ham, skinned, unwrapped, stored in temperature of 34° F.

Hours in storage	Weight		Shrinkage	Per cent
	Lbs.	oz.		
0	11	8		0.00
24	11	6½	1½	.81
48	11	6	2	1.10
72	11	5½	2½	1.36
96	11	5¼	2¾	1.50
144	11	4¾	3¾	2.04

Smoked ham, skinned, unwrapped, stored in temperature of 80° F.

Hours in storage	Weight		Shrinkage	Per cent
	Lbs.	oz.		
0	13	12½		0.00
48	13	8	4½	2.04
72	13	5¾	6¾	3.06
96	13	4¼	8¼	3.74
144	13	2¼	10¾	4.65
168	13	1½	11	5.00

Fresh ham, skinned, stored in temperature of 34° F.

Hours in storage	Weight		Shrinkage	Per cent
	Lbs.	oz.		
0	13	4¾		0.00
24	13	4¾		.00
48	13	3½	1¼	.59
72	13	3¼	1½	.71
96	13	2¾	2	.94
120	13	2½	2¼	1.06

Smoked picnic ham, unwrapped, stored in temperature of 34° F.

Hours in storage	Weight		Shrinkage	Per cent
	Lbs.	oz.		
0	5	5		0.00
24	5	4¾	¼	.29
48	5	4½	½	.59
72	5	4½	½	.59
96	5	4¼	¾	.88
120	5	4¼	¾	.88
168	5	3¾	1¼	1.47

Fresh shoulder, skinned, stored in temperature of 34° F.

Hours in storage	Weight		Shrinkage	Per cent
	Lbs.	oz.		
0.....	11	13	-----	0.00
24.....	11	12	1	.53
48.....	11	11 ³ / ₄	1 ¹ / ₂	.66
72.....	11	11 ¹ / ₂	1 ³ / ₄	.92
96.....	11	11	2	1.06
120.....	11	11	2	1.06

Fresh pork loin, stored in temperature of 34° F.

Hours in storage	Weight		Shrinkage	Per cent
	Lbs.	oz.		
0.....	8	12 ¹ / ₂	-----	0.00
24.....	8	11 ³ / ₄	3 ¹ / ₄	.53
48.....	8	11	1 ¹ / ₂	1.07
72.....	8	10 ¹ / ₂	1 ² / ₂	1.42

0.....	9	7 ³ / ₄	-----	0.00
24.....	9	7	3 ¹ / ₄	.49
48.....	9	6	1 ³ / ₄	1.15
72.....	9	5 ¹ / ₂	1 ² / ₄	1.48

0.....	12	2	-----	0.00
24.....	12	1	1	.52
48.....	12	0	2	1.03
72.....	11	15	1 ³ / ₄	1.55

0.....	10	6 ¹ / ₄	-----	0.00
24.....	10	4	2 ¹ / ₄	1.35
48.....	10	3 ¹ / ₂	2 ³ / ₄	1.65
72.....	10	3	3 ¹ / ₄	1.95
96.....	10	2 ¹ / ₂	3 ³ / ₄	2.26
120.....	10	2 ¹ / ₄	1 ⁴ / ₄	2.41

¹Normal.
²Abnormal.

Smoked bacon in piece, dry-cured, wrapped, stored in temperature of 34° F.

Hours in storage	Weight		Shrinkage	Per cent
	Lbs.	oz.		
0.....	7	7 ¹ / ₂	-----	0.00
24.....	7	7 ¹ / ₄	1 ¹ / ₄	.21
48.....	7	7 ¹ / ₂	1 ¹ / ₄	.21
72.....	7	7 ¹ / ₂	1 ¹ / ₄	.21
96.....	7	7 ¹ / ₂	1 ¹ / ₄	.21
120.....	7	7 ¹ / ₂	1 ¹ / ₄	.21
168.....	7	7 ¹ / ₂	1 ¹ / ₄	.21
Increased weight of wrapper.....			3 ¹ / ₄	-----
Actual shrinkage, bacon.....			1	.83

Smoked bacon in piece, dry-cured, unwrapped, stored in temperature of 34° F.

Hours in storage	Weight		Shrinkage	Per cent
	Lbs.	oz.		
0.....	7	12 ³ / ₄	-----	0.00
24.....	7	12 ³ / ₄	-----	.00
48.....	7	12 ³ / ₄	-----	.00
72.....	7	12 ³ / ₄	-----	.00
96.....	7	12 ³ / ₄	-----	.00
120.....	7	12 ¹ / ₂	1 ¹ / ₄	.20
168.....	7	12 ¹ / ₂	1 ¹ / ₄	.20

Smoked bacon in piece, dry-cured, stored in temperature of 80° F.

Hours in storage	Weight		Shrinkage	Per cent
	Lbs.	oz.		
0.....	8	11 ¹ / ₄	-----	0.00
48.....	8	9 ¹ / ₂	1 ³ / ₄	1.26
72.....	8	8 ¹ / ₄	3	2.15
96.....	8	7 ¹ / ₄	4	2.87
144.....	8	6 ¹ / ₂	4 ³ / ₄	3.41
168.....	8	6	5 ¹ / ₄	3.77

Smoked bacon in piece, pickle-cured, stored in temperature of 80° F.

Hours in storage	Weight		Shrinkage	Per cent
	Lbs.	oz.		
0.....	5	10 ¹ / ₄	-----	0.00
48.....	5	6 ³ / ₄	3 ¹ / ₂	3.88
72.....	5	4 ¹ / ₂	6	6.66
96.....	5	2 ¹ / ₂	7 ³ / ₄	8.59
144.....	5	2	8 ¹ / ₄	9.03
168.....	5	1 ¹ / ₄	9	9.97

Sliced bacon in package, stored in temperature of 34° F.

Hours in storage	Weight		Shrinkage	Per cent
	Lbs.	oz.		
0.....	5	10 ¹ / ₄	-----	0.00
24.....	5	9 ³ / ₄	1 ¹ / ₂	.55
48.....	5	9 ¹ / ₂	1 ³ / ₄	.85
72.....	5	9 ¹ / ₄	1	1.10
96.....	5	9 ¹ / ₄	1	1.10

Sliced bacon in package, stored in temperature of 80° F.

Hours in storage	Weight		Shrinkage	Per cent
	Lbs.	oz.		
0.....	5	11 ¹ / ₂	-----	0.00
48.....	5	10 ³ / ₄	1 ¹ / ₄	1.37
72.....	5	9 ¹ / ₂	2	2.19
96.....	5	8 ³ / ₄	2 ³ / ₄	3.01

PAPER OF A. W. CORWIN, SEALER OF WEIGHTS AND MEASURES, ALLEGANY COUNTY, N. Y.

Mr. Chairman and delegates, after listening to the two splendid papers by the gentleman from Virginia and the gentleman from Detroit it seems that the question has been pretty well covered.

Prior to the passage of the "net weight law" in New York State in 1912 it was, I believe, the custom to sell meat products by gross weight, charging meat prices for the paper wrapping. Section 194 of this law reads:

When commodities are sold or offered for sale in containers whose sizes are not otherwise provided by statute the net quantity of the contents of each container shall be plainly and conspicuously marked, branded, or otherwise indicated on the outside or top thereof or on a label or a tag attached thereto in terms of weight, measure, or numerical count: *Provided, however,* That reasonable variation shall be permitted.

A committee was given power to make regulations covering the different commodities, and we have regulation No. 8:

Hams, bacon, and smoked or cured meat products must be sold with a written representation as to net weight by the retailer to the consumer.

The wholesaler or packer must sell such meat products with a written representation as to net weight, and on wrapped meat products the wholesaler or packer shall mark the gross and tare weight. This shall be marked so that the tag or label or part thereof which bears the gross indication is removable or detachable, whereas the tag or label or part thereof indicating the tare weight is nonremovable or permanently attached to the wrapping or marked upon the wrapper.

When such products are sold in barrels or packing cases it will be sufficient to mark the tare on the individual wrapped units in such barrels or packing cases and the gross and tare on the outside of the barrel or case.

The lettering shall be bold-faced letters at least one-ninth of an inch in height. A variation of one and one-half per cent in weight will be allowed.

The above regulation requires the retailer, when he keeps the meat in stock for any length of time, to remove the gross-weight tag and reweigh and sell by the actual weight delivered to the consumer and to see in any event that the net weight, or both the gross and tare weights, appear on the container at the time of sale by him.

After this law was in effect a number of the packers did not comply with it, and in 1916 a suit was brought against Armour & Co. by John D. Eylers, city sealer of Yonkers, N. Y. In this case the packers contended that their product was not in a container and did not have to be marked as to net contents. The State of New York won through the superintendent of weights and measures, Mr. Farrell, and the packers were convicted in the city court of Yonkers, and this decision was upheld by the appellate division of the second judicial department. The actual sale in this case was a piece of bacon weighing 6 pounds. The wrapping weighed 6 ounces, cost $2\frac{1}{2}$ cents, and was sold at 26 cents per pound. It was also revealed that a piece of bacon weighing 6 to 7 pounds at Chicago shrinks from 6 to $8\frac{1}{4}$ ounces during two weeks following wrapping, and that the interval of 12 to 18 days was usual between shipment at Chicago and sale at Yonkers.

As far as my investigation has gone, the packers in New York State and those shipping into the State are marking the net weight on wrapped meats with no indication of the weight of the wrapping, except that one packing company in the case of boiled hams mark the gross, tare, and net weights thereon. The marking of the net weight, I understand, is necessary under a Federal regulation cover-

ing all plants making interstate shipments. The part of the New York State regulation requiring both the gross and tare weight is not generally complied with.

It seems that the greatest problem in the marking of quantity on wrapped meats is the matter of shrinkage. This varies under every different condition, but in average practice is great enough so that it can not be ignored. This makes the marking of the net weight when packed of little benefit to the retail customer and may be a detriment to him, due to the piece being sometimes sold at its marked weight after considerable shrinkage has taken place. Some suggest that the tare weight only should be placed on the wrapper, but this would not seem to comply with the net weight law. It seems necessary that the tare weight should be placed on the wrapper, together with either the gross or net weight, but in any case the Federal regulations should harmonize with those of the different States.

DISCUSSION OF ABOVE PAPERS

Mr. FULLER. Mr. Chairman, I would like to ask a question: Provided the packers comply with the Federal regulations, can the wrapped ham or bacon shipped into a State be resold at least one time within the State without changing the markings to comply with a State regulation?

Mr. SWEENEY. Mr. President, a few years ago, in Massachusetts, we had a case in relation to a law upon our statute books which required that the weight of a barrel of potatoes should be 150 pounds. We made a very thorough investigation at that time and we found many barrels that ran as low as 135 or 140 pounds. In the adjudication of the question the courts ruled that when an article was shipped from another State into Massachusetts it was only after it was sold by the party to whom it was sent that it became a part or parcel of the goods of the State, and only then did it become amenable to the law under which the State was operating.

Mr. RAGLAND. Mr. President, I have studied this question very carefully. What shall we sealers, knowing that this decision exists, do about it? This whole matter was first brought to my attention by a lady who came to me and complained about a fresh shoulder that she had purchased which was to have weighed 3 pounds and 15 ounces. When she weighed it at home it only weighed 3 pounds and 5 ounces, and I reweighed it and found this to be the actual weight. I started a case, but the court informed me that my warrant was not properly drawn and the case was dismissed. I studied it a little more carefully and asked for information from the Federal authorities as to when an interstate shipment ceases to be an interstate shipment. They replied that the interstate character of a shipment ceased when it reached its destination, according to its billing, and was redistributed in the State.

Mr. CUMMINGS. Mr. Chairman, the Massachusetts law specifically provides that food and fuel shall be sold by weight and no tolerance shall be provided. Recently eight retailers were prosecuted for selling wrapped hams under marked weight and a conviction was obtained in each case.

The sweet-potato case mentioned by Mr. Sweeney was reported and included in the proceedings of the last conference. The decision

in that case was that when a sale was made as and for a barrel of sweet potatoes and the barrels did not weigh 150 pounds, as provided by the Massachusetts statute, the seller was guilty of giving underweight. The court further said they might be sold as a package instead of a barrel and the law would not then apply.

Mr. SCHWARTZ. Mr. Chairman, I realize that the question before the conference now is one that has vexed the soul of honest weights and measures officials throughout the United States, but we in New Jersey feel that the proposition has been covered by the adoption of the Federal net container law. The tolerances are there provided for. We recognize that and make it a part of our basic law. In addition to that, we have a special act on the statute books that calls for the prosecution of any person, firm, or corporation who misrepresents the quantity sold. After a package coming into the State with the original weight marked on it becomes intrastate in its character and is sold by a retailer at marked weight, and does not weigh as marked, we prosecute the gentleman who makes the sale because he has misrepresented the weight and charged for more than he has sold. I think we cover that pretty well. We have had prosecutions against all of the big packing plants and have recovered penalties in each case of \$100, as specified in our law.

I think the various States should incorporate in their State laws the provisions of the Federal net container act, of course providing for the natural shrinkage that might occur, and should use, as one of the gentlemen earlier in the conference advised, a little common sense and good judgment. If the shortage on a package is too great, then prosecute and get a penalty imposed on the offending party.

Mr. FULLER. Our law is similar to the Federal act. I wonder if it would not be a defense under the provisions of the act to prove that the package was marked correctly at the time it was packed and that any shortage was the result of natural shrinkage.

Mr. HOLBROOK. Under the Federal act, Mr. Fuller, I think that if the commodity is full weight at the time of the shipment no case can be made. I think it has been consistently held in a large number of decisions of the courts that when the original package is broken in the one case, or after the first sale within the State, in case the original package is not broken, then the goods are considered to have become mixed with the general goods in the State and they can be proceeded against under State regulations; in other words, intrastate commerce has commenced and the goods are no longer protected by their original interstate commerce status.

Mr. FULLER. But provided our State act has that same provision for unavoidable shrinkage, would total unavoidable shrinkage still be a defense on the part of the packer or seller?

Mr. HOLBROOK. Natural unavoidable shrinkage would not necessarily be a defense for the local dealer, but the decision in any particular case would depend upon the wording of the act in question. It would depend upon whether it was interpreted to mean unavoidable shrinkage from the time of packing or while it was in the hands of the man selling it, for instance.

Mr. MEEK. In reference to this point as to whether the packer should sell at actual net weight at time of delivery, we found in our

activities in Virginia that some packers were wrapping the meat, but were reweighing it always at the time of delivery or shipment and charging the retailers for actual net weight at the time of delivery or shipment, deducting the weight of the wrappers. Others, however, would sell at the weight marked on the wrappers even though the meat had been held for some time and had sustained a shrinkage. Our efforts to bring about net weight at the time of sale to the consumer, we believe, is going to bring about a uniformity of the practice of those packers selling to the retailer. The retailer who is on the job is not going to buy from the packer who will not sell him net weight at the time he delivers if there is another packer who will do it, because under this regulation the retailer will have to absorb this loss before he sells the meat. When he finds this out he will certainly check back to see that the packer assumes his share of the loss.

Mr. SULLIVAN. Mr. Chairman, the previous speaker has mentioned just what we are trying to do. We have really put it up to the retailer, and when hams or bacon are received the retailer pays only for what he gets. We have given instructions along that line, and if the packers or distributing agency of a packing company will not comply, why the retailer will not buy any more meats from him. There is considerable competition and they are very careful. Our idea is to make the retailer see to it that he gets and sells the proper weights.

Mr. FOSTER. I think the gentleman who has last spoken has summed up the solution. If you hold your retailer to net weight he will look out for himself in dealing with the wholesaler. In my locality in the course of an extensive investigation of this question the wholesale representatives came to my office and explained their methods of dealing with the retailer. They declared: "If the retailers get caught it is their own fault. We sell wrapped meat at net weight at the time of delivery." The meat is wrapped a couple of days after it is cured and naturally there is considerable shrinkage. But they weigh it at the time of sale and deduct the wrapper weight from the weight of the meat, and the retailer is charged the net weight at the time of the sale. Consequently, there is no hardship.

WEIGHTS AND MEASURES ADMINISTRATION

By RALPH W. SMITH, *Bureau of Standards*

(At this point Mr. Smith spoke briefly of the forthcoming publication of the Bureau of Standards to be issued under the title of "Weights and Measures Administration," stating that this publication was expected to be available for distribution in about two months, at which time a copy would be furnished to each weights and measures official present at the conference.)

In addition to outlining the scope of this publication, Mr. Smith presented to the conference the material contained in that chapter dealing with organization of the weights and measures departments in typical foreign countries.)

The CHAIRMAN. I am glad that the bureau is in a position to get out the book described, and I also want to remind you of another, namely, the new edition of "Federal and State Laws Relating to Weights and Measures," which will appear in about a month.

REPORT OF COMMITTEE ON NOMINATIONS, PRESENTED BY WILLIAM F. CLUETT, CHAIRMAN, AND ELECTION OF OFFICERS

Mr. Chairman and delegates, your committee on nominations, having met, respectfully submits the following names of members of the conference as nominees for officers and members of the executive committee for the ensuing year:

President, George K. Burgess; first vice president, J. Harry Foley; second vice president, H. L. Flurry; secretary, F. S. Holbrook; treasurer, George F. Austin; members of the executive committee, all of the officers ex officio, Fred Benjamin, W. F. Cluett, H. N. Davis, Thomas Flaherty, William Foster, W. F. Goodwin, S. T. Griffith, T. F. Mahoney, E. J. Maroney, I. L. Miller, G. B. Nebinger, W. A. Payne, P. T. Pilon, B. W. Ragland, G. M. Roberts, A. W. Schwartz, W. F. Steinel, George Warner, H. A. Webster.

(Signed) W. F. CLUETT, *Chairman*,
I. L. MILLER,
PHILIP T. PILON,
ALLEN W. CORWIN,
Committee on Nominations.

The CHAIRMAN. Gentlemen, you have heard the report of the committee on nominations.

Mr. CLUETT. I will put the question. Are there any other nominations?

Mr. SCHWARTZ. Mr. Chairman, I make a motion that the secretary cast the ballot of the conference for the names as submitted for the various offices and for the executive committee.

Mr. FULLER. I second the motion.

(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 CHAIRMAN. Gentlemen, speaking as president of the conference and director of the bureau, I assure you that the Bureau of Standards is very proud, indeed, to go along with this conference year after year. I think you are doing splendid work and I hope it will go on with increasing effectiveness.

METHOD OF SALE OF ICE CREAM

The CHAIRMAN. The next item is the report of the special committee on method of sale of ice cream. This question can be brought before you for disposition as you choose.

Mr. SCHWARTZ. Mr. Chairman, I am in rather a peculiar position. Last year I presented the report of that committee, as chairman of the committee. We had some discussion on that subject. As a result the report was received and a motion was passed to the effect that it be referred to Doctor Skinner, of the Bureau of Chemistry, chairman of the committee on food definitions and standards, which committee was considering the question of overrun of ice cream. Your committee has not had a meeting and no further data was secured other than that which was presented to you at the last conference. Of course, we in New Jersey are very anxious for the sale

of ice cream by weight. You recall the committee as divided on that situation, but we were a unit on the matter of the limitation of overrun in the report presented to you.

Mr. HOLBROOK. Mr. Chairman, in order to bring a concrete proposal before the conference, I would like to present the following resolution:

Whereas the National Conference on Weights and Measures at its eighteenth and nineteenth meetings has given thorough consideration to the manner in which ice cream should be sold, this consideration including papers on the general subject giving the viewpoints of manufacturers, retailers, weights and measures officials, and food officials; and

Whereas it appears that as a result of these deliberations a consensus has been arrived at by the weights and measures officials of the country as to the proper method of regulation of this commodity: Now, therefore, be it

Resolved, That it is the consensus of this National Conference on Weights and Measures, meeting in Washington, D. C., May 24 to 27, 1927, that the maximum permissible overrun or swell of ice cream should be fixed at 100 per cent by appropriate laws or regulations in each State and that the present method of sale on the basis of liquid measure should be continued in effect.

Mr. FOSTER. I move the resolution be adopted.

(The motion was seconded.)

Mr. FOSTER. As a member of the last year's committee, it occurs to me that the chairman of the committee did not fully explain the action of last year's conference in reference to this. The matter of overrun was referred to Doctor Skinner, but the matter of sale by weight was referred to this conference to be disposed of by the conference.

Mr. SCHWARTZ. On the matter of overrun the committee was unanimous. The conference practically adopted the recommendation of your committee in this regard. The committee was not agreed on the method as to whether it was to be sold by weight or liquid measure and this subject was laid over. It is simply a question as to whether the sale by weight or liquid measure should be taken up to-day.

The CHAIRMAN. Has any report been received from Doctor Skinner?

Mr. HOLBROOK. There has been no report received from Doctor Skinner, nor do I think one is required. The results of our deliberations were turned over to him for the use of his committee. It seems to me it is up to this conference to decide whether ice cream should be sold by weight or measure.

Mr. SCHWARTZ. Mr. Chairman, I am opposed to the resolution because I must stick by the great Commonwealth of New Jersey. We want the sale by weight and we contemplate the introduction at the next session of the legislature of a bill to that effect. As one of the representatives from the State, I can not subscribe to the resolution which would tie our hands in the preparation of the bill. I am opposed to it and will have to vote "no" to sustain my reputation when I go back home.

Mr. WARNER. Mr. Chairman, I think we should all vote for this resolution. I hope it passes.

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

REGULATING THE FRUIT CROP IN MICHIGAN²³

By L. P. STRONG, *Chief, Division of Weights and Measures, State of Michigan*

Regulations are necessary to govern the weight and measure of fruit and vegetable packs. Michigan has a law which prohibits the manufacture, sale, or use of containers (whether filled or unfilled) which do not meet the requirements of the Federal regulations.

Michigan has standard grades for apples, peaches, pears, cantaloupes, grapes, and potatoes. In the absence of Michigan standard grades the United States standards are used. The net content by weight, volume, or numerical count is required on every container. To say which manner of declaring is best is a difficult matter, as the different fruits or vegetables are adapted to their own peculiar method. For instance, apples packed in bushel baskets are best sold by volume, as the weight varies with the variety and season. This is also true of any tree fruits. Potatoes packed in standard bags must be labeled with the net weight. Early potatoes are not mature, and considerable shrinkage can be expected if the temperature is high and the atmosphere dry. A tolerance of 2 per cent is not too much on early varieties. Early potatoes will fill a standard 150-pound sack, so that a very short ear is noticeable. Late potatoes which are mature when packed in the same size sack will, at the required weight, show an ear 3 to 4 inches long.

All tree fruits and potatoes packed in boxes are best declared by numerical count (this is the present-day trade practice, and I believe it should remain so). Small fruits or vegetables packed in the half-pint, pint, quart, 2-quart, 4-quart, or 12-quart baskets are best declared by volume for several reasons: Most small fruits, including grapes, must not be handled any more than is absolutely necessary to pick and pack. All such fruit must be handled carefully. Each package as it is being packed should be racked gently but often. (Racked means agitated so that the fruit will settle snugly and firmly.) If this is not done a slack pack is bound to occur. To determine a slack pack it is best to remove the fruit from the original container into a standard measure. If the pack does not regain a well-filled appearance it may be assumed that a willful attempt to slack pack has occurred. On the other hand, if after conversion and slight agitation, the package can be considered full measure the apparent shortness was caused by excessive vibration in transit.

All fruits and vegetables are subject to natural shrinkage and deterioration in transit. If shipped under refrigeration they will not stand up long after being removed from the car.

Michigan has a table of suggested weights by bushel, but this table is seldom used. Fruits and vegetables packed in bushels or aliquot parts thereof could not be practically sold by weight excepting potatoes, which must be sold by weight in Michigan. To weigh each package separately and declare the same would slow up the work too much to be advisable. Highly perishable fruits or vegetables must be constantly on the move after they are harvested.

²³ In the absence of Mr. Strong it was directed by the conference that this paper be printed in the record.

Growers and packers, as a rule, do not willfully slack pack or short measure. If, in your line of duty, you are asked to determine whether or not a pack is slack, look into every angle of the deal. Many slack packages are caused by pilfering. Many others are caused by a repack. Dealers often repack for the purpose of gaining additional units.

In conclusion, I wish to mention the benefits derived from the sincere cooperative activities of the United States Department of Agriculture and Federal Bureau of Standards with the Michigan State bureau of standards. The expedient and appreciative response of the Federal bureau, when called upon for needed assistance, prompts a thankful recognition. May our contact in the future (as the mutual bond strengthens) be of an assistant nature to all concerned.

GENERAL DISCUSSION OF SUBJECTS OF INTEREST BROUGHT UP FOR DISCUSSION BY DELEGATES

Mr. MARONEY. Mr. Chairman, if it is in order, I move you, sir, that a committee be appointed on this floor to draw up a constitution and by-laws and report next year. For a number of years we have gone along without a constitution, but I believe that a constitution should be adopted so that every man of this conference will be free and equal. The local weights and measures men are the bones and sinews of your organization rather than some State officials; it is high time that the rank and file should have some of the glory.

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

The CHAIRMAN. How do you wish the committee to be selected?

Mr. MARONEY. I have a tentative list. Some of the delegates may suggest others. I move that Messrs. Foley, Cluett, Griffith, Cummings, and Flurry constitute the committee to draft a constitution and report a year from to-day.

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

REPORT OF COMMITTEE ON RESOLUTIONS, PRESENTED BY H. L. FLURRY, ACTING CHAIRMAN

Mr. Chairman, as acting chairman of the resolutions committee, in the absence of Mr. Webster, I am permitted to present the following resolutions [reading]:

GREASE-DISPENSING DEVICES

Resolved, That the matter of devices used for dispensing greases to automobiles be made the subject of special investigation during the coming year and that the committee on specifications and tolerances be requested to prepare recommendations for the action of the next national conference.

(The resolution was duly adopted.)

Mr. FLURRY. The next resolution is as follows [reading]:

MEMBERSHIP ON EXECUTIVE COMMITTEE

Resolved, That if the executive committee remains at its present numerical membership there shall not be more than one representative from any State or Territory.

(The resolution was duly adopted.)

Mr. FLURRY. The next resolution is as follows [reading]:

APPRECIATION TO DIRECTOR AND STAFF OF BUREAU OF STANDARDS

Resolved, That the Twentieth National Conference on Weights and Measures herewith express its deep appreciation to our presiding officer, Doctor Burgess, for his unflinching courtesy and guidance in our deliberations, and to the members of his staff who have so ably and efficiently assisted us in our work and whose valuable cooperation at all times is gratefully acknowledged.

Mr. SCHWARTZ. Let us have a rising vote.

(The resolution was duly adopted by rising vote.)

The CHAIRMAN. Gentlemen, I greatly appreciate this action.

Mr. FLURRY. The next resolution reads as follows [reading]:

RECEPTION BY MRS. COOLIDGE

Resolved, That the National Conference on Weights and Measures appreciates the pleasing and gracious reception by Mrs. Calvin Coolidge arranged for the ladies attending this twentieth session.

(The resolution was duly adopted.)

Mr. FLURRY. The next resolution reads as follows [reading]:

THOMAS F. EGAN

Resolved, That the sorrow in the loss of our fellow member and coworker, Thomas F. Egan, formerly superintendent of weights and measures of Connecticut, who died March 26, 1927, is expressed, and to his family in their bereavement we extend the heartfelt sympathies of this conference.

Resolved further, That a copy of this resolution shall be sent to the family of the deceased.

The CHAIRMAN. It would be appropriate to adopt that by rising vote.

(The resolution was duly adopted by rising vote.)

Mr. FLURRY. The next resolution reads as follows [reading]:

APPRECIATION TO THE PRESS

Resolved, That this Twentieth National Conference on Weights and Measures express its appreciation to the press of the country for the effective manner in which the message of the conference and a report of its proceedings have been carried to the people of the United States.

(The resolution was duly adopted.)

Mr. CLUETT. Mr. Chairman, I would like to offer two resolutions at this time. First:

LOUIS A. FISCHER

Resolved, That the secretary of the conference be authorized to procure a suitable wreath to be placed upon the grave of Maj. Louis A. Fischer in Arlington Cemetery on Memorial Day in the name of this conference and as a token of our loving remembrance of our former secretary.

(The resolution was duly adopted.)

Mr. CLUETT. Also, as follows:

EXPENDITURES

Resolved, That the secretary be authorized to make the customary expenditures with relation to the conference and to draw upon the treasurer to cover these amounts.

(The resolution was duly adopted.)

REPORT OF TREASURER, GEORGE F. AUSTIN ¹⁴

GENTLEMEN: I herewith submit my report as treasurer of the National Conference on Weights and Measures for the year ending May 23, 1927:

Receipts:	
Balance on hand May 25, 1926.....	\$97. 50
Received through fees from delegates.....	110. 00
Total receipts.....	207. 50
Disbursements:	
Ralph Smith for delegates' badges.....	\$5. 25
Flowers in memory of Mr. Fischer.....	10. 00
Cigars for official reporter.....	14. 70
Candy for typists.....	10. 00
Page, service.....	5. 00
George F. Austin, for receipt blanks.....	. 60
Total disbursements.....	45. 55
Balance on hand May 24, 1927.....	161. 95

Respectfully submitted.

(Signed) GEORGE F. AUSTIN, *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.)

The CHAIRMAN. Is there any unfinished business or any new business to come before the conference? [After a pause.] If there is no further business, 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 11.35 o'clock, the Twentieth National Conference on Weights and Measures adjourned sine die.)

¹⁴ In the absence of George F. Austin this report was presented by George F. Austin, Jr.

APPENDIX

TENTATIVE SPECIFICATIONS AND TOLERANCES FOR BOTTLES FOR SALE OF LUBRICATING OIL, ADOPTED BY THE TWENTIETH NATIONAL CONFERENCE ON WEIGHTS AND MEASURES, MAY 26, 1927

FOREWORD

The Twentieth National Conference on Weights and Measures adopted the following code of specifications and tolerances for bottles for the sale of lubricating oil tentatively, in accordance with its usual custom. It will accordingly be reviewed by the committee during the coming year, and will be offered for final adoption by the next conference. In the interim officials, manufacturers, users, and all other interested parties are invited to submit to the committee any suggestions and criticisms which may occur to them, in order that the code may be revised, if necessary or advisable, before it is presented for final adoption. Such comments may be addressed to the chairman of the committee on specifications and tolerances, National Conference on Weights and Measures, or to any member of the committee, which is as follows:

- F. S. Holbrook, Bureau of Standards, Washington, D. C., chairman.
William F. Cluett, chief deputy inspector of weights and measures, City Hall, Chicago, Ill.
Charles M. Fuller, city and county inspector of weights and measures, Los Angeles, Calif.
A. W. Schwartz, assistant State superintendent of weights and measures, Elizabeth, N. J.
I. L. Miller, State commissioner of weights and measures, Indianapolis, Ind.

SPECIFICATIONS

1. Bottles used for the sale of lubricating oil shall be made of clear, uncolored glass, and only in sizes heretofore specified under the heading "Liquid capacity measures." They shall be made to contain their indicated capacities at a temperature of 20° C. (68° F.), and they shall not be subdivided.

2. Each bottle shall have its capacity clearly blown or otherwise clearly and permanently marked in or on the side of the bottle, and in or on the side or bottom the name, initials, or trade-mark of the manufacturer thereof.

3. Bottles shall be provided with a clearly defined graduation line blown or otherwise clearly and permanently marked in or on the bottle, and extending at least halfway around it, which indicates the correct capacity, and with the words "Fill to line" or a similar or suitable inscription clearly and permanently marked in or on the bottle and clearly referable to this graduation line. This line shall in no case be more than 0.10 inch in width and the bottom

edge of the line shall define the top of the meniscus of the water which is used in the test of the bottle. This graduation line shall be placed so that it is at least one-fourth inch below the bottom of any metal top when this is screwed firmly into place. The capacity of that portion of the bottle above the bottom of the graduation line shall be at least 3 cubic inches.

4. When a bottle is equipped with a spout, this shall be so constructed that free and unobstructed drainage is provided. This specification shall be construed to require that there be an effective air vent in the spout and no shoulder or other obstruction tending to result in a trapping of the liquid being delivered. The spout shall not be over 6 inches in length, measured from the point of contact with the top of the bottle to the tip of the spout.

TOLERANCES

The tolerances to be allowed on all bottles used for the sale of lubricating oil shall be in excess only and shall be the values shown in the following table: There shall be no tolerance allowed in deficiency.

Capacity of bottle	Tolerance	
	Drams	Cubic inches
2 quarts.....	12	2.7
1 quart.....	8	1.8
1 pint.....	6	1.4

NOTE.—The committee on specifications and tolerances was given authority by the conference to decide which portions of the above specifications and tolerances should be retroactive and which portions should be nonretroactive, respectively. It is the belief of the committee that the major portion of the code should be nonretroactive. Since these specifications and tolerances were adopted tentatively only and will be reviewed by the next conference before they are finally adopted, the committee will make its recommendations along this line at that time, together with a date at which they will be recommended to go into force and effect.



