U. S. DEPARTMENT OF COMMERCE

NATIONAL BUREAU OF STANDARDS

REPORT OF THE THIRTY-FIRST NATIONAL CONFERENCE ON WEIGHTS AND MEASURES

ATTENDED BY REPRESENTATIVES
FROM VARIOUS STATES

SPONSORED BY THE NATIONAL BUREAU OF STANDARDS
WASHINGTON, D. C., JUNE 3, 4, 5, AND 6, 1941

MISCELLANEOUS PUBLICATION M170

rst National Conference on Weigh

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

MISCELLANEOUS PUBLICATION M170

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Official photograph of delegates and guests attending the Thirty-first National Conference on Weights and Measures, assembled in the meeting room at the Hotel Mayflower, Washington, D. C.

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C. E. Tucker, Chief, State Bureau of Weights and Measures,, Sacramento, Calif.
Louis G. Waldman,[4] Commissioner of Weights and Measures, St. Louis, Mo.

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[1] Following the Thirty-first National Conference, Mr. Campbell resigned from the Committee, and Joseph F. Blickley, Director, Bureau of Standard Weights and Measures, State of Pennsylvania, was appointed to succeed him.
[2] Following the Thirty-first National Conference, Mr. Waldman retired from weights and measures work; his successor on the Committee is not yet appointed.
[3] Following the Thirty-first National Conference, Mr. Campbell resigned from the Committee, and C. D. Baucom, Superintendent of Weights and Measures, State of North Carolina, was appointed to succeed him.
[4] Following the Thirty-first National Conference, Mr. Waldman retired from weights and measures work, and Russell S. Ackerman, Superintendent, Department of Licenses, Weights and Measures, City of Minneapolis, Minn., was appointed to succeed him on the Committee.

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In Charge of Registrations: S. M. Derato and Mrs. H. G. Sweeney.

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[5] Following the Thirty-first National Conference, Mr. Boutell resigned from the Committee, and C. F. Horton, National Bureau of Standards, was appointed to succeed him.
[6] Following the Thirty-first National Conference, Mr. McHugh resigned from the Committee, and W. P. Reed, Inspector of Weights and Measures of Atlanta, Ga., was appointed to succeed him.
[7] Deceased. Following the Thirty-first National Conference, H. E. Howard, Chief Inspector of Weights and Measures, Miami, Fla., was appointed to succeed Mr. Griffith on the Committee.
[8] This Committee was authorized by the Thirty-first National Conference, and the membership was appointed by the President of the Conference following adjournment.
[9] This Committee was authorized by the Thirty-first National Conference, and the membership was announced by the President of the Conference during the sixth session.

PERSONS ATTENDING THE CONFERENCE

DELEGATES—STATE, CITY, AND COUNTY OFFICIALS

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- Solano—H. G. BERGWALL, Sealer of Weights and Measures, 205 Virginia Street, Vallejo.

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George A. Ritchey, Assistant Superintendent of Standards, Springfield.

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[10] Mr. Campbell registered and paid dues *in absentia.*

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Exact Weight Scale Co.:
W. A. SCHEURER, Vice President, 944 West 5th Avenue, Columbus, Ohio.
R. H. SANFORD, S. E. District Manager, Columbus, Ohio.
Fairbanks, Morse & Co.:
F. E. TOWNSEND, Chief Engineer, Scale Division, St. Johnsbury, Vt.
DALE P. JACOBUS, Experimental Engineer, St. Johnsbury, Vt.
J. F. CRUIKSHANK, Sales Engineer, 600 South Michigan Avenue, Chicago, Ill.
W. C. GANTT, Scale Service Manager, 2010 Lovegrove Street, Baltimore, Md.
C. A. HENNIE, Scale Department Representative, 2010 Lovegrove Street, Baltimore, Md.
JEROME KENNEY, Sales Representative, 2010 Lovegrove Street, Baltimore, Md.
Gilbert & Barker Manufacturing Co.: J. A. LOGAN, Manager, New Products & Patents Division, Springfield, Mass.
Gurley, W. & L. E.: FRANKLIN G. WILLIAMS, Washington Representative, 514 Fulton Street, Troy, N. Y.
Hobart Manufacturing Co.: KENNETH C. ALLEN, Chief Engineer, Dayton Scale Division, Dayton, Ohio.
Howe Scale Co.:
ELWOOD P. VROOME, Branch Manager, 111 Eighth Avenue, New York, N Y.
WILLY JENSEN, Service Manager, 111 Eighth Avenue, New York, N. Y.
ROBERT A. PARHAM, Representative, 28 North Eighth Street, Richmond, Va.

Kimble Glass Co.: James J. Moran, Technical Manager, Sales Department, Vineland, N. J.

Neptune Meter Co.:
- R. K. Blanchard, Vice President, 50 West Fiftieth Street, New York, N. Y
- C. E. Alden, Sales Engineer, 50 West Fiftieth Street, New York, N. Y.
- Walter H. Sieger, Engineer, 50 West Fiftieth Street, New York, N. Y.

Newark Scale Works: Gustav Ohaus, Proprietor, 10 Hobson Street, Newark N. J.

Owens-Illinois Glass Co.: J. D. Laird, Supervisor of Specifications, Toledo, Ohio.

Peerless Weighing & Vending Machine Corporation: E. M. Schiemer, Representative, 21–19 Forty-First Avenue, Long Island City, N. Y.

Pittsburgh Equitable Meter Co.:
- H. I. Beardsley, Manager, Oil & Gasoline Division, 400 North Lexington Avenue, Pittsburgh, Pa.
- S. J. Pascual, Manager, Oil Meter Co., National Meter Division, 4207 First Avenue, Brooklyn, N. Y.
- Raymond H. Barge, Engineer, National Meter Division, 4207 First Avenue, Brooklyn, N. Y.
- E. R. Eyler, Sales Representative, 3801 Seven Mile Lane, Baltimore, Md.
- Charles H. Obrock, Jr., Sales Engineer, 50 Church Street, New York, N. Y.
- J. L. Schumann, Sales Engineer, National Meter Division, 4207 First Avenue, Brooklyn, N. Y.

Robinson Seal Co. (Inc.): W. M. Robinson, 170 Summer Street, Boston, Mass.

Schirmer-Dornbirer Pump Co.: W. P. Schirmer, President, 1719 East Thirty-Ninth Street, Cleveland, Ohio.

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

Service Station Equipment Co.:
- Eric H. Bradley, Chief Engineer, Muskegon, Mich.
- Louis G. Close, Manager, Baltimore Division, 2801 Greenmount Avenue, Baltimore, Md.

Soweigh Scale Co.: O. H. Watson, Chief Engineer, Delavan, Ill.

Spinks Scale Co.:
- J. M. Spinks, Manager, 656 Mayland Avenue, S. W., Atlanta, Ga.
- Robert A. Parham, Representative. 28 North Eighth Street, Richmond, Va.

Standard Computing Scale Co.: W. Tom White, Assistant Supervisor of Sales, Detroit, Mich.

Streeter Amet Co.:
- Harry M. Roeser, Manager, Sales and Service, 4101 Ravenswood Avenue, Chicago, Ill.
- C. A. Lindsay, Special Representative, 1305 Euclid Street, Washington, D. C.

Tokheim Oil Tank & Pump Co.: William Louthan, Service Manager, Fort Wayne, Ind.

Toledo Scale Co.:
- S. Q. Bennett, Manager, Service and Weights and Measures Division, Toledo, Ohio.
- H. Warren Hem, Consulting Engineer, Toledo, Ohio.
- V. V. Radionoff, District Sales Manager, 807 Rock Creek Church Road, Washington, D. C.

Triner Scale & Manufacturing Co.:
- Felix Jansey, Director of Research, 30 North Michigan Avenue, Chicago, Ill.
- John E. Edgerton, Representative, 1395 National Press Building, Washington, D. C.
- Frank A. Lang, Chicago, Ill.

Wayne Pump Co.:
- C. C. Neale, Manager, Weights and Measures Department, Fort Wayne, Ind.
- Harold E. Duke, 4030 North Broad Street, Philadelphia, Pa.

Wood, John, Manufacturing Co. (Inc.):
- A. E. McKeever, Manager, Master Duplicator Division, 618 Capitol Avenue, Hartford, Conn.
- Ben L. Beverly, District Manager, Master Duplicator Division, 122 East Forty-Second Street, New York, N. Y.

Worthington-Gamon Meter Co.: Hubert P. Matte, Research Engineer, 296 South Street, Newark, N. J.

GUESTS REPRESENTING ASSOCIATIONS, BUSINESS AND INDUSTRY, AND RAILROADS

Alton Railroad Co.: R. O. Rask, Scale Inspector, Bloomington, Ill.

American Can Co.:
F. F. Fitzgerald, Director of Research, 230 Park Avenue, New York, N. Y.
Henry B. Tourtellot, Assistant General Manager, Sales, 230 Park Avenue, New York, N. Y.

American Veneer Package Association (Inc.): Robert W. Davis, Secretary-Manager, 804 Seventeenth Street, Washington, D. C.

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

Baltimore & Ohio Railroad System: E. Kent Lawrence, General Scale Inspector, Baltimore, Md.

Bethlehem Steel Co.: Harry Marchant, Scale Department Superintendent, Sparrows Point, Md.

Chesapeake & Ohio Railway: H. C. Propst, Supervisor of Scales and Weighing, Richmond, Va.

Chicago & Northwestern Railway Co: Harry Mayer, Supervisor of Scales and Work Equipment, 400 West Madison Street, Chicago, Ill.

Continental Can Co. (Inc.): William H. Harrison, 11 West Washington Street, Chicago, Ill.

Glass Container Association: H. W. Kuni, Secretary and Treasurer, 19 West Forty-Fourth Street, New York, N. Y.

Gulf Oil Corporation: Carl W. Wolff, Maintenance Superintendent, 1515 Locust Street, Philadelphia, Pa.

Label Manufacturers National Association: Charles R. Cosby, Executive Secretary, 1700 Eye Street, Washington, D. C.

Lockport Cotton Batting Co.: Richard M. Archibald, Lockport, N. Y.

Millers' National Federation: A. H. Krueger, 847 National Press Building, Washington, D. C.

National-American Wholesale Grocers' Association: M. L. Toulme, Secretary, 60 Hudson Street, New York, N. Y.

National Association of Broadcasters: Arthur Stringer, 1626 K Street, Washington, D. C.

National Canners Association: Carlos Campbell, Director, Division of Statistics, 1739 H Street, Washington, D. C.

New York Produce Exchange: J. B. Paige, Chief Scale Inspector, 2 Broadway, New York, N. Y.

Pennsylvania Railroad: M. J. J. Harrison, Supervisor of Scales and Weighing, Altoona, Pa.

Quaker Oats Company: Douglas Kirk, Purchasing Department, 1900 Board of Trade Building, Chicago, Ill.

Scale Journal Publishing Co.: Edith G. Jacobs, Secretary, 1703 East Eighty-Fourth Street, Chicago, Ill.

Soft Fiber Manufacturers Institute: William Magowan, Assistant Treasurer-Secretary, 9 Rockefeller Plaza, New York, N. Y.

Southern Railway System: J. N. Todd, Superintendent of Scales, Washington, D. C.

Standard Oil Company of New Jersey:
L. L. Kennedy, Superintendent, Automotive and Construction, 500 North Broad Street, Philadelphia, Pa.
J. W. Saybolt, Sales Manager, 26 Broadway, New York, N. Y.

Tissue Association: Ross A. Fife, Executive Secretary, 122 East Forty-Second Street, New York, N. Y.

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APPENDIX

REPORT OF THE THIRTY-FIRST NATIONAL CONFERENCE ON WEIGHTS AND MEASURES

SPONSORED BY THE NATIONAL BUREAU OF STANDARDS, AND HELD AT THE HOTEL MAYFLOWER, WASHINGTON, D. C., JUNE 3, 4, 5, AND 6, 1941

FIRST SESSION—MORNING OF TUESDAY, JUNE 3, 1941

(In the absence of the President of the Conference, who was prevented by official duties from opening the meeting, the Conference was called to order at 11:05 a. m. by H. N. Davis, Vice President of the Conference.)

REPORT OF CONFERENCE COMMITTEE ON FAY STANLEY HOLBROOK MEMORIAL TABLET, PRESENTED BY R. W. SMITH, CHAIRMAN

A portion of the special "Fay Stanley Holbrook Resolution," adopted in 1940 by the Thirtieth National Conference on Weights and Measures, reads as follows:

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

The Committee authorized by the resolution was appointed by Doctor Briggs in June 1940. The personnel was R. W. Smith, of the National Bureau of Standards, George M. Roberts, of the District of Columbia, and C. E. Tucker, of California.

At about this same time arrangements had been completed by the staff of the Division of Weights and Measures of the National Bureau of Standards for the procurement of a memorial tablet commemorating Louis A. Fischer, former Chief of the Division; this tablet was to be mounted in the Division office. It seemed to your Committee that it would be appropriate that the Fischer and Holbrook tablets be mounted side by side, and that in any event the Holbrook tablet should be similar in design to, and should harmonize with, the Fischer tablet.

Accordingly, your Committee made arrangements with the manufacturer of the Fischer tablet to prepare a drawing for the Holbrook tablet, embodying the tentative suggestions of the committee. This preliminary drawing was separately considered by each member of the Committee, and after some exchange of correspondence a design was agreed upon. The price of $44 quoted by the company appeared to be entirely reasonable. Therefore, on August 27, the order was placed.

On September 30, 1940, the Holbrook tablet was delivered to the National Bureau of Standards, and was mounted in the office of the Division of Weights and Measures. The manufacturer's invoice was forwarded by the Committee chairman to the Conference Treasurer, and a check in payment was mailed by the Treasurer on October 15.

So that the members of the Conference may have the opportunity of seeing the Holbrook tablet, this has been dismounted and brought here to our meeting room for the day. [At this point, Mr. Smith unveiled the tablet, which rested on an easel on the rostrum.]

In order that you may have a mental picture of the appearance of the Holbrook and Fischer tablets as these are mounted at the Bureau, a photograph was made of a section of the wall of the office of the Division of Weights and Measures, and this is reproduced on the lantern slide which you will now see. [At this point, the lantern slide was shown.]

It is the hope of the Committee that it has discharged its duties to the satisfaction of the Conference.

(Signed) R. W. Smith, *Chairman,*
George M. Roberts,
C. E. Tucker,
Committee on Fay Stanley Holbrook Memorial Tablet.

Mr. Crockett. I move that the Committee on Fay Stanley Holbrook Memorial Tablet be discharged, and that we give the Committee a rising vote of thanks.

(The motion was seconded, the question was taken, and the motion was agreed to. Conformable to the motion, the Conference expressed its thanks to the Committee by rising at the call of the Chairman.)

THE WEIGHTS AND MEASURES OFFICER AND THE PROGRAM FOR NATIONAL DEFENSE

By Dickson Reck, *Economist, Consumer Division, Office of Price Administration and Civilian Supply, Office for Emergency Management*

This is a time of national crisis. You all know that, and most people are conscious of it. I think as the weeks go on they will be even more conscious of it. It is a time when every American wants to know just what problems we face, and particularly how he can most effectively contribute to their solution. I take it that you want to know how these problems look to us here in Washington, what we are doing to solve them, and particularly how you, as weights and measures officers, can fit into the picture. That is a big picture, but I will try to sketch the outline and fill in with a little more detail those parts which most directly interest you.

First, let's look at the military program. We are procuring the necessary and essential items for a force of 2,000,000 men, and certain critical items for 800,000 more. On top of this, we are building a two-ocean navy and arranging to be the arsenal and provisioner of England and other anti-axis countries.

What does all this add up to? In the calendar year 1940 we spent 4.3 billion dollars on defense, which was only the start. It is estimated that in the 2 calendar years of 1941 and 1942 we must spend approximately 40 billion dollars upon defense, and the only limiting factor will be the speed with which we can produce planes and tanks and ships and other necessary war equipment and supplies.

This, then, is the first big economic problem we face: How to produce the material listed in the military program just as fast as is humanly possible.

How will the military program be felt by the civilian population? We can already feel some of the effects, and the time is rapidly approaching when it will be quite clear how civilians will be affected. There are present shortages in some important materials. Aluminum, magnesium, nickel, tungsten, zinc, neoprene, and machine tools are under priorities control now; copper is being put under at the moment; and the use of these materials for production of civilian supplies is being currently curtailed. All metals with the exception of certain of the precious metals—gold and silver—are on the priorities critical list, which means that there is serious question as to how long they can be used without priorities restrictions. For certain other essential materials such as tin, rubber, and mica, conservation measures are being worked out to restrict their use for civilian purposes. The production of next year's models of automobiles is to be cut down at least 20 percent under the peak production of this year's models.

It is clear, then, that some civilians will be unable to buy certain products and that they will find substitutes offered them for others, when they go about their day-to-day shopping. On top of this many consumers will have additional income to spend, either because they have stepped from the ranks of the unemployed into the ranks of those who receive regular pay checks, or because they are working longer hours or getting more per hour.

As over against these factors, we still have millions of men and women who want to work, but who are unemployed; we still have ample resources of many important materials; and we still have, according to the National Association of Manufacturers and the subcontracting section of the defense contract service, a pool of unused plant capacity for certain types of production.

What does all this add up to for consumers in the retail market places? It is difficult if not impossible to say what will happen in detail, but certain broad conclusions are clear. First, we will definitely face shortage of certain types of products where the bottlenecks are simply too severe to be relieved in the near future. Consumers must go without some commodities and accept substitutes for others. Second, for many other important goods and services which we can produce by putting our unemployed labor, land, material, and plant resources to work, we have two possibilities. One possibility is that we will produce more and meet the increased consumer demand with goods at the retail markets. The other possibility is that, for various reasons, prices will rise and the increased consumer money incomes will be met by higher prices instead of more goods at the retail counters. Of course, some combination of these two may be realized.

The first solution, of producing more, is obviously the most desirable, for only by increasing the production of civilian goods as much as we possibly can, without in any way obstructing the military program, can we protect our living standards. And this is the second big economic problem facing us.

These problems can only be solved successfully through the unified effort of all governmental and private agencies, and of all the people in our country. But the President has recognized the need for accepting a special responsibility for the solution of these problems and for setting up special agencies to cope with them. For this purpose he has delegated a large share of responsibility to the Office of Emer-

gency Management, and to the agencies set up under this Office. All of these agencies are working jointly on both the military and civilian problems, but each has its special responsibilities.

The principal responsibility for the production of the military supplies rests with the Office of Production Management. The country is relying on this office, the Army and Navy, the workers, managers and owners of the plants, shipyards, and farms producing military equipment and supplies for the successful solution to this first problem.

The principal responsibility for the protection of living standards rests with other agencies of the Office for Emergency Management. These are in particular the Office of Price Administration and Civilian Supply, the Office of Civilian Defense (which is the new agency headed by Mr. LaGuardia), and the Office of Defense Housing Coordination. I will speak principally of the Office of Price Administration and Civilian Supply, because a large share of the responsibility for protecting our standards of living has been delegated to this agency.

In OPACS, as we are familiarly called, there are a number of divisions, two of which I wish to discuss. Each of these is concerned with an important phase of the problem. The Price Division has the responsibility for doing all in its power to keep prices at reasonable levels, so that the pocketbooks of both Government and civilians will be protected, and also so that the increased money incomes of consumers will not be siphoned off by higher prices but will serve to call forth more production, put more men to work, and use more plants and more of those materials of which we still have plenty. Price ceilings have been placed on a few strategic commodities, precautionary steps have been taken for some, and the prices of many other commodities are being watched and studied so that appropriate action may be taken when and if it becomes necessary.

Second, the Consumer Division of OPACS has the responsibility of advising the other divisions and agencies on matters affecting the consumers' interest, and of advising and cooperating with consumers throughout the country on ways in which they can protect their living standards and contribute most effectively to the defense program.

Much of the work of the OPM and the Army and Navy on the military program, and the work of OPACS on protecting living standards as represented by the activities of the Price and Supply Divisions, will typically be carried on at a level where weights and measures officers and civilians, as consumers, cannot contribute directly. These agencies deal directly with producers, manufacturers, distributors, and labor unions.

The consumer meets the economic system in the retail market places. It is there that he must make a large share of his contribution to the defense program. Through intelligent buying he can contribute to stabilization of prices, and he can conserve essential resources by choosing the goods that will contribute most to his well-being and for which the replacement rate will be the smallest. As you know, far better than others, he cannot buy intelligently unless he has precise knowledge of three things, the amount of money he pays for a commodity, the quantity he receives, and the qualities con-

tained in the article. Insofar as he lacks a clear definition of any one of these factors, just to that extent it is impossible for him to make his contribution as a consumer to the defense effort.

You have been working for years to see that consumers get the weight or measure they pay for—to clarify the quantity factor in price. We in OPACS whose work it is to help consumers exert a stabilizing influence on prices and to eliminate wastes in buying, have a common interest with you in your problems. It is here, at the retail counters and in your communities, where you can make an important contribution to the solution of the emergency problems now facing us.

Some of you have more adequate laws to work within than others, some of you have more adequate appropriations than others, some of you have jurisdiction over more types of activities than others, and the problems of various localities differ. But all of you can make a direct contribution to total defense through your day-by-day work. Your immediate responsibility is to broaden and to intensify the work you have been doing to educate the public in the importance of your work and in ways in which they can cooperate, and to bring clearly before the public the problems you face so you can receive the aid necessary for their solution. Beyond that, you can inform the proper authorities of the type of work you do so they can call on you to perform any special tasks which may become necessary in the future.

I should like to outline for you the activities and plans of the Consumers Division which may touch your work, and to make certain concrete suggestions for cooperative effort. We expect shortly to have several regional field people at work. These field representatives will act as advisers to consumer representatives or committees of the State and local defense councils and to all groups concerned with consumer problems, and they will be available to cooperate with all agencies such as the weights and measures departments, which serve consumers.

In a bulletin "Check Your Weights and Measures," issued by the Consumer Division, we have recommended that consumer groups sponsor a 4-point weights and measures program in their community:

First, that consumers work to get the model State law on weights and measures adopted in their State; that the weights and measures department be charged with the responsibility for enforcing State laws regulating advertising and selling practices; that weights and measures officers be authorized to check prepackaged merchandise; and that weights and measures departments support the effort to secure legislation which will require standard containers.

Second, that consumers ask for an appropriation of at least 6 cents per capita to provide for personnel and enforcement activity.

Third, that consumers see that their weights and measures department provides inspectors to supervise the use of weights and measures instruments as well as to check their accuracy.

Fourth, that consumers encourage their weights and measures departments to extend and intensify their educational work so as to bring consumers into close cooperation with the departments.

As we build up our field force, we will be in a better position than we have been thus far to cooperate with your departments and consumer groups in working toward the accomplishment of such a program.

Now, I would like to make some concrete suggestions for your consideration:

First, that if you have not already done so, you immediately get in touch with your State or local council of defense and find out how you can tie in with their work. If these councils follow the organizational pattern suggested for State and local councils, they will have consumer representatives or committees whose problem it is to cooperate with public agencies providing consumer services and with State and local consumer groups, and to represent the consumer in the deliberations of the council. Where the defense councils have such representatives they are your natural points of contact, and you should find them your allies.

Second, our field representatives will be instructed to get in touch with you. To begin with, we will not have many, so we can't get in touch with all of you at once. They will also be in touch with the State and local defense councils. When they call on you, we hope that you will discuss your problems with them so that they will understand them and be able to cooperate effectively with you and put you in touch with consumer groups who can tie in with your efforts.

Third, we suggest that you intensify your educational work. Consumers are becoming more conscious of their problems with every passing week. We think you will find them more receptive and more eager to learn of your work than you might have a few years back. You need their help and they certainly need yours.

Most consumers feel ashamed or "cheap" about questioning weights and measures. It is your responsibility and ours to help them overcome this feeling and to make them ask questions. I remember asking one consumer who had been "shamed" by a clerk when she questioned the weight he had given her, if she was also ashamed to count her change in front of the clerk, and then suggested it was her responsibility to check her weights and measures just as carefully as she counted her change. The next time she insisted, and apparently with good effect, for after two or three such episodes, the store put a scale near the cash register so their customers could check-weigh their purchases if they cared to.

Our field representatives will also be glad to cooperate with you and with consumer groups in efforts you may care to make to get weights and measures programs on the radio. They will be in touch with any consumer programs that are given and may be able to help you get a hearing by this medium.

In this educational work, we urge you to pay particular attention to low-income consumers. In our work around the country with trade-union groups and settlement houses, we have found that when we ask them generally about consumer problems, one of the things they almost inevitably mention is weights and measures, and they are very much interested in it. I am certain that many of your difficult problems are in low-income districts where coal is bought in small quantities and where many dry groceries are bought by the nickel's worth instead of by the pound. These must present difficult problems for you, but you should be able to get the cooperation of the settlement houses and, as they become more aware of their problems of spending, of the labor unions and Negro groups.

Fourth, we urge you to intensify your efforts to obtain uniform weights and measures regulations throughout the country; to adopt nationally effective specifications for weighing and measuring equip-

ment; to push hard in your drive for Federal legislation to standardize containers; and finally to work to get uniform weights and measures regulations throughout the country. Doctor Briggs made a strong plea to you for uniform regulations at your Conference last year. I want to underline his comments with special reference to the present emergency. The horse and buggy days are gone. The telephone and radio, the airplane and train, have made us an indivisible whole. In this emergency we must have a unified and efficient nation. We have too much to compete with to do anything else. We can not afford the luxury of pointless individual initiative that lowers the efficiency of our plants and, by allowing confusion to continue to exist in the markets, condones wasteful consumer buying. We count upon your whole-hearted effort to standardize the standards.

Another point which I would like to mention and to emphasize is that none of us can tell what the future holds. We don't know and we can't tell in Washington, and I do not think anybody can in your communities, what kind of work you may be called upon to do next year or the year after. The point I want to make is that if you keep in touch with us, with our field representatives, and particularly with your State and local defense councils, where you have them, you will know what is going on. The people who have the problems to solve will know what kind of work you are doing and will be able to call on you to fit into whatever programs develop. I know that during the last war, weights and measures officials were called upon to do work that was not strictly weights and measures work, due to the fact that they were in close contact with the markets and the retail outlets. That may happen again. It is not in sight now, but if you keep in touch with the right people, you will be in a position to make the most contribution.

Fifth, and finally, in finishing I would like to start something. As a beginning of what I hope will be a period of closer cooperation between weights and measures officers and the Consumer Division of the Office of Price Administration and Civilian Supply, I would like to invite any of you who are interested, but especially your Committee on Weights and Measures Education, to visit our office and sit down with the chief of our consumer relations staff and me to discuss ways in which we can cooperate to help each other and consumers make their contribution to national defense.

The CHAIRMAN. Mr. Reck's address has certainly given us something to think about in the coming months. I am sure that weights and measures officials will want to do, and will do, their part in this crisis which confronts us.

DIRECTING THE PERSONNEL OF A WEIGHTS AND MEASURES DEPARTMENT

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

I have been requested to use as my subject this morning "Directing the Personnel of a Weights and Measures Department." On February 13, 1935, Mayor Kelly appointed me as Inspector of Weights and Measures of the city of Chicago, and the only instructions he gave me were to prosecute dishonest merchants without fear or favor.

I presume our problems are the same in smaller communities as well as in the larger cities. New York and Chicago, with their great population, may have a few more problems, but the inspectors, the public, and human nature in general are the same, whether they work on "Main Street" in the smaller town, Broadway in New York, or State Street in Chicago.

From a survey in Chicago, there are about 500,000 housewives who make purchases every day, and the cheating average per day is 10 cents, or $50,000; which every 20 days would amount to $1,000,000 and, as someone said, "that is an awful lot of lamb chops and cauliflower."

In Chicago, we have 40 employees whose work is divided into several classifications. Some of these men test all of the scales throughout the city, some test the gasoline pumps, and the shoppers investigate all of the retail stores in the city to see that the merchants are giving honest weight.

The men assigned to the produce market inspect every shipment of produce arriving in Chicago by rail or truck in the South Water Market. It might interest you to know that 3 years ago I opened up a branch office at the market, and an inspector is kept at the team-tracks as carloads of potatoes, onions, etc., are being unloaded. The first year we found a shortage of 586,000 pounds in potatoes which were coming into Chicago in so-called 100-pound bags which only contained from 80 to 95 pounds of potatoes, the rest being dirt and shortweight. We make them rebag all shortweight potatoes right at the railroad now, and we OK the shortage claims of the commission merchant on the shipper. During the first 3 months of this year 583 cars were unloaded, and the shortage was only 710 pounds—quite a difference from 3 years ago.

The men working on coal pick up loads promiscuously on the street, check the weight and the kind, grade, and size of the coal to see that the purchaser receives what he has ordered.

We, of course, make drives at different seasons of the year. From September 1 to April 1, I increase my personnel on coal. Then, from April 1 to June 1, I take some of the teams off of coal and put them on peddlers. In May we add one or two more teams on shopping of gas stations.

Two inspectors are assigned for 3-month periods, twice a year, to a testing plant I have set up to test all fuel-oil meters and tanks delivering fuel oil in Chicago. We have a list in our office of all such tank wagons, and these meters are tested twice a year. We also have every gas station listed and the number of pumps contained thereon. These pumps are tested twice a year and a fee of $2.00 charged. We keep a daily record so that at the end of 6 months we can tell our inspectors which pumps they have missed, so they try not to miss any.

Our inspectors travel in pairs for the purpose of corroborative evidence when a case comes to trial. Each inspector is provided with a star, an ordinance book, an instruction manual, a receipt book, seals, condemned stickers, warning notices, and arrest books. The arrest books contain 50 arrest notices in triplicate, and each slip bears a serial number. When an inspector discovers a violation, he issues the original copy of the arrest slip to the merchant, the duplicate copy with the report of the investigation is turned in to the office, and the triplicate

copy remains in the book. Every month all inspectors must turn in their arrest books for the purpose of being checked upon. This system, I think, eliminates any possibility of an inspector having a change of heart after he once decides that a merchant really has committed a violation, and also prevents any tampering with the tickets by someone other than the reporting inspector.

Shopping stores is the same old story day in and day out, just an "honest mistake"—but the honest mistakes are always made in favor of the merchant. These men and women inspectors are just human beings and are all subject to the same temptations and abuse, and in the last nearly 7 years in office my men and women have found out that no one will back them stronger than I, and no one will fire them quicker for dishonesty. I do not believe in the old adage "it takes a thief to catch a thief."

Some time ago I found that two of my men had taken $2.00 from an old baker for a slight violation. I would have fired them, but they were advanced in years and had served nearly 20 years under civil service. I suspended them for 2 weeks—that amounted to $95.00 in salary for each inspector, or $190.00 for taking $2.00; that was a lesson for all of them, and I think we have a splendid, clean department. Our temporary employees are paid $160.00 per month and the civil-service employees are paid $190 per month, and we have a fairly happy family.

Coal is one of our biggest problems. A few years ago we were having considerable trouble with coal being trucked in from mines 50 to 100 miles from Chicago with only a mine ticket being delivered to the consumer. There were about 1,200 tons per day being trucked in, which would have eventually put the Chicago coal merchants out of business. In Chicago, we have an ordinance providing that a certified public weighmaster's ticket must be delivered with every load lot, showing the gross, tare, and net weight of the merchandise. This weighmaster must be licensed and bonded by the City of Chicago. These boys hauling coal in from the mines could not give a Chicago weighmaster's certificate unless they drove into Chicago, dumped the coal off their wagons, weighed their wagons empty, and then put the coal back on the wagon and weighed the whole load on the same scale—and that is just exactly what the United States Supreme Court here in Washington said they had to do to insure the people of Chicago the proper weight. This was, of course, too expensive a procedure, so the trucking in of mine coal has stopped in Chicago.

In 1940 my department made 109,651 inspections, 13,344 investigations, and prosecuted 329 violators whose assessed fines amounted to $5,355. In one case, we found a baker 1 ounce short on every loaf of bread. It seemed like a very small shortage, but he put out 30,000 loaves per day. Therefore, this 1 ounce per loaf would have amounted to 1,875 pounds a day—nearly 1 ton of bread. At a considerable cost to him we made him change his entire pan system to rectify this matter.

We collected in fees nearly $75,000 per year. Every seal that is placed on a scale, gasoline pump, meter, or anything else under the jurisdiction of our department is numbered and every number is accounted for in our office. The men doing this work turn in all monies collected daily, for which they receive a receipt. At the end of the month, each inspector's collections are totaled and compared with the

total collections made during the corresponding month of the previous year. In this way, we can find out whether or not an inspector is falling behind in his daily receipts. All in all, it is a big job in a large city and we are doing the best we can.

Now, going back for just a moment to inspectors and the personnel of a weights and measures department, I think the personnel and the morale are built up by the individual who heads that department. If he is dishonest or wishy-washy, so are his employees. If they see he is of forceful character, honest and sincere in his work, backing up his inspectors and not fixing cases which his inspectors may have spent many hours in building up but instead helping them to the limit to bring these cases to successful prosecution, there is no doubt in my mind that these inspectors will, within a short time, give the best they have. Of course, on the other side of the picture, an inspector must also be checked at times to make sure that he is not persecuting merchants because he has some personal grudge against the merchant or some clerk working in the store. We insist that they be courteous at all times and under all circumstances avoid arguments. When a merchant is argumentative about a violation that the inspector thinks is not great enough to send to court, we give the merchant a slip requiring him to come in to our office and discuss his case. We can convince him that he is wrong in our own yard better than we can in his, and if he doesn't come in, we go out and get him.

One of the finest things that has happened, and I think one of the most helpful things in the conduct of weights and measures work since these National Conferences have been held these last few years, is the exchange of ideas among the different directors around the United States who have met each other here and have formed valuable friendships. Not only do we exchange ideas, but we also advise each other that certain firms in our respective cities are violating the law in the nature of false labeling, false packing, and many other ways. In this connection, I extend my thanks to Dr. Briggs, Ralph Smith, Mr. Pisciotta, Mr. Kanzer, Mr. Bussey, Mr. Fuller, Mr. Rogers, Mr. McBride, and Mr. Baucom.

We have exchanged many ideas and corrected many evils, and I say again that I think one of the most valuable results that has come out of these yearly Conferences is this exchange of information, and I hope it will be carried on to an even greater extent.

Secretary's Note.—Following his paper, Mr. O'Keefe displayed to the Conference some interesting exhibits, illustrating certain improper and fradulent practices discovered and corrected by his department. These included a can only partially filled with beer, the shortage having been the result of a mechanical failure associated with the filling machine; a 14½-ounce piece of lead which had been used to increase the weight of poultry; a piece of elastic material found beneath a scale, and used in that position to cause the scale to underregister in buying operations; a "ten-cent" package of a well-known brand of face powder, repacked by a concern other than the original packer, the contents of which was such that, as compared with the regular "dollar" package, the cost of the powder to the purchaser of the small package was more than three times the cost when bought in the regular package; and a 5½-ounce piece of paper which a clerk was about to put on a scale preparatory to weighing a piece of meat. He also mentioned a package of confection with an abnormally large space reserved for a toy, reporting that a new and smaller package, with a greatly reduced "toy space," was about to be substituted for the deceptive package as a result of action taken by the Chicago department.

The Chairman. That completes the forenoon program. Has the secretary anything to say?

Mr. R. W. Smith. With your permission, Mr. Chairman, I wish to make a few general announcements at this time.

Word has been received from a number of our members who have found it impossible to attend the Conference this year, although they had originally made plans to be present; these men have written me, specifically asking that their greetings be extended to the meeting. I have received word from Mr. Hammon, of Idaho, that his plans to attend were disrupted by reason of the illness of his wife. The same word has reached me from Mr. Chandler, of Virginia. Mr. Tucker, of California, wrote that press of duties at the last moment made it impossible for him to come. Mr. Waldman, of St. Louis, has written that circumstances have made it impossible for him to be present. All of these gentlemen wish the Conference to know their regret because they cannot meet with us.

On the table near the exit door you will find from day to day mimeographed copies of the papers and committee reports which are presented to the Conference. This service, which was inaugurated last year, seemed to please the Conference, and accordingly we are doing the same thing this year.

I wish to mention specifically that the report of the Committee on Specifications and Tolerances has been available since the meeting opened this morning. I would suggest that the members of the Conference get copies of that report for study so that when the report is presented they will know in advance the recommendations which the Committee proposes to make.

(Additional routine announcements regarding registration, a meeting of the officers of the Conference, and other matters were also made.)

(At this point, at 12:10 p. m., the Conference took a recess until 2:00 p. m.)

SECOND SESSION—AFTERNOON OF TUESDAY, JUNE 3, 1941

(The Conference reassembled at 2:00 p. m., A. J. Jensen, Vice President of the Conference, in the chair.)

THE CHAIRMAN. As you know, Dr. Briggs was absent this forenoon when he was scheduled to deliver his opening presidential address. Dr. Briggs is here this afternoon, and I am sure his is one talk which each and every one of us wants to hear.

ADDRESS BY LYMAN J. BRIGGS, DIRECTOR, NATIONAL BUREAU OF STANDARDS, AND PRESIDENT, NATIONAL CONFERENCE ON WEIGHTS AND MEASURES

Mr. Chairman and gentlemen of the Conference, it is a pleasure, indeed, to welcome you to this, the Thirty-first National Conference on Weights and Measures, and to note the presence of many members who have come long distances despite the pressure of their official duties—duties which have been enhanced in many instances by the exigencies of the defense program. The thorough inspection of weights and measures and the wise administration of weights and measures laws impose an added responsibility on all of us at this time when industry and commerce are doing their utmost to carry the increased burden of the national defense program.

Personnel changes in our Conference membership made it necessary to modify some of the committees as announced at our last meeting. Following the retirement of J. J. Levitt, of Illinois, from weights and measures regulatory work, V. D. Campbell, of Ohio, was appointed to succeed Mr. Levitt on the Conference Committee on Legislation. It will also be recalled that at the last National Conference, it was officially reported that Frank L. Hammon, of Idaho, had retired from weights and measures work. Accordingly, C. E. Tucker, of California, was appointed to replace Mr. Hammon on the Conference Committee on Assistance to the States. I am happy to report that Mr. Hammon has resumed his duties as Director of the Idaho Bureau of Weights and Measures.

With the completion of the program of vehicle-scale testing in the State of Utah, the Bureau brought to a close in 4½ years the "5-year" country-wide program begun in November 1936. This testing program has been carried out without exception in every State not provided at the time with an adequate vehicle-scale testing equipment of its own; and, in addition, a number of jurisdictions were visited which had in operation special testing equipment.

The successful adherence to the original plan of operation has been gratifying, and has been made possible by the splendid cooperation of the State and local officials with whom the Bureau personnel worked. The effectiveness of this cooperation will be appreciated when it is recalled that in numerous instances there were no active

weights and measures organizations, either State or local, to carry on the program. Nevertheless, in these instances cooperation was provided by some existing State organization which realized the importance of the service that the Bureau was prepared to render and accordingly assigned members of its staff to accompany the Bureau unit.

I think it is only just to state, and I am very happy to state, that much of the credit for the successful and uninterrupted progress of the vehicle-scale testing unit from State to State should be given to Messrs. Horton and Crouch, who were selected for this service by Mr. Holbrook and who have operated the unit continuously since it was put into service. Weights and measures officials from many States have voluntarily written to us commending in the highest terms the work of these men. I might add, parenthetically, that Mr. Horton and Mr. Crouch will now be on duty in Washington, where they will help Mr. Smith.

The primary purpose of the vehicle-scale testing program was to stimulate the procurement by the various States of adequate equipment of their own for the uniform testing of wagon and motor-truck scales. The Bureau is gratified that the testing program has been productive of this desired result in many cases and that plans even now are under way in some other jurisdictions for the purchase of special equipment for this purpose.

For the coming year it is not planned to keep the vehicle-scale testing unit in operation except for the testing of scales in the vicinity of Washington that are owned by the Federal Government. The unit will be used, however, in connection with a special study of vehicle scale weighing in which the Bureau master vehicle scale will also be utilized.

Some of the States have been unsuccessful in obtaining equipment for testing vehicle scales despite the urgent need for such equipment, as shown by the vehicle-scale survey. If any of these agencies feel that a more extended survey of vehicle-scale conditions in a particular State would be helpful in securing the necessary equipment, the Bureau will be glad to entertain such a request. These requests should present somewhat detailed plans for the work that is desired, and should be filed during the present calendar year.

The Bureau cannot commit itself at this time to carry out new surveys, but will be glad to give the matter careful consideration. The primary purpose, as before, would be to assist State Governments in obtaining equipment for this work. The Federal Government cannot undertake to relieve a State of its responsibility for the routine testing of vehicle scales, and the Bureau testing program cannot be continued indefinitely. The resurvey would be made for the purpose of directing attention a second time to the actual condition of the vehicle scales in a particular jurisdiction. It is probable that the Bureau will find it necessary to limit the personnel assigned to the unit to one man, thus making it essential that at least one, and probably two, State inspectors should be assigned to duty with the Bureau unit throughout its stay in the State.

As announced in the May issue of the Weights and Measures News Letter, a new plan has been adopted with respect to the sealing of class *A* standards of mass. It has heretofore been the practice to

use a steel die to mark class *A* weights of the larger denominations to show that the weights have been found to conform to class *A* requirements. This procedure had one objectionable feature—there always existed the possibility that the gold plating might be cut through during the stamping operation. To avoid this, negotiations are now under way with manufacturers of class *A* weights regarding a system of identifying symbols and numbers which can be placed on these weights before plating just as the denomination is now stamped on the weight. These identifying characters will be included in the Bureau's certificates, thus definitely associating the certificate with the particular weight to which it refers.

A drastic curtailment of Bureau funds in 1933 made it impossible for the Bureau to continue its practice of sending a representative to State conferences dealing with weights and measures. An item to restore this service was included in the estimates of the Department of Commerce a year ago, and your special committee ably supported the proposal before the Bureau of the Budget. While your committee was given a friendly and attentive reception by the Budget authorities, the item was not included in the Budget recommendation to Congress. Under present circumstances, it seems to me inadvisable for the Bureau to pursue the matter further. Despite this situation, I am happy to state that the Bureau believes it will be possible to renew these old relationships in part. The completion of the current phase of the vehicle-scale work will release travel funds that can be used for this purpose. The Bureau has recognized the handicap of not being in closer touch with the problems of weights and measures as encountered in the field, and is happy now to be able to look forward to a closer association with weights and measures officials.

The Weights and Measures News Letter, inaugurated with your approval at our Conference last year, has met with a very appreciative response. Eight numbers have been issued during the year. The success of this venture rests upon your cooperation. Our Secretary must have the news in order to write the Letter. Some of the States have been very cooperative and helpful in sending in items which have been of great interest to all the members of the Conference. From others we have had little or nothing. Please remember that the problems you encounter and the decisions that you make in your jurisdiction are likewise of interest to the other members of the Conference. I think the News Letter can be made very helpful, and I earnestly request that you send to the Secretary the information needed for that purpose.

Gentlemen, these are strenuous days. I regret very much that demands on my time of which I had no warning at the time this Conference was planned will compel my absence from the Conference during a considerable part of the meeting. For example, a hearing was called on very short notice for this morning, before the Committee on Interstate Commerce of the House of Representatives dealing with a matter of great importance to the Bureau, namely, the support of funds for basic research. Basic research provides a foundation for new industries. As soon as this emergency is over most of the men now engaged in the production of munitions are going to be out of jobs. Consequently, there will have to be a tre-

mendous readjustment of employment, and it is important that we should, so far as possible, work out now some means of providing employment at that critical time. Furthermore, I believe that after this war our country will be confronted with the most intense industrial competition from overseas that we have ever known. Unless we can provide those things that are made abroad as cheaply as our competitors can, our markets and then our employment will suffer. So I am very anxious to see that every possible step is taken toward providing new industries which will manufacture new things that people will want in addition to what they already have. That is the foundation of prosperity, that is what will give our people employment, and this bill which is under consideration deals with that situation.

There will be another meeting of this committee tomorrow, and I also have a meeting of the Structures Committee of the National Advisory Committee for Aeronautics, which also is entrusted with tremendous responsibilities at this critical time in connection with the advancement of our airplane program. So that if I am not with you in person, I am confident that you will accept my statement that I am with you in spirit.

THE CHAIRMAN. We thank you from the bottoms of our hearts, Dr. Briggs, for this splendid address, and you may be assured that we are always with you both in heart and in spirit. We realize the hard task that you have before you. We shall excuse you; but whenever you have even a few minutes to spare, we want you to be with us.

Dr. BRIGGS. Thank you very much.

The CHAIRMAN. Dr. Briggs has spoken about the work done by the Bureau Vehicle-Scale Testing Unit. I think it has been a wonderful education for every State; we are getting more weight conscious and we are realizing the importance of using more test weights. In North Dakota this year we have sent out two new testing units each with six 1,000-pound weights and 1 ton of 50-pound weights and with two men to each truck. We have also commissioned a large unit for calibrating truck tanks and transports. This came about through the work of the National Bureau of Standards; if it had not been for the Bureau many of us in the different States would still be testing large scales with only a few test weights. I want to give credit to Dr. Briggs and to the Bureau for this advancement in the standards of our weights and measures profession.

I shall now yield the chair to Dr. Briggs.

(At this point Lyman J. Briggs, President of the Conference, assumed the chair.)

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

I wish to say at the outset that your Committee has no hesitancy in confessing its disappointment at the results accomplished, which you have already heard in part in Dr. Briggs statement in relation to this activity. We are aware that these are difficult days, and your Com-

mittee was restrained by that fact from adopting some of the courses of action which it had in mind.

To the Thirtieth National Conference on Weights and Measures was presented your Committee report, which savored more of hope than accomplishment.

On June 3, 1940, the day before the convening of the last Conference, your Committee met with Major Jones, of the Bureau of the Budget, setting forth the purposes of and the necessity for this aid. The matter appeared to be well received, and it was our expectation that the Bureau of the Budget would favorably agree on an appropriation item in the 1942 budget covering our proposal.

The National Bureau of Standards included in its 1942 appropriation schedule an item of $11,000 to cover this matter, and this item was sanctioned by the Department of Commerce. The figure set by the Committee was $25,000, but this was not intended to be an arbitrary figure, and the matter of amount was left to the discretion of the Bureau. The amount of $11,000, or even $25,000, certainly is not an exorbitant amount, and the Committee confidently expected that it would be passed by the Bureau of the Budget.

The Committee members wrote to the Bureau of the Budget, presenting arguments in favor of the proposition. However, before final preparation of the budget certain other exigencies arose in relation to national defense, and the amount was deleted from the National Bureau of Standards budget by the Bureau of the Budget. This left as our only avenue of procedure the introduction of this item through the Appropriations Committee or from the floor of the Congress. The Committee weighed the wisdom of this procedure, and finally concluded that the deletion was not a reflection on the merit of the request but was due to a concentration of expenditures on the immediate purposes of national defense, and decided that it would be better to refrain from promoting legislative activity.

In its original concept, this matter of Federal aid was much greater than our proposal, but even this small amount appeared to be out of line with Federal economy. The desire for this extension of cooperative assistance is sincere, and in the opinion of the Committee is not wholly out of line with current needs and national defense, and it is with regret that we report no success.

It is the recommendation of this Committee that this matter be kept alive and advanced at some more opportune time.

This is the final report of your Committee. We wish to thank Dr. Briggs for his time and his assistance in arranging an appointment before the Bureau of the Budget so that we might personally present the proposition which we had in mind.

(Signed) JOHN P. MCBRIDE, *Chairman*,
J. A. MEEK,
ROLLIN E. MEEK,
CHARLES C. READ,
W. P. REED,
C. E. TUCKER,
Committee on Federal Legislation to Provide Assistance for the States in Administration of Weights and Measures Laws.

The CHAIRMAN. Is there any discussion of this report?

Mr. J. G. ROGERS. It seems that this is a matter which should not be dropped. Weights and measures has a very difficult and a very serious

part in the defense program as we see it in New Jersey, and I believe the same condition exists in other States. The whole defense program is based fundamentally on weights and measures; we are not going to build a battleship or a gun or anything else in which the elements of weights and measures do not enter. This makes it all the more surprising that the small amount of $11,000 was not sanctioned. I believe that if we contact our representatives in Congress we may be able to have this included in the next budget. I think the people should do this out of a sense of duty, because this extension work that the Bureau proposes to do is necessary. There is no reason why there should be 12 or 15 States active in weights and measures work, others in which the work is only about 50 percent done, and others where there is nothing done at all.

The CHAIRMAN. The emphasis, of course, is being placed very specifically on defense matters now. However, if it is your desire not to drop this matter, I shall be glad to include the item again in our estimates for next year; I am leaving that matter to you to decide.

I assume that Mr. McBride's report is accepted, and that at the proper time you will consider whether or not you wish to do anything further along this line.

ACTIVITIES OF THE NATIONAL SCALE MEN'S ASSOCIATION

By HARRY MAYER, *President, National Scale Men's Association*

The National Scale Men's Association, which has honored me with its presidency, and which you have honored by inviting its nominal head to address you at this time, has just celebrated its silver anniversary. Our Association includes about 400 men involved in what we are pleased to term "the sweating end of the scale business." We represent those who fill the gap between the distribution system and the public you serve, and we justify our usefulness by holding the brunt of responsibility for the practical operation of weighing machinery at the standards of quality you find acceptable.

In meetings of this kind, and on this kind of subject, speakers are inclined to cite items of prideful historical interest relating to the origin and existence of bodies, and announce in booming tones inspiring hopes for the future. A precept of the scale man's craft is to leave the past to the historians and the future to the prophets. And, if you please, what little I have to say will deal only with current events. That stubbornly narrow attitude may result in dull subjects of conversation or platform orations, but it produces sharp scales, and that, my friends, epitomizes the entire history, and the future of my Association.

A general subject on which speakers become inspirational where representatives of groups of allied interests gather is that of cooperation. Scale men shrug off easily the words of such. They have not come off well in allowing their single-purpose, practical minds to take for granted that vehement declaration of intent denotes sincerity of devotion to following a course. Not much of that has happened between your organization and mine certainly, and for very practical reasons. You have certain things to do and we have others; and except within narrow boundaries where the two fields of activity

overlap, opportunities for practical cooperation do not exist. I will cite one in which realization of the purpose requires your active and sympathetic consideration, and bring to you the assurance of my people that we can and will cooperate toward an achievement of great practical consequence.

The object of this comment is National Bureau of Standards Handbook H22, Specifications, Tolerances, and Regulations for Commercial Weighing and Measuring Devices. That document is one with which all of us, theoretically at least, have plenty to do. Presumably, you use it as a basis of judgment whether scales are good enough to meet public requirements, and we use it to determine whether we have made them good enough. The section on scales covers 33 pages of text and an up-to-date version contains many interpolations approved by your Association since the handbook was published in 1937. The subject matter is resolved into specifications for design, workmanship, and construction, and tolerances on quality of performance.

Scale men do not concern themselves much with the specifications. Generally speaking, the minimum requirements are far below those established nowadays by reputable manufacturers, and the extent to which they cover the field is insufficient to make them an effective tool for a man who needs a scale or who has to build or repair one. The concern of scale men, in general, and on this occasion, mine in particular, is with the requirements for performance, or the tolerances.

To sharply focus ideas, suppose for the moment that comment be restricted to the tolerances applicable to one class of scale only, namely, vehicle scales. That restriction is especially apt, since vehicle scales are now, and, in your proceedings of the past few years, have been scathingly crucified for their shortcomings in performance. My purpose has not to do with the justice of the crucifixion, but rather the manner in which Handbook H22 prepares the cross.

On the tolerances applicable to vehicle scales, the subject matter in Handbook H22 occupies in the aggregate approximately 2½ pages of text, and by actual count 18 sets of circumstances, any one or more of which may affect the application of the rules. Wordy language in quasi-legal style compound the difficulties of comprehension. The simple fact is that the majority of weights and measures men find Handbook H22 as incomprehensible as do scale men. The effect is to stifle the practical utility of a well-intentioned work, and indeed, to make of it a dead letter—as much so as if it had never been written.

This topic has been considered by my Association many times, and by formal resolution the facts have been deplored, the general tone being that we dislike seeing our betters held in contempt, and that in pursuing our business we need something to back up against where a common understanding may be reached by those with whom we have to deal; namely, the general public and the weights and measures authorities. We are not destructive critics. On this occasion, I bring to you our idea of a tolerance on vehicle scales, as expressed in a formal resolution adopted by our 1940 convention, and

> The tolerance on vehicle scales in service shall be 2 pounds per 1,000 pounds of applied load of standard test weights, but not less than the value of the smallest graduation on the indicating element.

ask in the name of the National Scale Men's Association that all the subject matter in Handbook H22 on vehicle-scale tolerances be discarded for the statement just read.

Another phase of tolerance application that has been repeatedly considered by our members is the practical necessity of a tolerance at zero load. This is a matter of secondary importance, perhaps, in other than automatic-indicating scales, to which class this comment may be especially directed. Consider an automatic-indicating scale, a dial scale, with 1,000 graduations on its face. Your tolerance code in Handbook H22—J–1a(2) is the paragraph reference—provides that the tolerance at any load shall be not less than the value of one of the smallest graduations. Thus if the dial face is graduated 1,000 by 1 lb, the tolerance shall not be less than 1 pound for any load. For 10-pound load the tolerance is 1 pound; for 1-pound load the tolerance is 1 pound; indeed, for every graduation on the dial except the one at zero, a graduation leeway on either side is given the position of the indicator. At one mark, and one mark only—the zero graduation—the indicator is required to hit infallibly on the head. Our Association is largely of the opinion that weights and measures officials cannot justifiably flaunt the laws of nature boldly thus, and that paragraph B–2l of the Handbook should be specific on the point of allowable natural variation in the positioning of the indicator of an automatic scale.

Finally, on the subject of Handbook H22, you will be interested to learn that on the occasion of our annual convention in St. Paul last February a committee was authorized to translate Handbook H22 into the language of the scale man's craft. We recognize the well-intentioned merit of this digest of your work, and we are determined that its value shall not be lost to our members. I would not have you miss the significance of that last statement. My duty to our members is to use this opportunity for enlisting your cooperation; but, they would hold me remiss if at the same time I did not say to you that we are resolved to make of Handbook H22 a code of rules useful to us, whether we get cooperation or not.

After using so many words telling you about yourselves, perhaps I should become a bit more specific about us. As stated in my introduction, our Association has just celebrated its silver anniversary. The occasion of the twenty-fifth birthday was used to reorganize the activity of the Association in a manner intended to spread participation in the development of the basic science of the craft more widely among the working membership, or, in homely language, to put the affairs of the Association in the hands of the man behind the nose iron. Consequently, our present structure is something like it never was before, and perhaps in painting the picture we should use a wide brush over the details.

Time is running out, and I shall be brief. Our membership now comprises 14 committees of which 13 are assigned to study and develop certain more or less sharply defined branches of the art. By title, these committees are: Railway and Industrial Track Scales; Highway Vehicle Scales; Built-In, Self-Contained, and Portable Scales; Counter Scales; Grain Scales, Automatic and Hand-Operated; Automatic Indicating and Recording Railway and Industrial Scales; Automatic Indicating and Recording Scales, Other than Large Capac-

ity; Pits and Foundations; Weighing Practices, Scales Used for Transportation and Labor Charges; Weighing Practices, Scales Used for Purposes of Barter; Corrosion Prevention; Construction Materials; Welding and Heat Treatment.

Thus you can see we have bit ourselves off something to chew, so much that even at the robust age of 25 years we shall need sympathetic cooperation in achieving our ends and patient tolerance for our mistakes. For this opportunity to lay facts before you, and for the generous allotment of your valuable time in listening to their authorized voice, I want to express to you the hearty thanks of every member of the National Scale Men's Association.

The CHAIRMAN. You have heard Mr. Mayer's paper and recommendations. Is there any discussion?

The Chair would suggest to Mr. Mayer that he present to the Secretary of the Conference, along with the recommendations made in his paper, any other recommendations from his Association; I am sure they will be very sympathetically considered and will be referred to the proper committee for consideration.

TESTING LIQUEFIED PETROLEUM GAS METER SYSTEMS BY THE GRAVIMETRIC METHOD

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

Last year we discussed the measurement of liquefied petroleum gases under several headings: Physical properties; instruments for commercial measurement; measurement problems of the distribution industry; and contemplated methods of testing meter systems for accuracy of measurement delivered to the buyer.

At that time, I described two proposed types of testing units for use in the field. These must be portable so that they can be readily moved from place to place, and the meters must be tested as used so as to make sure that the entire installation is correct. This creates an entirely different problem from that of a laboratory method where the testing unit is stationary, the downward displacement of water is used to keep the liquefied gas under pressure, and the meter, only, is tested for accuracy. It is obvious that a meter, no matter how accurate it may be, cannot deliver full measure if installed in a faulty system that allows vapor or air to pass through.

One contemplated testing unit was of the volumetric type, utilizing a tank, shaped something like a mushroom, with a large chamber below for the liquid, a connecting column and a gage glass between, and an accumulator chamber above for the vapor. The other proposed unit made use of the gravimetric or weight method.

We had in mind building one outfit that would combine both methods, but found that would not be practical. The weight and bulk of the volumetric unit was too great for transportation and use on a portable scale of the required sensitivity. Therefore, we built a gravimetric outfit, as there appear to be many reasons why this offers more accuracy, with a smaller number of variables to be considered, than the volumetric type. The latter might seem to be more direct at first consideration, until such problems arise as: Vaporization taking place in the unit under certain conditions of pressures and tem-

peratures; condensation under other varying conditions; changes in the capacity of the tank under different pressures; and differences in level of the liquid in the tank and in the column gage glass on account of the effect of outside temperature on the column glass.

However, we are planning to build an outfit of the volumetric type, which will have an insulated, jacketed, reflex gage glass. We will then be able to make comparative tests at the same meter installations, and arrive at definite conclusions regarding the relative merits of these two methods.

By following the illustrations, you will get a clear understanding of our outfit and its operation. Figure 1 shows the method of mounting on a scale and trailer. The scale is set in the floor of the trailer. It is provided with a drop lever which removes all weight from the pivots when not in actual use. It has a capacity of 1,000 pounds, a 50-pound beam with 4-ounce graduations, and is sensitive enough to show 1 ounce under a full-capacity load through the use of an arrow indicator for exact balance.

The tank is constructed of heavy gage steel, the heads being of ¼-inch thickness and the shell $\frac{5}{16}$ inch, to withstand a pressure of 250 pounds. This is strong enough to provide for the testing of propane, a necessary provision, as there is every reason to believe that most of the available butane may be used in the near future in the manufacture of aviation gasoline for the Government, and that propane will be sold in the commercial stations. A thermometer well is set in the fill line for taking the operating temperature of the liquid. This thermometer well is made of brass and is filled with kerosene for the purpose of better contact with the thermometer.

An electric motor and pump are used to return the liquid to storage after the test is made. The motor is explosion-proof, is wired for 220 volts, and can be operated at 110 volts through the use of an adapter switch. The pump is especially made for handling liquefied gases and has a capacity of 50 to 60 gallons per minute.

All fittings, piping, elbows, etc., are of extra-heavy malleable iron to withstand a 300-pound pressure. The brass valves are of special construction, pressure type. The hose connections are of synthetic rubber, with a wire woven in which accomplishes the purpose of a grounded connection, and made for use with liquefied gases.

Figure 2 shows the specific gravity kit in use, with the sampling line connected to the operating fill line. The arrow indicator for balancing the scale is also visible.

Figure 3 shows the pressure gage, vapor-return connection, thermometer, and pressure-relief, or safety, valve. There is also a 10-percent valve which does not show above the rim.

One end of the specific-gravity kit is illustrated in figure 4. The vacuum flask in the foreground, used for testing the samples for specific gravity, contains a stirring rod, a low-temperature thermometer, and a special hydrometer. Its operation will be described later.

We are now ready to make a test. In order to secure uniform conditions, 50 gallons are run into the test tank, and then returned to storage. This serves the purpose of charging it with vapor and equalizing the temperature.

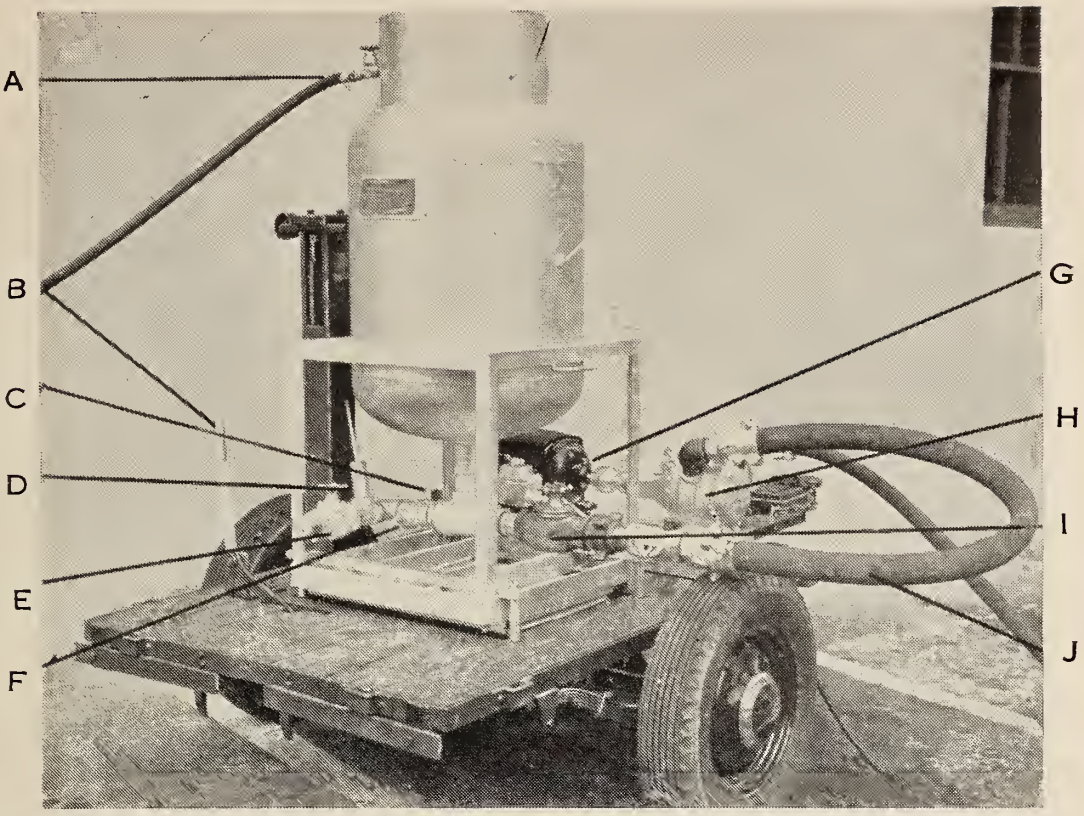


FIGURE 1.— *Testing outfit, showing method of mounting on scale and trailer.*

A, vapor return line; *B*, scale drop lever; *C*, sample valve; *D*, thermometer and well; *E*, fill connection and valve; *F*, bleeder valve; *G*, electric motor; *H*, pump; *I*, discharge valve; *J*, pump suction line.

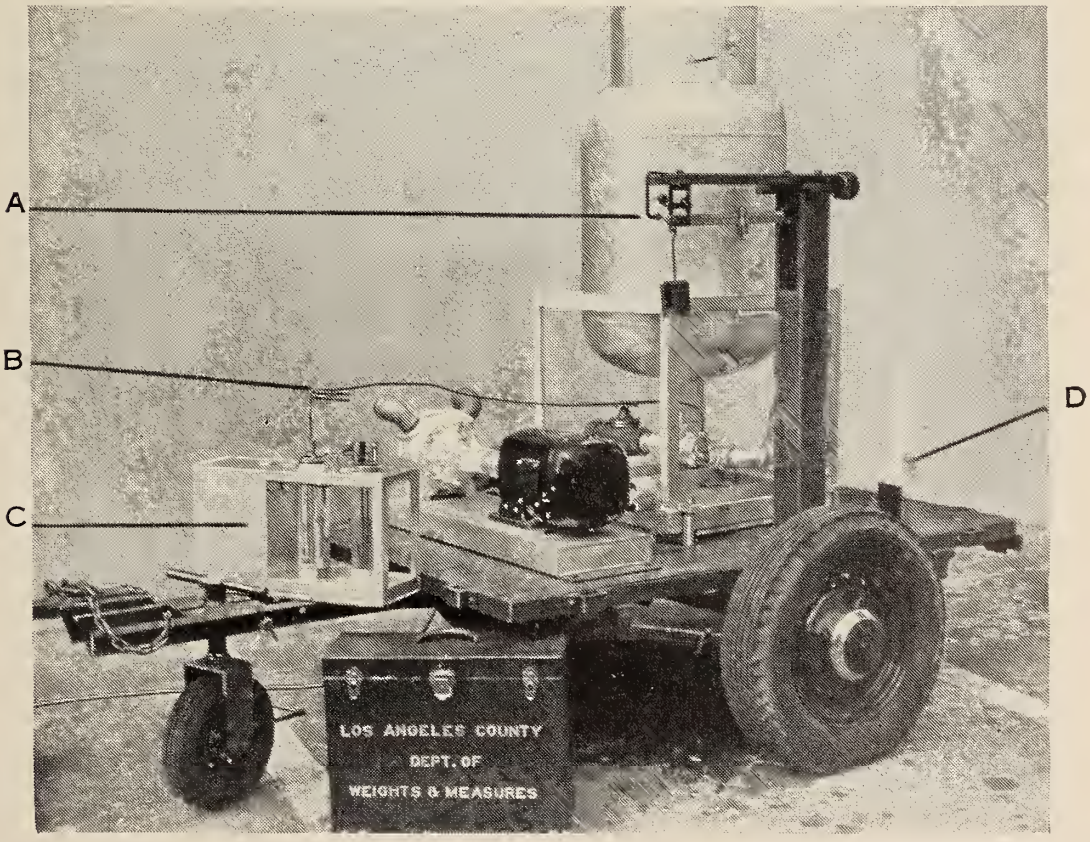


FIGURE 2.— *Testing outfit, showing connections, specific gravity kit, and electric motor and pump.*

A, arrow indicator for scale balance; *B*, sampling line; *C*, specific gravity kit; *D*, scale drop lever.

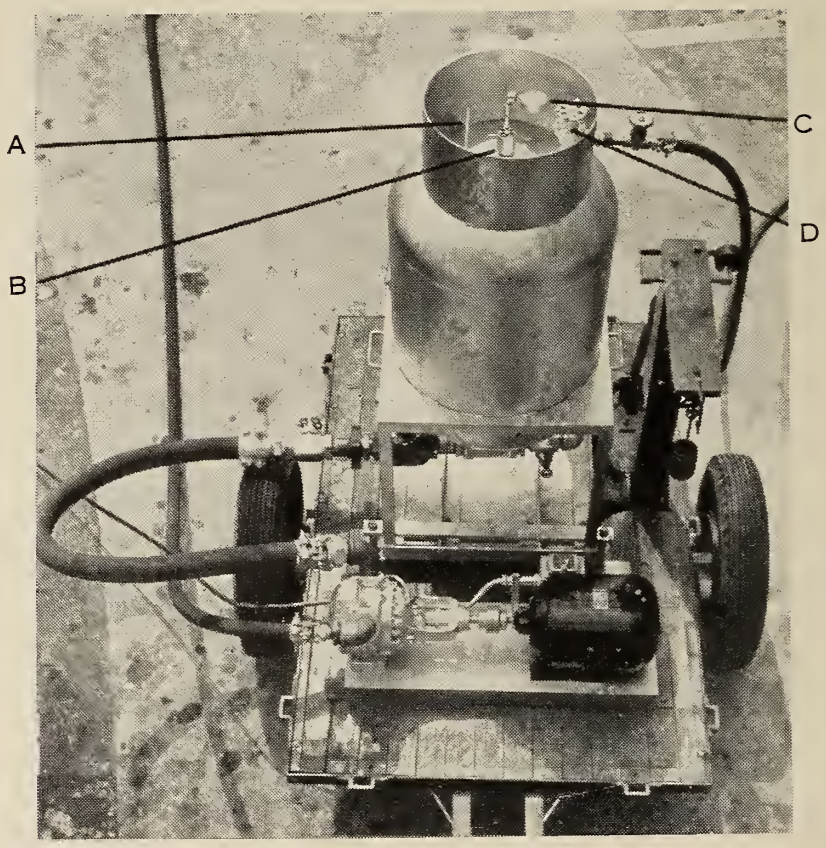


FIGURE 3.—*Testing outfit, overhead view, showing pressure gage, thermometer, and connection for vapor return line.*

A, thermometer; *B*, pressure relief or safety valve; *C*, pressure gage; *D*, vapor return connection.

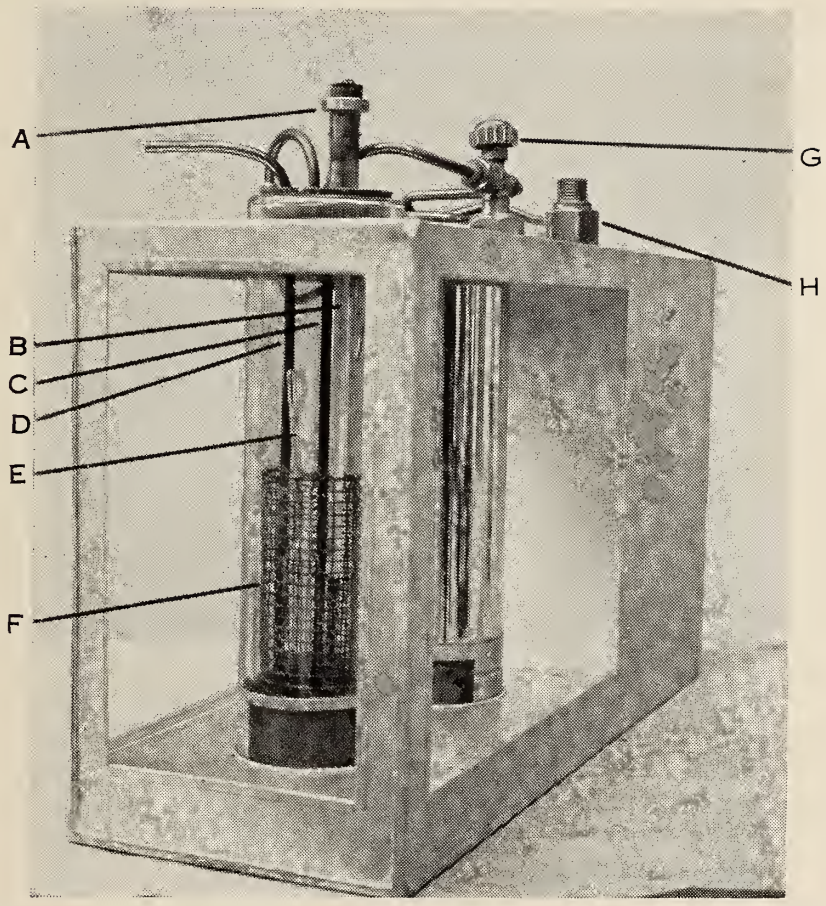


FIGURE 4.—*Specific-gravity kit, showing wire cage in thermos for thermometer and hydrometer.*

A, stirring rod; *B*, low-temperature thermometer; *C*, fill pipe; *D*, exhaust pipe; *E*, hydrometer; *F*, wire cage; *G*, fill control valve; *H*, connection to sampling line.

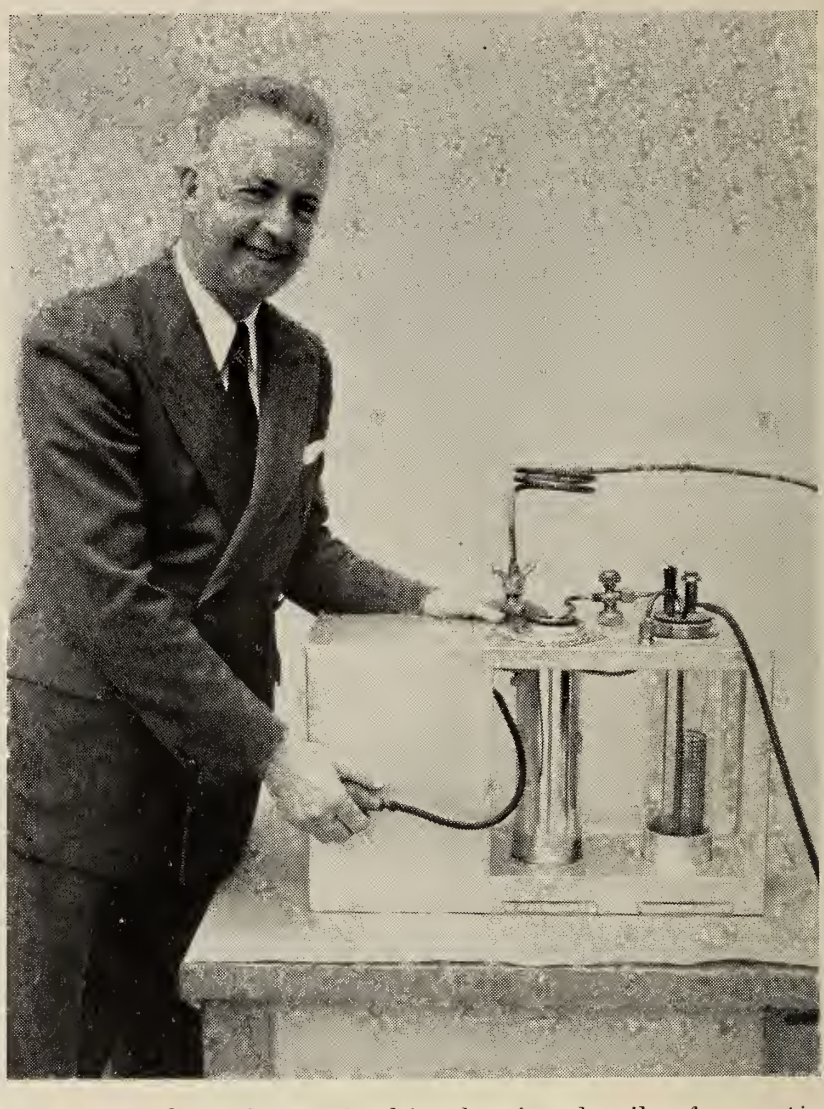


FIGURE 5.—*Specific-gravity kit, showing details of operation.*

FIGURE 6.—*Testing liquefied petroleum-gas meter installations in the field.*

The hose connections are disconnected and a tare weight made of the tank. It is again connected to the meter which is operated until a delivery of 50 gallons is indicated. The operating temperature is taken at the half-way mark of 25 gallons. When the run is completed, the hoses are disconnected and the gross weight taken. We are then able to compute the net weight of the delivery.

The sampling line is attached to the specific gravity kit. Figure 5 shows this device. The chamber on the left contains a U-tube filled with calcium chloride. When air is forced through this, it is completely dried and there is eliminated any moisture which might otherwise form on the thermometer or hydrometer in the sample flask and affect their accuracy. This is an improvement on the original kit, which was described last year. The silvered vacuum flask in the center of the kit contains a long coil of soft copper tubing. The remaining space in this flask is packed with CO_2 or "dry ice."

The sample flask, shown on the right, is precooled by allowing it to be filled with some of the liquefied gas which first flows slowly through the coils in the silvered flask. The stopper in the top of the flask is left open during this process. The stopper is then closed, the rubber tube from the sample flask is placed in the silvered cooling flask and, by pressing the bulb, dry air forces the liquid back to the other flask, where it forms a cooling bath with the "dry ice." This makes a better contact with the copper tubing and cools the test sample to a temperature of from 75° to 80° F below zero, where it is stable at atmospheric pressure.

The test sample is now allowed to slowly pass through the coils and into the sample flask which is filled to the immersion mark on the thermometer. A stirring rod insures even distribution of temperature. Several successive readings of the hydrometer and thermometer are made. By means of prepared charts, these readings are converted to the weight per gallon of the liquid at the operating temperature of the 50-gallon test run.

We have made comparative tests of the accuracy of this method of obtaining specific gravities with the latest picnometer methods used in the laboratories of the oil companies, and we find that the results obtained check in every particular. Now that we have the weight of a gallon of the liquefied gas as it was measured through the meter, and the net weight of the delivery, a simple division gives us the actual amount delivered.

Figure 6 shows the outfit being operated in the field. It is easy to operate and positive in results, so do not allow the length of this discourse to mislead you into thinking that there is anything difficult about it. In appearance the liquefied petroleum gas-meter system looks just like one of our ordinary meter systems for gasoline, but it has one feature which most gasoline systems do not have, namely, a "dead-man control," so that if anything should happen to the operator the pressure on the valve immediately closes it and shuts off the flow of the liquefied gas. The illustration shows one of the inspectors with the gravity kit and the other operating the line from the meter system.

You will find that a great many of the dispensing systems pump against pressure, without a vapor return line, in making deliveries to

fuel tanks. Others still retain vapor returns. Our tests must be made in accord with the normal operation of each individual system. If a vapor return line is used, the system should be tested with that connection made to the outfit and the meter set so that a full delivery will remain in the tank at the end of the run.

This brings up another problem when a system operates part of the time against pressure and part of the time with a vapor return. In this case, we believe that the meter should be set to deliver when pumping against pressure, and that an allowance should be made to the purchaser when a vapor return is used, to compensate for the amount which flows back to the storage tank in the form of vapor.

A number of formulas have been worked out for computing this amount. Two of them are appended to this paper for further consideration. They are, of necessity, somewhat complicated and require quite an amount of figuring.

In drawing up specifications and regulations for measuring devices used in the purchase or sale of liquefied petroleum gases, care must be taken that they do not conflict with safety codes issued by industrial accident commissions. Much of our present code for liquid-measuring devices can be adopted, or modified, for this purpose. Sections will have to be added to cover items which are peculiar to this type of equipment and its use, such as dip pipes, column-gage glasses, and vapor-return credit. On account of the nature of the commodity handled, I believe that it will be necessary to provide somewhat more liberal tolerances than are specified under our present code.

The use of liquefied petroleum gases is rapidly expanding. Service stations are installing and using outfits to meter this product from storage tanks into the fuel tanks of passenger busses, transport trucks, and other automotive equipment. California production last year was over 89 million gallons.

Extended tests are being conducted and, by the time of the next National Conference, we should have enough data available to intelligently draw up for your consideration a complete code of specifications and tolerances.

SECRETARY'S NOTE.—As an appendix to Mr. Fuller's paper, the following data were submitted:

References:

Bulletin TS–392, *Tentative Specifications and Tentative Standard Methods of Test for Liquefied Petroleum Gases.* Published by the California Natural Gas Association, 510 West 6th Street, Los Angeles.

Handbook of Butane-Propane Gases. Published by Western Gas, (Western Business Papers, Inc.) 1709 West 8th Street, Los Angeles.

Hydrometers:

1. Specific gravity scale 0.580 to 0.600 (60° F/60° F) (for propane).
2. Specific gravity scale 0.600 to 0.620 (60° F/60° F) (winter mixtures).
3. Specific gravity scale 0.620 to 0.640 (60° F/60° F) (summer mixtures, Butane).

Scale length: 2 to 3 inches.
Diameter of Stem: 3/16 to 1/4 inch, O. D.
Hydrometer length: 6 to 8 inches.

Thermometer:

Temperature range	0° F to −75° F.
Scale divisions	1° F.
Scale length	2½ to 3½ inches.
Immersion	4½ inches.

Vapor Return Credit:

Proposed formulas for computing amount to be allowed purchaser when a vapor return line is used without the meter being set to compensate for same:

Formula 1:

$$\frac{\text{Gallons delivered to vehicle tank} \times (\text{vehicle-tank pressure} + 14.7)}{7.0 \times (\text{vehicle-tank temperature} + 460)} = \text{gallons.}$$

Formula 2:

$$\frac{\text{Gallons delivered to vehicle tank} \times (P_1 + 14.7)}{7.0 \times (T_1 + 460)} + \frac{\text{outage} \times (P_1 + 14.7)}{7.0 \times (T_1 + 460)} - \frac{\text{outage} \times (P_2 + 14.7)}{7.0 \times (T_2 + 460)} = \text{gallons.}$$

P_1=Pressure on vehicle tank at start of loading,
P_2=Pressure on vehicle tank at finish of loading,
T_1=Temperature of vapor in vehicle tank at start of loading,
T_2=Temperature of vapor in vehicle tank at finish of loading,
Outage=Volume of that portion of vehicle tank above the liquid, after loading, expressed in gallons,
14.7=Atmospheric pressure (sea level),
460=Number of degrees Fahrenheit from "absolute zero" to 0° F.

DISCUSSION OF FOREGOING PAPER

The Chairman. Mr. Fuller, when transporting the equipment is the load removed from the knife-edges of the scale?

Mr. Fuller. By means of the drop lever, all weight is removed from the knife-edges of the scale during transportation of the equipment.

Mr. Witt. After the liquefied gas is dispensed from the meter system into the supply tank of a truck, must this be kept under pressure, and are special tanks required?

Mr. Fuller. These tanks must be of very heavy construction so that they will withstand the pressure necessary to keep the liquid from vaporizing. About 250 pounds pressure is required. I may add that in California, liquefied petroleum gas is used to a tremendous extent on freight transports and passenger busses and is being used on some passenger cars. One man is even using liquefied petroleum gas as fuel for an airplane and is getting splendid results.

The Chairman. The use in the East is largely as fuel for heat, is it not?

Mr. Fuller. I believe that is so at the present time, but I think, from what I hear about the numerous advantages of using it as motor fuel, that the use of liquefied petroleum gas will undoubtedly spread, so that many officials will be called upon to test liquefied-gas dispensing systems just as we are in California. Of course, if one tries to test such a system with an ordinary 5-gallon field standard, the hose many be inserted in the standard and the valve opened, but not a drop of liquid will reach the bottom of the bucket.

AIR ELIMINATION FOR LARGE-CAPACITY METERS

By C. P. Griffith, *Vice President in Charge of Engineering, S. F. Bowser & Co., (Inc.)*

The problems involved in air eliminators for use with large-capacity meters vary a great deal for different types of installations, and I have concluded that consideration of types of installations might be

the most helpful thing we could do in the short time we have for this subject today.

I first want to offer a few general comments in regard to the subject, and then we will have some lantern slides showing some equipment and some installations and endeavor to point out the problems involved. I realize that this presentation will be elementary to some weights and measures officials and to meter men present, but it is my hope that I can make it helpful to those weights and measures men who have not had an opportunity to become familiar with the problems involved.

This subject has been given very careful consideration on the part of meter manufacturers for many years. I remember, away back in 1913, on the first day of my employment with the company with which I am still associated, the chief engineer of the company invited me to make a trip through the factory with him, and one piece of equipment that was in production in one department was new to me. I asked about it and was told that it was an air eliminator for use with meters in the petroleum industry. This was my first contact with air eliminators, and I mention it only to show that these devices are as old as meters themselves. The air eliminators are to a very large extent manufactured by the meter manufacturers, and this is as it should be, as it tends to make the meter manufacturers completely responsible for the satisfactory operation of a particular installation.

It is, of course, well recognized that modern meters will measure and indicate any air or gas passing through them exactly the same as they do for the liquid passing through them, and in view of this, suitable air eliminators must be provided to ensure accurate meter performance. The most difficult problems for air eliminators are the installations that include power pumps, and for this reason I will confine my remarks to installations that include pumps.

The development of air eliminators has always been an interesting research problem. In our own laboratory we have made models of glass, or if this is impractical because of the size of the unit, we use steel containers having a number of glass windows so that we may observe exactly what is taking place inside the unit while under actual operation. We have found in this manner that with some air eliminators we did actually separate the air from the liquid, but due to a turbulent flow inside the unit, this air was again mixed with the liquid and passed on out with the liquid and on through the meter. Constructing the units of glass enables us to correct such conditions.

The size of an air eliminator for a particular installation is in some cases all out of proportion to the size of the meter it is to protect. In other words, you may find it necessary to provide a 6- or 8-inch air eliminator to protect a small meter because of the particular installation conditions. This situation makes it necessary to carefully analyze each installation to determine exactly what is required to ensure accurate meter operation.

Meter manufacturers have found it necessary to manufacture a number of types of air eliminators, as well as a number of sizes of each type, in order to handle the great variety of installation conditions that are encountered. There are, of course, many installations that will operate highly satisfactorily with an air eliminator of the most simple type,

but there are others requiring a much more elaborate device and one much more expensive. This brings in the question of economics, so about the only practical plan to follow is to analyze the particular installation and furnish the equipment that will ensure accurate meter performance.

Meter manufacturers recognize the necessity of adequate air eliminators, as satisfactory meter performance on many installations is impossible without the proper air eliminator. We have learned the hard way that air-eliminator performance is as important as the meters themselves in securing accurate meter operation.

Notwithstanding the progress that has been made in this direction, if we get a report of inaccurate meter performance today, the first thing we do is to carefully analyze the installation from the standpoint of air elimination, and many times faulty air eliminators are found to be responsible for the trouble. I don't want to leave the impression that the problems are insurmountable by any means, but I do want to emphasize the fact that different installations present a variety of problems.

The air that must be separated from the liquid is in some cases very intimately mixed with the liquid and this entrained air is difficult to separate from the liquid. We have also the problem of free air to contend with. This is easier to handle than entrained air, but with some types of installations, some of which will be illustrated later, the large volume of free air becomes exceedingly difficult to handle.

Figure 7 is an air eliminator in about its most simple form. It consists of a pressure receptacle having inlet and outlet connections; a simple baffle is interposed between the inlet and outlet. Air is separated in this particular air eliminator by gravity only. The size of the receptacle must be such as to slow up the velocity of the liquid to such an extent that the air has a chance to separate from the liquid. The simple baffle shown here is omitted in other types of air eliminators and much more elaborate baffles substituted for it. In some cases the interior construction is so arranged that a centrifugal motion of the liquid is set up as an aid to gravity separation. The internal construction of these units is highly important from the standpoint of air separation.

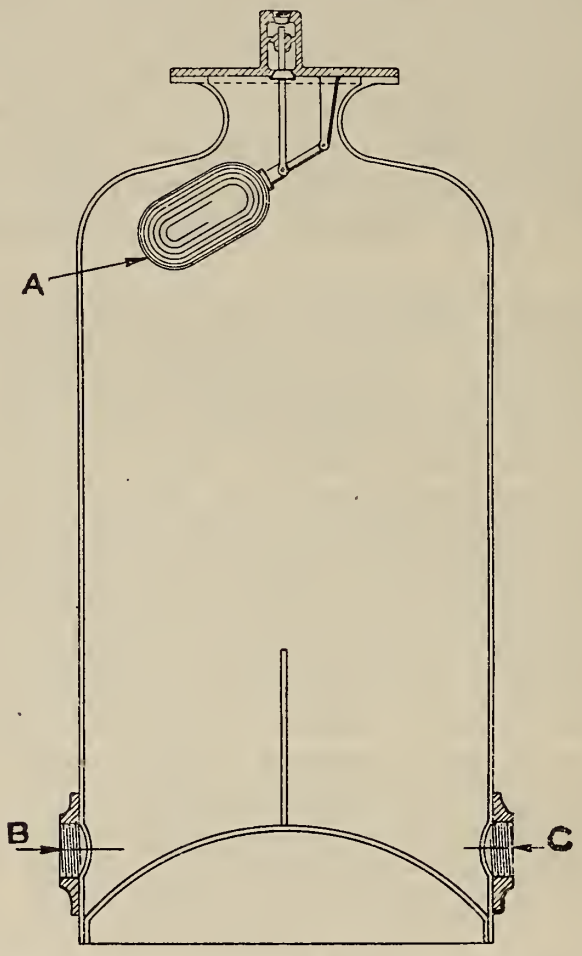
The air, after being separated from the liquid, rises to the top of the receptacle, and all air eliminators are provided with some means of exhausting this accumulated air. On this drawing we show a simple float-operated vent valve; in fact, most air eliminators employ some type of float-operated air-vent valve. The design of this valve is important. It must be of ample size to exhaust all the air that the pump, or pumps, will deliver when the source of liquid supply is exhausted, and do so without creating any pressure at the outlet of this receptacle.

It is obvious that pressure in these receptacles must be reduced to zero gage pressure when only air is entering; if not, the meter will continue to run and air will then pass through the meter, resulting in a false indication of delivery.

Another important feature in the design of such float-operated vent valves is the pressure at which they will open. This drawing shows a lever of the first class. You probably will not find an air eliminator on the market having the simple construction shown. These float

levers are compounded, usually so that a float, while weighing only a few ounces, will open a valve poppet of about 1-inch diameter under a pressure of from 50 to 75 pounds per square inch in the receptacle.

The disposition of a vent line from the air exhaust of these air eliminators is a matter of some interest to weights and measures officials. Perhaps the best solution of this problem is to run this vent line back to the top of the tank that is the source of supply; however, in many cases this is impractical because of the distance involved. On some installations the vent line is connected to the meter discharge line. This is satisfactory only if the discharge line is very short, such as in



A, Float-operated vent valve; *B*, outlet; *C*, inlet.

FIGURE 7.—Simple form of air eliminator.

the case of a gravity meter on a truck tank. It is obvious that with a long meter discharge line having this vent line connected into it, accurate meter operation is impossible. I saw installations some years ago having this vent line connected into the pump suction line. This is definitely bad practice and should not be tolerated. When this is done you cannot exhaust the air and, in fact, you have no air eliminator at all. In many installations this vent line exhausts to the atmosphere adjacent to the air eliminator. This is entirely satisfactory from a weights and measures standpoint, but it must be recognized as a fire hazard.

Figure 8 illustrates another type of air-vent valve which I will call a "power-operated vent valve." The float as shown operates a small pilot vent valve. The air exhausted through this pilot valve acts on a plunger which opens the large poppet. This construction makes it

possible to open the large poppet with a small, light float. Power-operated vent valves of this, or a modified design, will be encountered on large air eliminators in some cases.

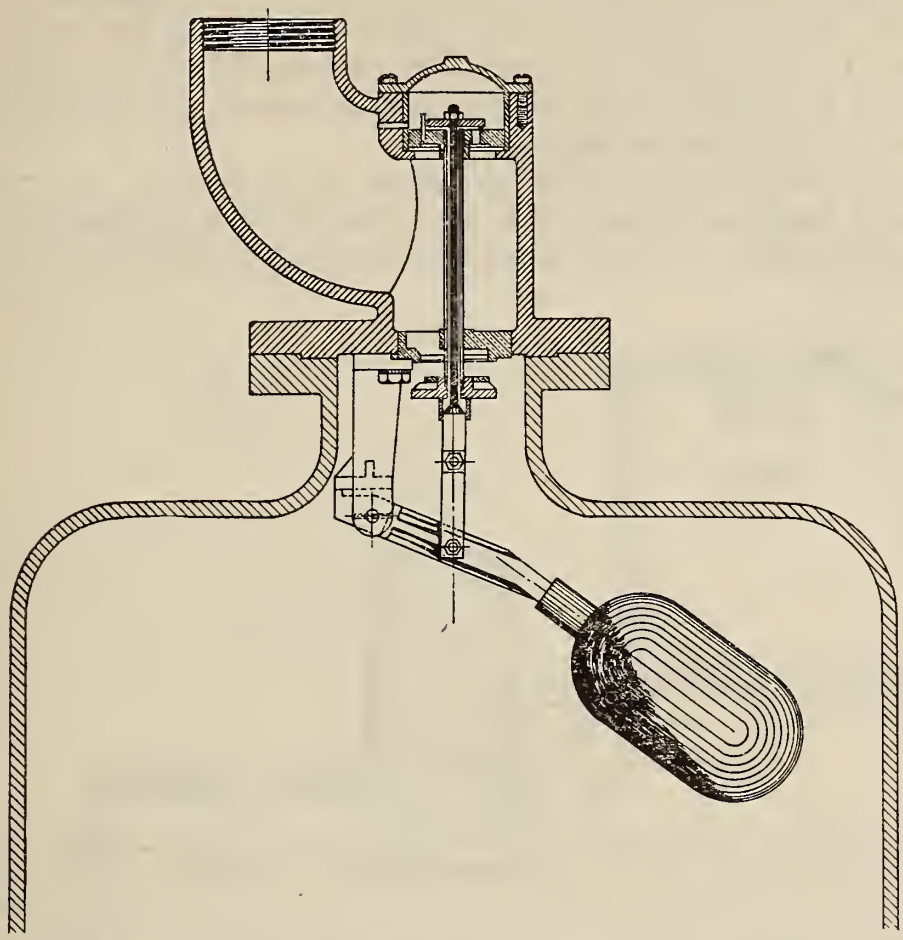


FIGURE 8.—*"Power-operated" vent valve on air eliminator.*

In this connection, I can say without fear of contradiction that inadequate air eliminators are usually found to be inadequate from the standpoint of air separation and not because of their inability to exhaust the air that has been separated from the liquid.

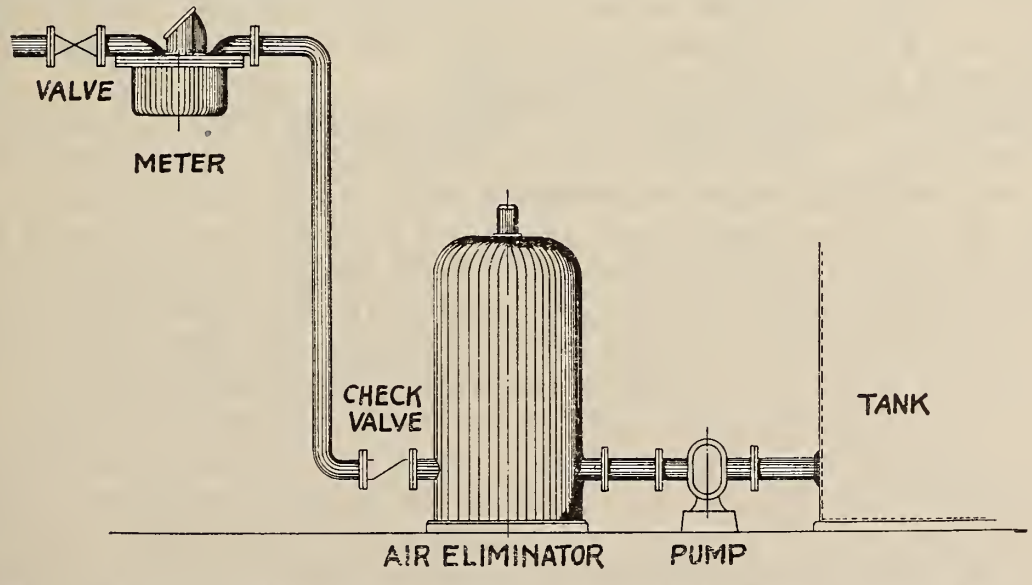


FIGURE 9.—*Pump-operated meter installation—supply from above-ground tank.*

Figure 9 illustrates perhaps the most simple of pump-operated meter installations. It will be observed that the pump suction comes

from an above-ground tank, and there is no air whatever to contend with until the contents of the tank are exhausted. In such installations, the air eliminator, and in fact all air eliminators, should, of course, stop the meter when the liquid supply is exhausted, and when the supply is replenished the next delivery through the meter must be accurate. I have shown this installation because of its simplicity, and any device worthy of the name air eliminator will handle such installation entirely satisfactorily.

The installation illustrated in figure 10 is similar to the previous one, except that the pump suction comes from an underground tank. Unless you happen to have a leak in the suction line you have no air

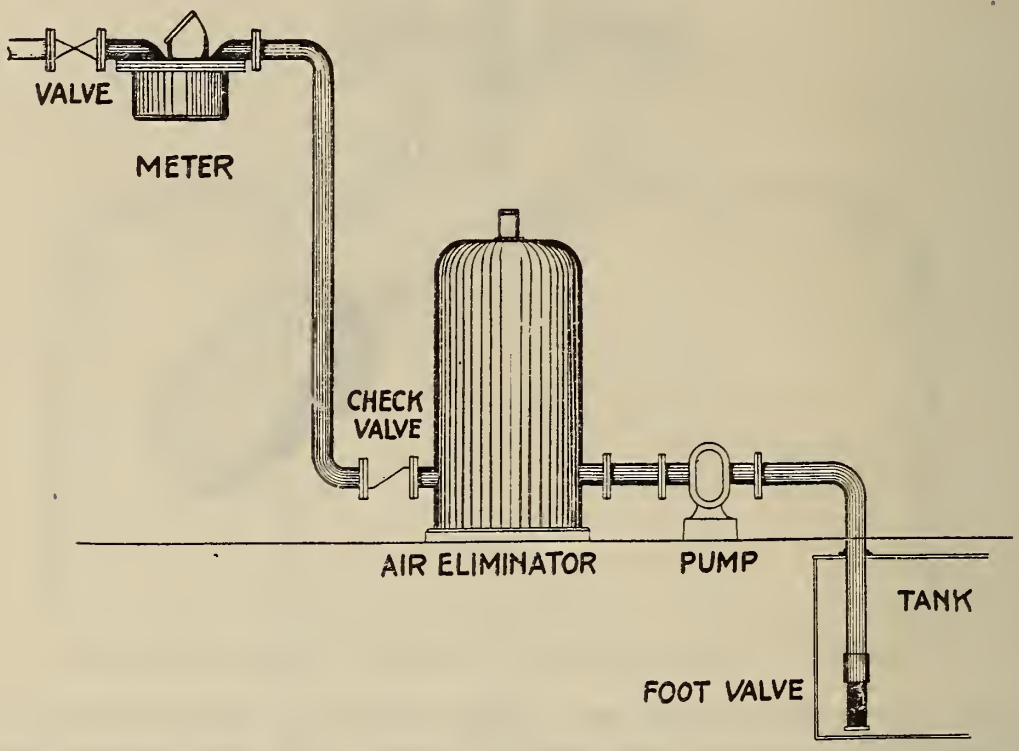


FIGURE 10.—*Pump-operated meter installation—supply from underground tank.*

to contend with until the liquid supply is exhausted, and at that time you have about the same situation to contend with as is illustrated in figure 9. This installation is simple, and the simple types of air eliminators will handle it satisfactorily.

Figure 11 is a plan view of an interesting and difficult water-terminal installation. You will not encounter many installations of this type, but we do have them to contend with. Only one pipe line is provided for any one liquid, and this pipe line will vary from 4 to 12 inches in size. Gasoline is received from barges and stored in large above-ground storage tanks. Sometimes the storage tanks are elevated and gasoline may go out of this bulk plant by gravity or may be pumped out when the supply in the storage tanks becomes low.

It will be noted that meters are used for tank-truck loading only. The important and difficult thing about this installation from the standpoint of air elimination is the situation that develops if loading a truck tank while a barge is unloading, or immediately thereafter. The barge pumps may fill this whole pipe line with air, and only a first-class air eliminator will protect the meters on this type of installation. It will be observed that the potential air-elimination problem

here is altogether different and much more complex than that of the rather simple installations shown in the previous illustrations.

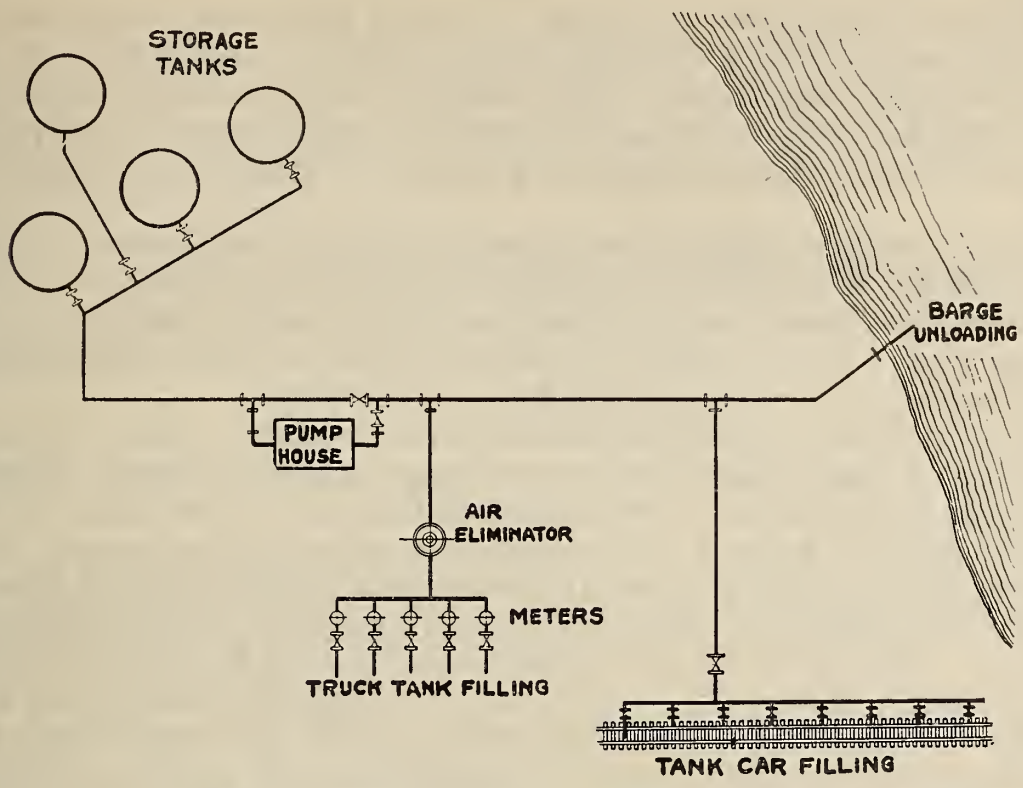


FIGURE 11.—*Water-terminal meter installation.*

The final illustration (fig. 12) represents an actual installation that was difficult to handle. The drawing shows in elevation a bulk terminal consisting of facilities for filling tank cars and truck tanks. The tank-car filling arrangement consisted of an 8-inch pipe, about 1,000 feet long, elevated above the top of the tank cars with a number of take-

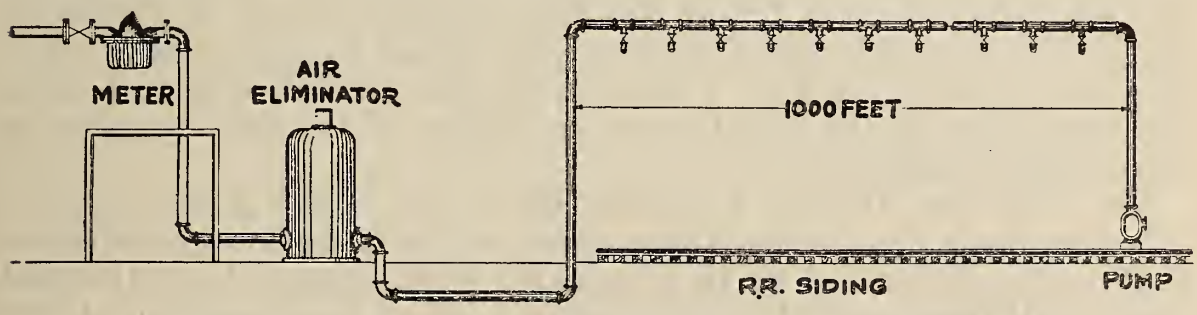


FIGURE 12.—*Tank-car and truck-tank meter installation.*

off valves so that a number of tank cars could be spotted at one time. At the end of the 8-inch line, opposite the pumps, a 3-inch line dropped below ground level and then ran along about 50 feet and into an air eliminator and meter for filling truck tanks.

The filled tank cars were taken out of this plant at night and replaced with empty tank cars that were to be filled the next day. This 8-inch pipe when filled with gasoline was recognized as a definite fire hazard when switching tank cars in and out, and, to avoid this hazard, it was the regular practice to drain this 8-inch pipe every night. If they filled tank cars the next morning before they filled truck tanks, the air condition would not be particularly difficult, but if they filled truck tanks first, as they frequently did, the air-eliminator problem

was a very complex one. When filling a truck tank the first thing in the morning a tremendous amount of air must be exhausted from this system.

I have no hesitation in saying that this particular installation at the time represented a challenge to us, and we used it as a proving ground for air eliminators. The problem was eventually solved, and the particular design that came out of this experience is incorporated as one of our standard types and is now available in a number of sizes.

I have now shown some illustrations of simple installations and some more that are very difficult to handle. We, of course, have to contend with these and many others which we will make no attempt to show at this time. I trust that I have been able to show that different installations present entirely different problems.

In conclusion, I would like to offer one comment. This Conference has set up a reasonable tolerance on large-capacity meters. I believe the design of meters has now progressed to a point where this tolerance could be reduced as far as the meters themselves are concerned. However, we have no tolerance requirements on air eliminators themselves. It would be difficult, if not impractical, to attempt to write such specifications. As the situation stands today, the allowable tolerance on large-capacity meters not only includes errors in the meters, but it also reflects air-eliminator errors, and when we take into consideration the complexities of the many types of installations we must conclude that present tolerances on large-capacity meters should not be reduced, for the present at least.

DISCUSSION OF FOREGOING PAPER

Mr. Boyle. In our examination of meters we have found that in 50 percent of the cases the air eliminator rather than the meter was the cause of the inaccuracy in the delivery. Also, in the examination of air chambers we have found the floats either entirely collapsed or partially filled with water, which caused them to sink instead of to float on top of the liquid. I wish to ask Mr. Griffith if any thought has been given to the metal or to the design of the float in order to correct such conditions.

Mr. Griffith. In any air eliminators with which I am familiar defective floats should not affect meter accuracy, because a defective float on the air vent of an air eliminator would simply leave the vent open at all times, and the air eliminator would be exhausting all the air.

Mr. Baucom. I think the crux of Mr. Griffith's paper is that air eliminators for all meter systems should be able to eliminate the maximum air-pumping capacity of the pumps, and I think that such a requirement should be incorporated in our specifications to make it unnecessary for the meter to take care of eliminator errors or imperfections. In that way we could reduce the tolerance for large-capacity meters.

Mr. Griffith. I do not think the problem is as simple as that. I know that in the last two installations which I illustrated the problem was not air pumped by the pumping units. Particularly in the last installation it was the operating practice to drain the big meter every night, and that produced a large amount of air to be taken care

of when the system was started the next morning. Also in the other installation, where barges were being unloaded, the problem was stripping the barge tanks; the barge pump fills the line with air, and thus there is a tremendous amount of air to be taken care of at the next operation. It seems to me that it is a rather simple matter to make an air eliminator to take care of air as fast as pumps will pump air, but the real problem arises when we get a condition where we have an accumulation of air.

THE CHAIRMAN. We shall be glad, Mr. Griffith, to have your suggestions regarding modifications which you think are desirable in our regulations, and I am sure that Mr. Smith will be glad to transmit these to the proper committee for consideration.

VEHICLE-TANK PIPING DESIGN

By CHARLES H. ENGELHARD, *Superintendent of Weights and Measures, County of Middlesex, New Jersey*

Things are not always what they seem. All too often we come across a beautifully streamlined oil truck, attractively painted and with many chromium handrails and gadgets; yet when we come to calibrate the capacity of the compartments and test the meter, we find that in more ways than one it is a "device which lends itself to the perpetration of fraud."

Shall we say that this is definitely due to the intent of the owner to get the better of the customer? I would say that in most cases the man who buys such a truck is just starting in the fuel-oil business; he has seen someone else make money at it and wants some for himself. He knows little or nothing about the business and the vehicle-tank salesman sells him a bill of goods.

We have seen competitive vehicle-tank salesmen get their contract signed by telling the prospect that instead of a 6-valve job he will furnish an 8-, 10-, or 12-valve job for the same money. The purchaser assumes he is to get more for his money from this salesman, and when it arrives, he has bought himself a "device which lends itself to the perpetration of fraud", a device which the alert weights and measures official sees through and condemns, a beautiful-looking job that can't be used in trade.

The novice is told that he will be furnished not only a tank truck piped and valved so that he can deliver into the customer's storage tank, but one which will permit him to suck out of it any dirty oil as well. But how many fuel-oil dealers have occasion to clean out a customer's tank? Would one-half of one percent cover the requirements? And how many dealers would want to contaminate the entire system with one client's dirty oil or muck? Some dealers say that this "service" is part of their stock in trade; that they clean out the customer's tank before the heating season starts. Fine! I'm in favor of it. But I don't want someone else's muck pumped into my storage tank. Besides, no dealer who values his equipment will allow this muck to get into the normal system for oil delivery.

But that's what the oil man bought, and what happens? Modern valves are well made. When closed, they do not permit liquids to pass through them. But foreign matter can and does get under the seat of a disk valve; a gate valve may be scored on either disk or face

or both by hard foreign matter. And much depends on the valve, especially a by-pass valve. Once the pump has delivered oil through the meter, that oil belongs to the customer. The customer is entitled to get every cubic inch of liquid that has been metered. It's his. He has paid for it—or will. There must be no means of permitting any part of the oil once metered to go any place but to the customer's storage tank. No intent to defraud may enter into the transaction, and yet the customer can be shorted by by-pass valves. Let's take a look at the scrupulously honest dealer, the merchant who realizes it's hard to get business and does everything he possibly can to retain it.

When the strictly honest dealer sends out a truck equipped with by-pass valves, he is putting temptation into the hands of his driver. He also takes the chance of having his customer realize that his oil bills are too large and that he should try another dealer; and away goes a hard-won customer, the dealer himself having profited nothing and yet having lost.

This clean-out-the-customer's tank hookup is usually a permanently installed line connecting the normal discharge line to the suction side of the pump. By inserting the hose nozzle with appropriate extension into the customer's storage tank, the pump will suck from the tank. The normal discharge from meter to hose reel is valved off at such a time, what was normal suction now becomes discharge, and another series of valves must be respectively closed and opened. What a mess! And after the job is done, this one job of suction as against several hundreds or thousands of delivery, the driver proceeds to close some and open other valves and the next customer gets the accumulated muck which lies in the system.

If all valves are not tightly closed, there is trouble. Liquids would much rather go through the by-pass valve to the suction side of the pump (since nature abhors a vacuum), than go against the resistance of a group of ells, tees, valves, a hundred feet of hose, and a nozzle. And since it has already passed the meter, the customer owns that oil.

Or take the other side of the picture. When the normal cycle is resumed after the reverse system has been in use, an improperly closed or damaged valve between pump discharge and hose reel will permit unmetered oil to go direct to the customer's storage tank. Since it hasn't passed through the meter, the dealer won't collect for it. For again in this case, the liquid would rather seek the path of least resistance and go to the hose direct rather than crawl against added resistance, through a series of ells, fittings, strainer, air eliminator, automatic trip valve, and meter. And the dealer wonders why he can't get out of the truck the gallonage he puts into it, and promptly condemns the meter.

There is a cure for these evils. Permit no permanently installed piping to conduct oil, which has been metered, to any place but to the hose reel or other discharge. If and when the customer's tank is to be cleaned out, why not just connect a garden hose to an outlet from the suction side of the pump? And a hose connected to the pump discharge can then be used to pump the sludge and muck into a barrel. A subsequent 5-gallon flushing of this short section with clean oil will again leave the entire system clean.

There are some other items on vehicle tanks that will bear looking into. What about indicator studs fastened to dome covers? When compartments are to be cleaned out, the manhole covers are removed from all compartments, and when they are put back, they may, intentionally or otherwise, be changed around. Then the finger-setting sealed by the official will show more or less than the rated capacity. The cure? Enforce the obligation of the tank manufacturer that the indicator stud be permanently affixed to the shell, not to the removable dome cover.

Again, the matter of the adjustable finger on the stud. All too often we find a finger merely drilled $\frac{9}{16}$ inch and sliding over a ½-inch stud. The manufacturer naively tells us that if we seal through the stud and the finger, the finger is sealed. And in every case to date, I have demonstrated that I can raise or lower the finger without breaking the seal. If I'm buying, I'll raise it; if I'm selling by the compartment, I can lower it. We in New Jersey never seal an indicator unless it is threaded or, what amounts to the same thing, the finger is welded to one of the jam nuts.

Another matter is the lack of a spring-loaded check valve at the nozzle. This is especially necessary when the system is equipped with a predetermine-set device. The shut-off occurs at the meter. The driver takes his sweet time about shutting off the pump and eventually he shuts off the valve at the nozzle itself. If a hundred feet of hose on a down grade is stretched from truck to customer's storage tank, the next customer who may have an installation requiring only a few feet of hose will certainly take a licking. The first 5 or 7 gallons pumped and metered will go to fill the hose to the nozzle.

A matter which will also bear watching is the safety-valve question. We lay down hard and fast rules as to compartments being calibrated with line capacities not included. And yet we have no rule forbidding the control of safety valves in tandem; that is, to open the safety valve of one compartment, we must by the very nature of the installation open the safety valves of all compartments. What difference does it make? Well, suppose we concentrate on a multiple-compartment truck, number one compartment of which holds 150 gallons, and the other compartments of which hold much larger quantities. After making one or more deliveries of larger quantities, we come to a client who needs, or can pay for, only 150 gallons. Before delivery of his gasoline is made our client climbs up on the truck and finds that the gas does not touch the indicator by an inch or more. Right away he squawks that we are a bunch of gyp artists and broadcasts it to all and sundry. As a matter of fact, when we made the very first delivery, we pulled the safety valves on all compartments, and that apparent deficiency of gas is now in the line. I say that if the the safety valves are not individually controlled, we should include the line capacities in our calibrations.

And speaking of safety valves, a little piece of foreign matter under the seat of a valve will permit the lines to fill during loading and then we are told that the loading-rack meter is wrong. Might it not be a good idea to make it general that lines be included always? Of course, the safety valves must be closed while the truck is in transit. If an accident should occur and the lines be sheared off, what was in the lines would be spilled but not much more. We have

calibrated compartments with safety valves closed, lines not included. And the very next time the truck was loaded, a compartment held 4 gallons more than rated capacity. Why? During our test, the safety valve did close and hold. But during the emptying process, a chip of iron scale was flushed on to the seat of the safety valve, the disk jammed down on it with sufficient force to imbed it nicely in the seat, and thereafter the valve did not hold. It took 3 minutes to load the compartment at the bulk plant, and during those 3 minutes, 4 gallons leaked past the now defective safety valve into the line to the manifold valve.

Where the unit of measure is the capacity of the compartment itself, as in the case of gravity drops of gasoline, we can't be too careful about manifolding. Let's go back to the example of the

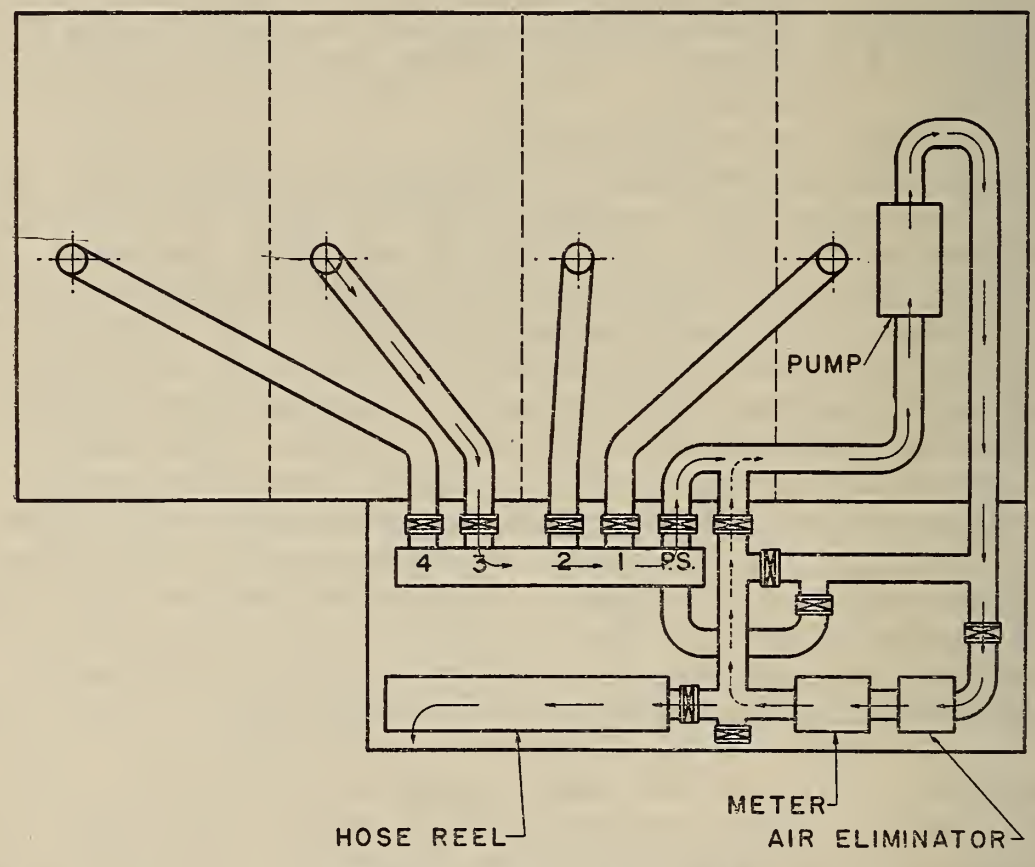


FIGURE 13.—*Side installation.*

multiple-compartment tank truck. After one or more customers have been served, the next client is asked to see if the compartment whose contents he is to receive is filled to the indicator before delivery is started. Now let's try our little "gyping" experiment. We will say that number one compartment was empty when we arrived. Of course, our client doesn't know or care about that compartment—we are delivering to him the contents of compartment number two. He takes a look, sees the gasoline level nicely kissing the indicator, and is satisfied. We open number two valve at the mainfold and proceed to make a gravity-drop delivery. Now, suppose we nonchalantly clean around the manifold and "sort of open up" the valve from number one compartment. Liquids have a way of seeking and finding their levels. With a 3- or 4-foot head in number two, it won't take very many minutes for 25 gallons or so to back up into the num-

ber one compartment. After a few minutes we again close number one manifold valve and the contents of number two now has nowhere to go except into the client's storage tank. When no more flows, our client takes a look, sees number two compartment dry, and signs up for the rated capacity. But we've stolen from him the amount backed into compartment number one.

What to do about it? I recommend: (1) Permit no permanently installed piping to conduct oil which has been metered to any place but to the hose reel or other legitimate discharge; (2) indicator studs to be permanently affixed to the shell of a compartment itself, not to a removable dome cover; (3) indicator fingers to be tapped or threaded to move mechanically along the studs to which they are to be sealed; (4) when a wet-hose system is used, a spring-loaded check valve at the nozzle or end of the delivery hose must be installed; (5) the rated capacity of compartments to include the line capacity up to a hand-operated shut-off valve at manifold or outlet; (6) either install nonreturn checks between tank outlets and manifold valves or, better still, eliminate all manifolding, and when we want to pump the liquid, connect a flexible hose from the compartment outlet after its shut-off valve to pump suction line. All of these recommendations are for the better protection of both the buyer and the seller.

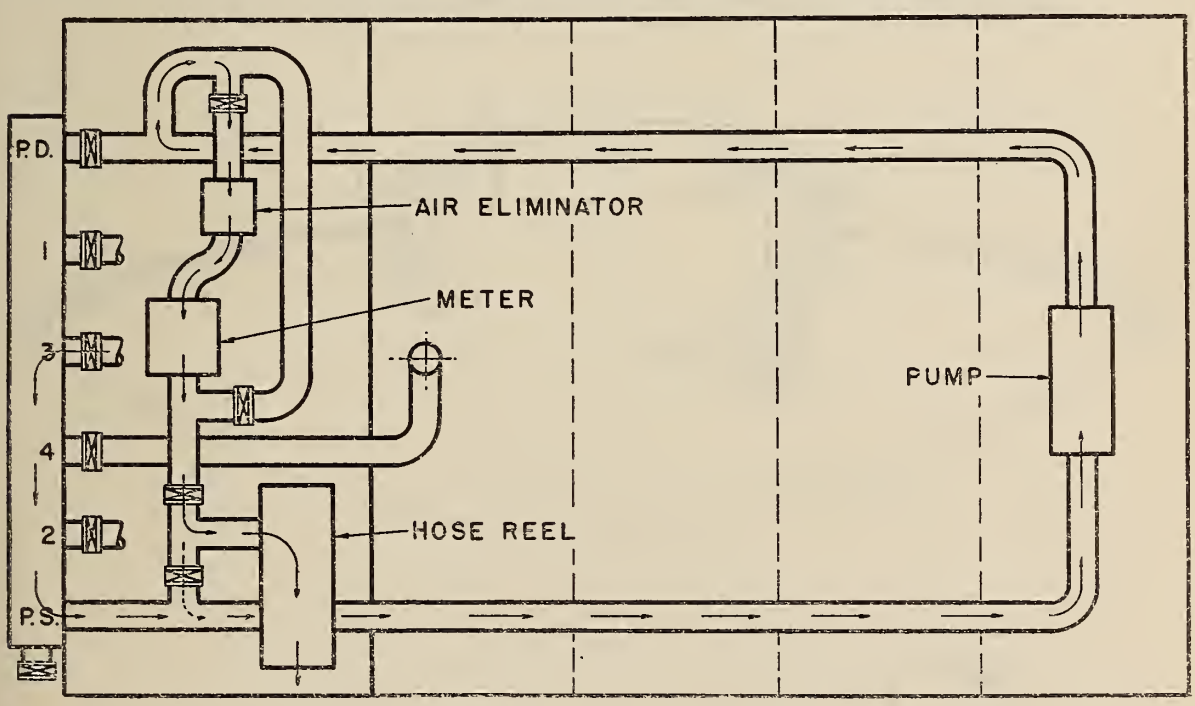


FIGURE 14.—*End installation.*

Figure 13 illustrates a "side" installation, and figure 14 illustrates practically the same layout as a "rear" installation. These layouts are comparatively simple; we have seen some rather complicated ones. Full-line arrows indicate normal flow of liquid; dotted-line arrows indicate diversion of metered liquid back to the pump suction line. But it is also possible to by-pass the meter. By a damaged valve, or by a valve opened intentionally or unintentionally, the customer may be defrauded or the dealer may be defrauded.

Figure 15 illustrates what, in my estimation, is an ideal hook-up. It will be noted that the pump suction line has a fitting which is flexible, and which can be connected to No. 1, No. 2, No. 3, or No. 4 compartment, and that liquid can then go nowhere except to the pump.

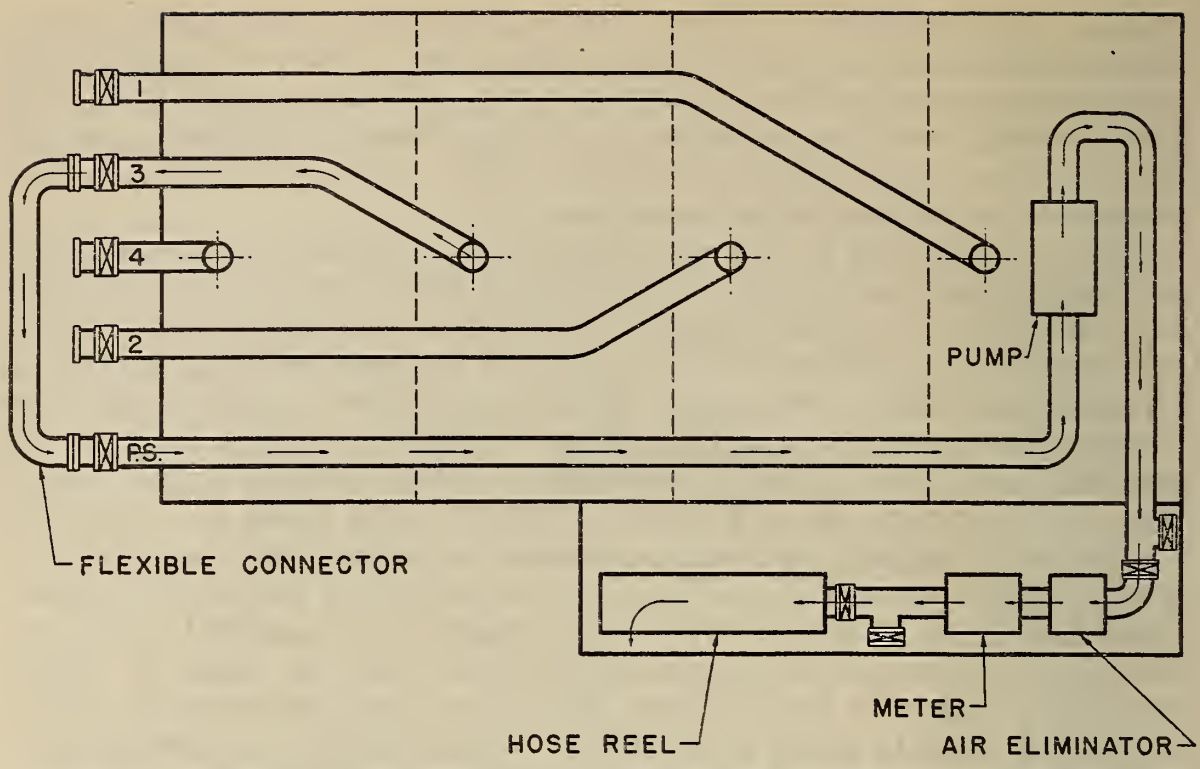


FIGURE 15.—*Satisfactory installation, having flexible hose connection between pump suction line and any desired compartment outlet line.*

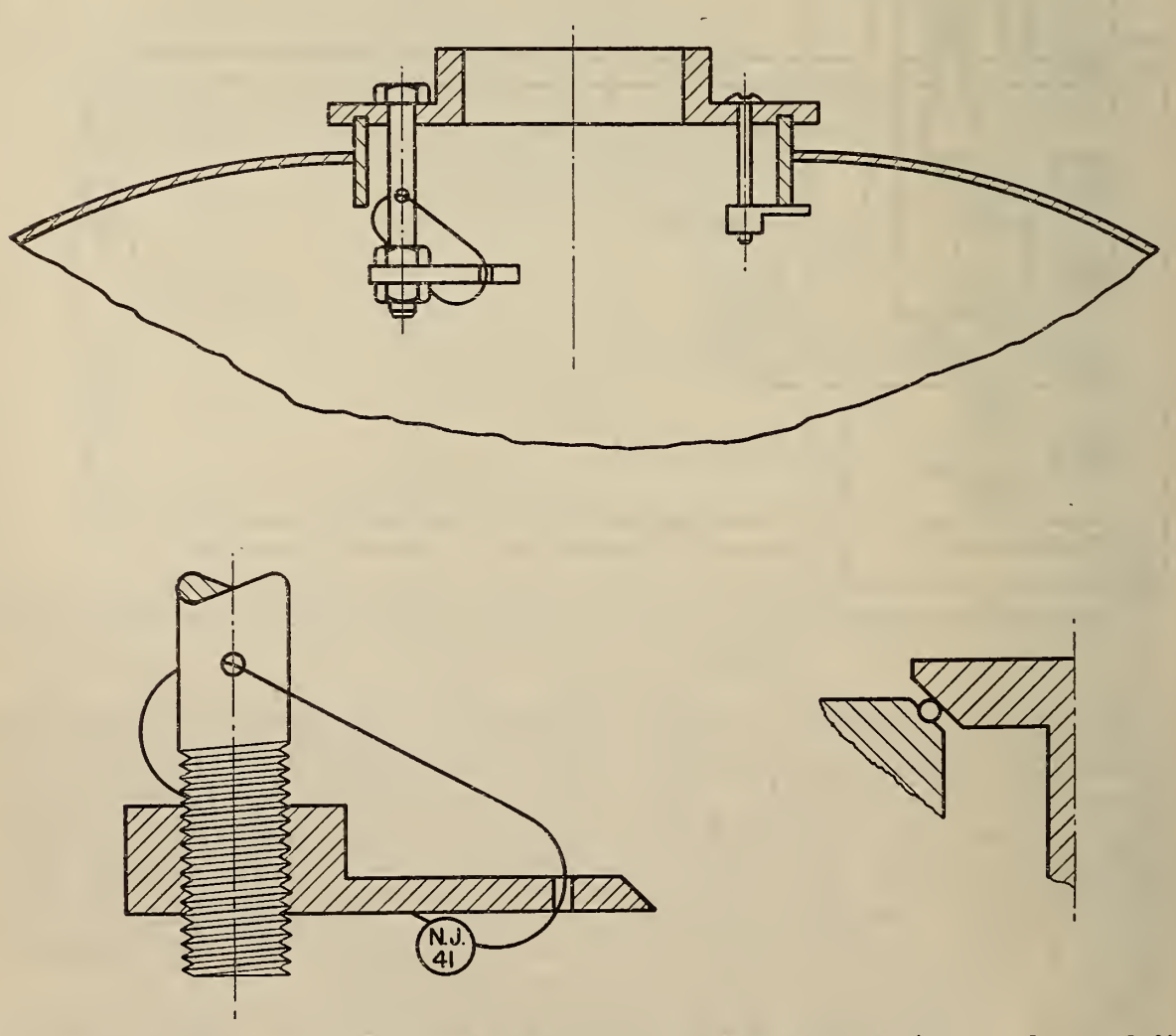


FIGURE 16.—*Top view: Unsatisfactory method of sealing indicator—lower left view: Satisfactory method of sealing indicator—lower right view: Embedded particle obstructing seating of valve.*

In figure 16 the top view illustrates an indicator which can be moved up and down on its stud without cutting or damaging the lead-and-wire seal. The lower view at the left illustrates my idea of how an indicator should be threaded on its stud; this design permits only a one-quarter turn after the sealing wire is applied, and this amount of movement is not excessive. The view at the lower right illustrates how a chip can be embedded in the seat of a disk or globe valve, thus keeping the valve partially open.

(At this point, at 4:00 p. m., the Conference adjourned, to meet at 10:00 a. m., Wednesday, June 4, 1941.)

THIRD SESSION—MORNING OF WEDNESDAY, JUNE 4, 1941

(The Conference reassembled at 10:00 a. m., C. L. Klocker, Vice President of the Conference, in the chair.)

APPOINTMENT OF COMMITTEES

The CHAIRMAN. Dr. Briggs is unable to be here this morning and has asked me to read his committee appointments, as follows:

As the Committee on Nominations: C. L. Klocker, of Connecticut, Chairman; W. S. Bussey, of Texas; R. E. Meek, of Indiana; George M. Roberts, of the District of Columbia; George F. Austin, of Detroit, Michigan; L. E. Witt, of Milwaukee, Wisconsin; R. W. Bodenweiser, of Mercer County, New Jersey.

As the Committee on Resolutions: Joseph F. Blickley, of Pennsylvania, Chairman; Erling Hansen, of Minnesota; W. T. Fossett, of Illinois; W. P. Reed, of Atlanta, Georgia; C. T. Quinn, of Lansing, Michigan; R. M. Johnson, of Birmingham, Alabama; C. P. Smith, of Suffolk County, New York.

DEVELOPMENT OF SINGLE-SERVICE MEASURE-CONTAINERS

By C. E. HAWKINS, *Sealer of Weights and Measures, City of Springfield, Massachusetts*

For the purpose of this paper I am going to confine myself to single-service measure containers, and not to single-service containers which presuppose the use of an approved weighing or measuring device for quantity determination and the use of the container as a means of delivery only.

As the science of merchandising progressed, the problem of dispensing certain viscous or semisolid commodities received more and more attention. Such articles as ice cream, baked beans, chowchow, sauerkraut, pickles, and others had always been sold by measure, and under prescribed practice would require the use of a measuring element. These commodities lent themselves readily to sale in single-service measure containers where the quantity was determined by filling such a container from bulk and delivering to the consumer. This immediately brought up for consideration the sufficiency of such containers to accurately measure in relation to specifications for liquid capacity measures.

In 1920 a law was placed on the statute books in Massachusetts permitting the use of paper or fiber cartons in the sale by measure of viscous or semisolid commodities, or mixtures of solids and liquids. It provided that these containers shall contain, and shall be sold as containing, 1 quart, 1 pint, ½ pint, or 1 gill, Massachusetts standard liquid measure. The containers must be of such shape and dimensions as may be approved by the Director of Standards for Massachusetts, and the director may authorize the manufacturer to have printed on each container a statement of its capacity in terms of Massachusetts standard

liquid measure, with the words "Approved by the Director of Standards for Massachusetts," and with such other marking as the director may require. Such cartons shall be legal measure only for such commodities as may be designated, and shall be exempt from the laws requiring the sealing of measures.

As I have mentioned, the sizes set up in this original legislation were the quart, pint, half-pint, and gill, which at the time seemed to suffice, as the principal use was in the retail field. This type of measure-container has developed very rapidly from its original retail use and has now entered the wholesale end of business, particularly in the manufacture and sale of ice cream. Paper or fiber containers have now largely supplanted the metal ice-cream measure. This use undoubtedly will spread into other fields, and the change to this type will be accelerated to a very marked degree should restrictions in relation to national defense be placed on the use of metals. With this in mind, legislation was introduced into the Massachusetts Legislature at its present session, and was enacted into law, whereby other sizes could be approved by the Director of Standards. The additional sizes which he may approve are the 2 quart, 1 gallon, 2½ gallon, and multiples of the gallon. Filling machines at the various ice-cream plants are not readily and permanently sealable, and the sizes authorized in this 1941 legislation will permit the use of measure-containers as the real measure.

The same situation of using cartons as a measure is true in relation to molds, and the development has gone to paper molds supplanting the previous metal molds in which the cream is frozen. The prevalent size used in this manner is of 2-gallon capacity, and this is broken up into various sizes by means of impressions in the mold equally distant and designed to freeze the quantity in either pints or quarts. The ice cream stays in the 2-gallon mold until the product is frozen and is then subdivided and placed in paper cartons which are designated as transfer cartons. Some question may arise as to whether or not a 2-gallon mold with these impressions is a subdivided measure, but to our way of thinking this is not the case as the situation strikes us as somewhat analogous to a means of determining volume by dimensional measure. The prohibition against the use of a subdivided measure is largely on the basis of inability to observe the level of fill of the measure. In this case, the quantity is determined by a set marker, the dimensions of which can be readily ascertained, and the operator merely cuts the commodity along the lines of the impression.

Specifications on liquid capacity measures require them to be of sufficient strength and rigidity to withstand usage without becoming bent, indented, distorted, or otherwise damaged. These apply to measures which are to be repeatedly used, but are recognized in our requirements wtih some degree of reasonableness when it is considered that the measure is a single-use device. These cartons are principally cylindrical, but some are keystone shaped. While the cylindrical cartons are sturdy and rigid, the keystone-shaped cartons have sidewalls that are not so strong. The danger of using this keystone package is not one of insufficient measure, but rather of over-measure, and not fair to the dispenser of the merchandise in this respect. It has been found that the most practical way in making tests on this type

is to constrict the sidewalls during tests so as to simulate the condition of use where molds are used at the place of filling. When this keystone shape was first used it was general practice to use a mold to constrict the sides of the carton while being filled, but in some cases this practice is not being followed at the present time. The use of a mold is not necessary, of course, when the cylindrical type of carton is employed, owing to its greater rigidity.

A more recent development in the paper carton field is its use as a straight container for the dispensing of milk. While our statute in Massachusetts makes provision for paper or fiber cartons used as measure-containers for milk or cream, its language is not construed to be prohibitive of the use of a container which is not a measure but a container only. This is especially true when a measuring device is employed to determine the quantity of content which goes into the various cartons. We have, however, taken the attitude that the filling device must be sealed and the container must bear a statement of net quantity of content as required by law pertaining to food in package form. It is not necessary that these packages bear the seal of approval, as they are not measures but merely containers.

Prior to the enactment of laws on the subject of containers and measure-containers it was found that cartons of all shapes and sizes were being used by retail merchants. There was no control over the shape, dimensions, or strength, and no ready means of identifying the source of manufacture of the cartons. Some of these containers were of the conventional size of 1 quart, 1 pint, ½ pint, or 1 gill—but many were of other sizes. Due to lack of control, a lot of them were greatly deficient, and some were in excess of the tolerance for liquid-capacity measures, but especially where conventional sizes were not employed the sale was consummated on the basis of money's worth rather than on the basis of quantity.

By virtue of the provisions of our law the capacity of a carton must be printed on it, and the sale must be made on the basis of quantity determination. Manufacturers are assigned an identifying code which permits easy tracing of the source of manufacture. When a code has been assigned to a manufacturer there must be printed on the carton the capacity of the container in terms of United States liquid measure, and the words "Approved for Massachusetts" followed by the code designation. This restriction of the sizes which may be employed, and the ease of tracing the manufacturer of the cartons, has worked out very satisfactorily for all concerned.

There was submitted for tentative adoption at the last National Conference a special code for single-service measuring containers. This covered very much the same field we have covered in Massachusetts, but our requirements call for the specified marking to appear plainly and conspicuously on the side of the carton, or on the top and bottom. This latter requirement was deemed necessary as in many cases these cartons have detachable tops, and it is not considered plain and conspicuous if the marking appears on the top only. The capacities listed in last year's tentative code are for 1 gallon, ½ gallon, 1 quart, 1 pint, ½ pint, and 1 gill. In view of the spreading use of this type of measure-container to the wholesale field, it might be well to give consideration to the advisability of including larger capacities than were listed in the tentative code submitted last year.

"YOU'RE ON THE AIR"

Arranged and presented under the supervision of Arthur Stringer, National Association of Broadcasters

THE CHAIRMAN. I wish to call upon our secretary to introduce the next item on our program. Mr. Smith.

MR. R. W. SMITH. You will recall that last year we had on our program, as a prelude to the report of the Committee on Weights and Measures Education, a very interesting presentation by a representative of the newspaper fraternity; it was considered that the close relationship between the work of the committee and the newspaper field made that arrangement particularly appropriate. We shall shortly have another report from our Committee on Weights and Measures Education, and as a prelude to that report we are going to learn something about radio broadcasts, another medium which is available to weights and measures officials from time to time for the education of the people with whom they deal.

Arrangements for the next item on our program were made with the National Association of Broadcasters, and Mr. Stringer of that association has very kindly consented to handle this item for us; it will be something of a departure from the conventional, but I believe you will enjoy it. I wish to introduce to you Mr. Stringer, who will take over from this point.

MR. STRINGER. When Mr. Smith visited our offices and sold us a bill of goods, we were delighted to accept his invitation to appear on your program because, you know, you do not have to work very hard to get radio people to talk about themselves and what they have to offer. Since the time of that visit, as you know, there has intervened an unlimited national emergency, and that changes the whole picture. We had a paper all written for delivery but it is now in the wastebasket. Instead of that, we directed one of our script writers to prepare an original one-act play for delivery here this morning, and it tells the story of today's conditions regarding the availability of radio time throughout the nation.

In August of last year, at San Francisco, the National Association of Broadcasters went out one hundred percent for national defense. That meant that we would give ample time to the defense agencies. It meant that we would give time to organizations and people who could contribute to the national solidarity—but we are a nation of enthusiasts, and almost at once everyone who had an idea to sell or a course of action to promote, wanted time on the air. The next thing we knew we could just about fill 18 hours a day with speakers, one after another, and have two or three times as many more sitting out in the anteroom. Of course, that is not the best situation and we are on the spot, and so we are going to tell you about it in a play.

Before we start the action, let me say that Mr. Smith wanted us to tell you something of the mechanics of broadcasting, how to prepare your speech, how to time your speech, how to sell your idea to the broadcast manager. In order not to let Mr. Smith down, we have brought a supply of a little pamphlet which answers all those questions, and I understand that these will be made available at the close of the session to those desiring copies.

(At this point there was presented a one-act play depicting the problems of the manager of a radio station in meeting demands for free time on the air. A cast of seven persons participated in this dramatic sketch.)

Mr. R. W. Smith. Gentlemen, I think the story has been told in a very forceful way and that none of us has failed to understand the message. However, I am sure that if you have any questions to ask Mr. Stringer, he will be glad to answer them. Mr. Stringer, this is a curtain call.

Mr. Stringer. My criticism of this playlet is that it is just a little tough, and now that you have seen it let me say that we do not mean it to be quite that tough. We simply mean that radio must help to make this a strong nation. At the present time there is no disposition in the United States to make anyone a dictator of radio, but one of the ways in which that might be brought about would be through complaints from organizations and individuals that they were barred from the air. We simply say that first things must come first and I know that you gentlemen in your official capacities will agree with me on that.

Mr. R. W. Smith. Allow me, in the name of the National Conference, to thank you, Mr. Stringer, and your capable associates, for the very interesting program which you have presented to us this morning.

Secretary's Note.—Extracts have been made from the booklet referred to by Mr. Stringer, which contained practical suggestions for the preparation and delivery of radio talks, and this material will be found in appendix I of this report beginning on page 165.

REPORT OF COMMITTEE ON WEIGHTS AND MEASURES EDUCATION, PRESENTED BY W. S. BUSSEY, CHAIRMAN, AND DISCUSSION THEREON

I know that everyone present has enjoyed the playlet presented to us by Mr. Stringer and his cast this morning, and also I am sure that you all believe what he said about not meaning it to be quite as tough as it looked. I am sure that the radio stations in our State do not mean it to be that tough because they have certainly cooperated with us, and I might say that we have never approached a radio station in Texas concerning the broadcast of a weights and measures program but that they have cooperated completely. Moreover, they have not always waited for us to see them—they have taken it upon themselves to get in touch with us upon several occasions. We appreciate that deeply.

Turning now to the report of the Committee, in our report just 1 year ago your Committee on Education made certain suggestions and recommendations relative to a comprehensive educational program, to be pursued by weights and measures officials throughout the United States. You in turn approved those recommendations, and the President of this Conference saw fit to continue the same Committee for another year, in order that we might have the opportunity of putting the proposed program into effect.

This Committee is composed of H. G. Boutell, Chief, Information Section, National Bureau of Standards; Robert Williams, County Sealer, Nassau County, N. Y.; A. Edward Snyder, Deputy State Inspector, Terre Haute, Ind.; James E. McHugh, City Sealer, Allentown, Pa.; A. J. Jensen, State Inspector, Jamestown, N. D.; M. A. Hubbard, Supervising State Inspector, Richmond, Va.; and, as Chairman, W. S. Bussey, Chief of the State Division of Weights and Measures, Austin, Tex.

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It was the thought of your Committee that our educational program should be designed to cover three distinct fields. First, the weights and measures officials themselves; second, those persons representing the various industries with which we come in contact; and third, the consuming public.

For the education of the first group, the weights and measures officials, we suggested a course of study for the individual inspector, and a general school of instruction for all weights and measures officials in the jurisdiction. These items are designated as numbers 1 and 2 on the Committee's list of material. We are glad to report that the work of preparing and distributing these two items has been completed and that additional copies are available for those who may desire them.

We feel that it is impossible to place too much emphasis upon educating the weights and measures officials themselves, and we are glad to report that some 85 names appear on our mailing list to receive the course of study for the individual inspector; furthermore, some jurisdictions, such as the State of Michigan, have seen fit to republish this course of study in their "Sealer's Bulletin," thereby making it readily available to every inspector in the jurisdiction.

In at least two jurisdictions, this study course has been followed up by a series of written examinations, and with most pleasing results. The Committee feels justified in recommending to every jurisdiction having a personnel large enough to warrant such procedure, that a systematic program following the study course be adopted and that a written examination be arranged to cover each three-month period, the examination to be prepared and conducted by the State officer or by the educational committee appointed by the State association, in the particular jurisdiction.

The Committee is very much encourged over the way this study course has been received; we feel that every active weights and measures official in the United States, who is interested in becoming more efficient in his duties, should make it his responsibility to pursue this course diligently and earnestly until he has covered it in its entirety. A. J. Jensen prepared this study course and he deserves a lot of credit for having done a splendid job.

Some 46 persons have requested copies of the proposed program for a general school of instruction for all weights and measures officials in a jurisdiction, but so far as the Committee has been able to learn, only a few jurisdictions have followed this suggestion. In fact, only three such schools have been definitely reported to the Committee, those having been held in Indiana, Virginia, and Texas. We understand, however, that district meetings have been held in a number of instances, including New York, California, New Jersey, Michigan, Massachusetts, Ohio, and possibly several other States.

Of course, conditions vary in different States, but your Committee feels that in every instance possible, the weights and measures officials in a State should get together at least once each year for the purpose of conducting a general school and discussing the various technical problems with which they are confronted from time to time. We strongly recommend this method of educating weights and measures officials and would like to see all of the States make a

general school of instruction a part of their routine for each year. M. A. Hubbard deserves credit for preparing a very fine outline for a school program, which will certainly be a big help in any jurisdiction undertaking a training school for the first time.

The matter of educating those persons connected with the various industries with which we come in frequent contact, and the matter of educating the consuming public, are very similar tasks, and we feel that the same material, with certain modifications, will serve both purposes. In fact, it is a matter of getting the information before the proper groups, and in the right manner.

For the purpose of covering these last two fields, your Committee recommended six weights and measures talks to be delivered before interested groups, six newspaper articles, and six radio programs. We are glad to report that the six weights and measures talks to be delivered before interested groups have been completed. These six talks have been prepared by Committee member Robert Williams of Mineola, N. Y., and we know that everyone who has read them has found these talks most interesting and instructive.

Several of these talks have already been used in different States, and we know the information they contain is worthy of your consideration when preparing talks to be delivered before any group of interested citizens.

The six newspaper articles have not been quite completed; however, four of these articles have been completed and the other two will be forthcoming in the near future.

We would like to see these newspaper articles appear in as many papers as it is possible to get them in throughout the United States. So let us urge that all weights and measures offices in the Nation avail themselves of copies of these suggested articles and see just how many newspapers they can get to run them. I believe we would all be surprised at the results if we would really concentrate our efforts on trying to put this feature of our educational program over. These articles have been contributed by several different parties, and if you have something in mind which you think is appropriate for such an article, won't you please send it to the Committee?

Only two of the radio programs, listed as item No. 5 in the Committee material, have been completed, but this is due to the fact that Committee member A. Edward Snyder, upon whose shoulders has rested this responsibility of preparing these talks, had the misfortune of being ill for quite an extended period during the year and has not been physically able to complete his assignment. However, the Committee wishes to assure you that this series of talks will be completed in the very near future.

Your Committee also suggested that an attempt be made to get at least one weights and measures article carried in a magazine having national circulation. We regret that credit cannot be taken for having accomplished this undertaking, but we still have hopes for the future. In this regard, we might add that although your Committee takes no credit for same, an article entitled "How Much is a Dozen" did appear in the May issue of Readers Digest.

Your Committee is firmly convinced that the matter of education has a permanent place in weights and measures enforcement. We have found that the lack of knowledge of the fundamental prin-

ciples, as well as of the various activities of weights and measures bureaus throughout the Nation, is appalling. We feel that an Educational Committee should be a permanent part of the National Conference, and that each member of the Conference should give this Committee his wholehearted support, for if weights and measures enforcement in this country is ever advanced to the degree of prominence which its fundamental importance so rightly deserves, much educational work will have to be done; and we repeat some of the things mentioned in our report of last year: We must continue to educate ourselves. We must continue to educate other public officials, such as State legislators, members of city councils, the governors of the several States, and so forth. We must also continue to educate those connected with various industries which are vitally concerned with quantity determinations. We must educate the officers and other representatives of various civic and business organizations. We must educate our educators, if you please—as well as the consuming public.

You see police departments, fire departments, health departments, and so forth, expanded and improved. Why? There is but one simple answer—education. Someone has started an educational program in those fields, and with the necessary help has educated the people to a standpoint of realization of the true value of such serivces.

There is no service rendered by any branch of our government, Federal, State, county, or city, that is more far-reaching, or that offers more in return for the tax dollar necessary to maintain same, than does weights and measures enforcement; but do the people know this? We, your Committee, think they do not, and it is up to us as members of the National Conference on Weights and Measures to see that they find out about it; if we don't do this work, it will not be done.

There are so many ways to disseminate weights and measures knowledge that we can rightfully report that our educational activities have hardly begun. We are thoroughly familiar with various means of educating the people along these lines, such as making personal appearances before various groups—civic organizations, ladies clubs, school children, and so forth. And, we might add that one of the most fertile fields for weights and measures education is through various trade associations. We believe that the weights and measures department in each jurisdiction should be represented at every convention or trade organization meeting which represents industries vitally affected by weights and measures control, where the necessary invitation can be had, and in most instances these groups are glad to have us. Get better acquainted with the leaders in these various industries and sell them upon the importance and truly worthwhile value of the services weights and measures departments throughout the Nation are actually rendering. Sell them to the extent that their active support is enlisted, for this kind of support is certainly worth a lot, not only in our routine work, but also when it comes to the passage of necessary weights and measures legislation and the procurement of adequate appropriations under which to operate.

We believe that in our public schools at least one project each year should cover weights and measures supervision and the proper methods of buying. The Commission on Teacher Education of the American Council on Education has expressed interest in our work and has distributed copies of our mimeographed material.

Our daily, as well as weekly, newspapers cannot be overlooked as a most important means of educating the public on weights and measures matters. National magazines, trade magazines, and various other publications also offer excellent opportunities.

Only a few weeks ago the house organ of a large manufacturing company, which is distributed very widely, possibly throughout the world, carried an article regarding the work of the weights and measures official of the city where the plant of the company is located, and the official in question is to be congratulated for doing his work in a manner to justify the splendid article in question.

We all recognize radio as one of the most effective means of informing the public today, yet to what extent have weights and measures officials taken advantage of this golden opportunity? You hear health talks, safety talks, defense talks, and various and sundry talks and programs relative to the numerous services of government; yet, how many weights and measures radio programs have you ever heard on the air? Relatively few, we would say. Your Committee wants to recommend and urgently request that weights and measures officials throughout the Nation take full advantage of this opportunity. It has been our experience that the radio stations in the various sections of the Nation are most anxious to cooperate with weights and measures officials in disseminating the valuable information which we have, and in which the public is so intensely interested, if they are only given an opportunity to learn about it. Have you ever approached the officials of the radio stations in your jurisdiction to ascertain whether or not they would entertain an idea of broadcasting a weights and measures program? It has been done in many jurisdictions and we are happy to report that the response of the broadcasting stations has been most generous.

There is one other method of education which is most effective, and as Chairman of the Committee, I want to commend Alfred O. Oslund, Superintendent of Weights and Measures for Hudson County, New Jersey, for continually calling to the attention of your Committee the possibilities of visual education, in the weights and measures field. We need not elaborate upon the possibilities or the effectiveness of visual education—that is, sound motion pictures. Yet, to what degree have weights and measures officials taken advantage of this means to educate the public? We recall having seen only one full-length picture based upon a weights and measures story, that being James Cagney in the "Great Guy" which was screened several years ago. About a year or so ago, "March of Time" included about 8 minutes of film in one of its releases, based upon the activities of the New York City Department, and through the courtesy of the Interstate Theaters, Inc., of Texas, and RKO pictures, this excerpt from the "March of Time" film was shown during the Sixth Annual Conference of the Texas Weights and Measures Association in Galveston on May 2 of this year. Through the motion-picture industry there are possibilities that greater assistance may be received from this

source in the future. We heartily agree with Mr. Oslund that this field of education should be more fully explored by weights and measures officials; not only through the regular channels of the motion-picture industry but to the extent of producing special educational films ourselves. Surveying the potentialities of weights and measures education, the field seems almost unlimited.

We all agree that weights and measures officials have the most valuable "bill of merchandise" in the form of "service and protection" which can possibly be offered the people of this Nation today. We also admit that we have unlimited opportunities to sell our wares to the people. The questions are (1) Why haven't we done it? and (2) Are we going to continue to sleep at the switch?

Your Committee is not making a series of definite recommendations for a program for the ensuing year, as we feel that this should be left to the incoming Committee, but we do feel that the educational phase of our work is most important, and since all letters which have been received by the Committee have requested that the Committee be continued, we do want to recommend that this Conference go on record as favoring the continuation of this Committee as a permanent part of the Conference, and that the President of the Conference be instructed to appoint the personnel of the Committee from year to year.

We also want to recommend that the weights and measures officials throughout the Nation cooperate whole-heartedly with the Committee, helping them to make their plans for the coming year and helping them to execute these plans after they have been made. Any program we undertake must have the wholehearted cooperation and complete support of each individual, if success is to be expected. In these trying times, we know of no other one thing which would tend more to strengthen our Nation and to build up a solidarity unknown among other Nations of the world, than would the active encouragement of honesty and fair dealing in every industry, thus helping to promote and establish confidence among the entire citizenship of this land.

After listening to Mr. Reck's talk yesterday, I know that we all realize that the Consumer Division of his organization is willing and anxious to cooperate with weights and measures officials in a comprehensive educational program throughout the Nation. This is an opportunity of which we certainly should avail ourselves. When we go home from this Conference each one of us should take advantage of the first opportunity to become acquainted with the local defense committees and begin working on that program. I hope that everyone here will bear in mind the invitation to cooperate with the Office of Price Administration and Civilian Supply. Finally, let us say that we have a big job ahead of us. Let us do it well through education.

This report is respectfully submitted by your entire Committee on Education.

(Signed) W. S. Bussey, *Chairman*,
H. G. Boutell,
M. A. Hubbard,
A. J. Jensen,
James E. McHugh,
A. Edward Snyder,
Robert Williams.

Committee on Weights and Measures Education.

Mr. Fuller. This Committee is certainly doing a fine job. It is a great deal of work to get out the material that they have been getting out, and this has certainly been helpful to everyone who has received it. If they are willing to accept the assignment and if it is in order, I wish to move that this Committee be continued for another year.

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

Mr. A. J. Jensen. Mr. Bussey said that we did not have any national article published. I may say that I wrote a 2,000-word article which I prepared from the writings of Mr. Bussey, Mr. Snyder, Mr. Williams, and Mr. Hubbard. This was printed by the "Grain and Feed Review," which is a national publication having a wide distribution among grain and seed dealers in the United States, and I understand that they distributed about thirty thousand copies. Shortly before I left home I received a request that they be permitted to reprint 10,000 additional copies.

Mr. Spinks. I may add that the "Farm Journal," which has a very large circulation, has carried a number of articles on weighing and measuring. Also, last week I was in Kentucky, and it appeared that every paper in the State was carrying stories and pictures of what they are doing there in the way of testing scales. It appears that if weights and measures officials will make a determined effort they can get material printed in the newspapers and trade journals; the job can be done if we will only take the time and expend the energy to do it.

The Chairman. Referring to educational efforts, we had a disappointing experience with motion pictures. We prepared a film of about 800 feet, but we found that we could not keep up with the film and give the people as much information as we desired. So now we have a group of 95 slides and a projector which we take to various meetings showing as many of the slides as we think appropriate for the particular audience. Using slides, we can talk as long as desired about any one view, and we have found this more satisfactory than motion pictures.

Mr. Bussey. In explanation of the report of the Committee on Education, I wish to say that our thought was not to take credit for having brought about the publication of an article in a magazine having national distribution, and we did not classify trade journals in the category of the national magazines which we had in mind when our original proposal was made. No doubt there have been published a number of articles in magazines having national distribution, but the Committee regrets to say that we ourselves cannot take credit for this.

The Chairman. You will remember that last year there was referred to the Committee on Weights and Measures Education the assignment of developing a National Conference emblem suitable to be worn as a lapel button. Mr. Bussey is now prepared to report upon this matter.

NATIONAL CONFERENCE EMBLEM

A Supplementary Report of the Committee on Weights and Measures Education, Presented by W. S. Bussey, *Chairman*

The Committee have thoroughly investigated the matter of an emblem to be worn by members of the National Conference in the form of a lapel button; from suggestions received from different sources we have selected a design which we wish to submit for your consideration, and for your approval or disapproval, as you see fit. (See fig. 17.) The upper portion and the sides of the emblem are to be finished in 10-karat yellow gold, and the lower central portion will be inlaid with a red background.

Figure 17.—*National Conference Emblem.*

Three sizes were considered. The first one was believed by the Committee to be too large; the next one submitted was so small that there was a question about the legibility of the lettering. The third sketch was a compromise between the first and second in size and appears to the Committee to be satisfactory in this respect. [At this point there was circulated among those present at the Conference a full-sized color drawing of the proposed emblem.]

We have a price of $1.25 each on these emblems on an order of 100. On a larger order the price would be somewhat less. We first thought of purchasing 100 of these emblems and having them available here at the Conference, but on second thought we believed it better to present the design to the Conference for final action before any of the emblems were ordered. If the design meets with your approval, it is our present suggestion that all those who care to procure the emblems place their orders with the Treasurer of the Conference, paying him in advance $1.25 for each emblem ordered, the emblems to be mailed to the purchaser as soon as they are delivered from the manufacturer.

We have been asked whether the emblem should be available only to active weights and measures members of the Conference and whether it should also be available to associate members. Your committee has not attempted to decide that question, believing that it is one which the Conference itself should decide.

Mr. Fuller. I think the emblem is very attractive and is something which we have wanted for a good many years. I move that we accept this as our official emblem button.

(The motion was seconded.)

Mr. O'Keefe. I think "Washington, D. C." should be added to the design.

Mr. Bussey. We have already experienced diffculty in finding room for the lettering which is already provided for. We had to accept an emblem somewhat larger than we really wanted in order to accommodate the lettering already shown. If more lettering is added, I believe we shall have to accept a larger emblem.

Mr. O'Keefe. I have no objection to anything the Committee wants to do. But we might let this matter lie over for one or two days so that we can all talk it over.

Mr. Boutell. It seems to me that it would be rather unfortunate to put the name Washington, D. C., in quotation marks on the emblem. As I understand it, this organization is a continuing organization, and it is conceivable that at some time it might meet at some other place than Washington.

Mr. Engelhard. Is the privilege of wearing the emblem to be confined to people who attend the Conference here in Washington, to those who are present today, to others who may attend next year, or is any weights and measures official who subscribes to what the National Conference on Weights and Measures stands for to be considered entitled to wear the emblem?

The Chairman. The Committee has not decided that question, and I know of no rule having been laid down as to who shall be entitled to wear the emblem; as I recall last year's motion, this was simply to the effect that an emblem be developed which members of the National Conference could wear. If that is the way the motion was worded, I think any member of the National Conference who is in attendance this year or who was in attendance at any previous year should be entitled to buy and wear the emblem.

Mr. R. W. Smith. May I interject the thought that we have always considered any active weights and measures official of the United States to be, ex officio, a member of the National Conference on Weights and Measures? Certainly, if any weights and measures official subscribes to the principles which this Conference stands for, I believe he should be entitled to wear one of these emblems as a member of the National Conference, even though circumstances may have prevented him from ever attending one of our meetings. Such a person might be able to come next year or a year later.

Mr. Englehard. I think Mr. Smith's remarks express the original intention. For instance, in New Jersey we have ninety-odd, bona-fide weights and measures officials, and there are 22 of them here today. Our officials do subscribe to the principles of the National Conference and I am sure that many others who are not here today would like to wear the Conference emblem. If Mr. Fuller and his second will accept the amendment, I think it would be appropriate to include in that motion the thought that the emblem may be worn by any bona-fide weights and measures official; if the Conference wishes to do so, associate members might also be included.

The Chairman. Personally, I think the emblem should be available to any weights and measures official in the country but this is a matter which the Conference should decide. However, we should first adopt an emblem before deciding who can wear it.

Mr. Baucom. I wish to offer a substitute motion that we defer action on this until tomorrow morning.

(The motion was seconded.)

Mr. Jensen. Much thought and work went into the design of this emblem, and I think it is one which every weights and measures official will be proud to wear. I would like to have this question settled now, because our program is heavy and we have much yet to do.

The Chairman. We now have before us an original motion which was seconded and a substitute motion which has been seconded. I

think we must first call for a vote on the original motion which is to accept this emblem.

(The question was taken by a voice vote; upon the call of the Chairman those opposed to the motion were asked to rise, after which the Chair declared the motion carried. The National Conference thus adopted as its official emblem the design proposed by the Commmittee on Weights and Measures Education.)

THE MANUFACTURE OF PRECISION GLASSWARE

By J. J. Moran, *Technical Manager, Sales Department, Kimble Glass Co.*

The manufacture of laboratory glassware in this country before 1914 was restricted mostly to special research pieces, and to a very limited number of other items which were of such character and were used in such quantities that semiautomatic methods of production could be used for at least some of the operations.

Upon the outbreak of war in 1914, imports became impossible to obtain and a very serious shortage soon appeared. Stocks in the hands of importers and users were practically exhausted by the summer of 1915. Due to insistent demands, several of the larger glass manufacturers undertook to supply the necessary requirements. A few companies had been making Babcock fat-testing glassware for the dairy industry and pharmaceutical graduates for druggists. With experience in calibrating methods thus acquired, the development of a full line of volumetric apparatus and tubing products was begun.

Time was required, however, to teach the necessary personnel and work out satisfactory manufacturing procedures, so that the shortage was not completely overcome until late in 1918. You will see that this took a period of 3 years.

After the war was over, imports began to recapture the American market. But the essential nature of the domestic industry, particularly in its relation to national defense, had been conclusively shown, and a sufficient tariff was provided in 1922. When a general tariff revision was made again in 1929, protection for the domestic industry was retained.

How farsighted the Congress was has been demonstrated in the past 20 months. The present European conflict has created no shortage, and the very few items not being made here in 1939 have already begun to appear on the market in quantity. The organized industry has easily designed the necessary machinery and provided the additional facilities for manufacture.

If there had been no domestic industry in 1939, conditions would have been much worse than in 1914. Industry has replaced rule-of-thumb methods by precise control, and the health of the civilian and military population is guarded by innumerable laboratory workers. The national-defense program could not proceed without laboratories. Scientific apparatus would have been the greatest "bottleneck" of all.

The glasses used in laboratory apparatus are divided usually into two classes, soda-lime and borosilicate, although the better soda glasses contain some boron, and the borosilicates, some alkali. Sometimes these types are also called "soft" and "hard," taken from the glassblowers' habit of classifying glasses according to the ease with which they can be softened by heat.

The soda-lime glasses are easy to work over gas flames and to etch. At the same time, they exhibit good resistance to the action of chemicals and weathering. Thus they are the first choice when fabricating calibrated glassware which will not be highly heated and which must be provided with etched calibrations. A further advantage in the latter case is the rough surface produced by acid etching. Colored fillers, a great visual aid in reading, stick more easily to such a surface then to the smooth surface produced by etching a borosilicate.

The usual soda-lime glass is made from a batch consisting of white sand, soda ash, limestone, feldspar, and borax. This batch is fed into a tank furnace, where it is heated in order to melt it and transform it into finished molten glass. The melting temperature is 2,600 to 2,700° F.

Tanks are of many designs. In general, they are divided into two parts, a melting end, covering about 70 percent of the area, and a refining end. Large blocks made of selected clays held by binders or fused into one piece are butted together to form the sides and bottom. Silica brick are used to form the crown. Either a wall with a hole at the center near the bottom or a floating clay dam separates the two parts, in order to hold back scum from the refining end. This scum may be a result of interaction of the batch or a decomposition product of the action of the batch or glass on the walls of the tank. The batch is fed in at the rear of the melter and either flows out of the refiner into forming machines or is gathered like molasses on the end of a pipe by the glassworker. The melting process is continuous, the batch being fed in at regular intervals.

Laboratory apparatus can be classified into two general groups (1) articles produced from molten glass by pressing into shape or by blowing in a mold, and (2) articles made from tubing. Some pieces, of course, are composed of parts made by both methods and sealed together later.

A pressed object is made by dropping molten glass into a cup and forcing the glass against the sides by means of a plunger. Stoppers and stopcock plugs are made in this way. The molten glass may be fed into the cup by an automatic device attached to the furnace and regulated to deliver successive gobs of identical size, or it may be transferred from the furnace on the end of a rod by a workman.

Similar methods are used to obtain the glass needed for a piece blown in a mold. In the case of the mechanical transfer, the plunger is replaced by a head having a hole in the center. Compressed air is forced through this opening to blow the glass against the mold. Few pieces of laboratory glassware, however, are produced in sufficiently large volume for mechanical schemes to be economical, the glass usually being withdrawn from the furnace by a workman using an iron pipe about 6 feet long. The pipe is dipped into the bath and slowly turned until the "gatherer" judges that the correct amount has been obtained, when the pipe is withdrawn.

While the "gatherer" may do some preliminary shaping of the gob of glass, usually he hands the pipe over to the blower immediately. The latter proceeds to swing the glass on the end of the pipe to elongate it, roll it on a polished iron plate or otherwise work it into the approximate shape of the finished article. Finally, he in-

serts the glass into the open mold made of two halves fastened by a hinge. The mold is closed mechanically or by a boy, and the man blows through the pipe so that the glass takes the shape of the inside of the mold. Figure 18 shows a blower about to insert the blank for a cylinder into the mold.

Some idea of the judgment required of the gatherer in taking up the glass and of the blower in shaping it so as to distribute the glass, working any excess back onto the head of the pipe, can be obtained by reflecting that there is only about one-eighth of an ounce possible tolerance in the weight of a 500-ml volumetric flask in order for it to hold the correct amount. A well-trained group will produce 95 to 100 percent good flasks consistently throughout a working day.

The bases of cylinders and similar objects require an extra operation. After the body has been blown, the blower opens the mold and hands the pipe with the glass still attached to another workman called a "gaffir." The latter holds the pipe upside down, and a second gatherer deposits molten glass on the bottom of the cylinder. The gaffir then kneads this glass to the main body, at the same time forcing it into a form which gives the correct shape to the foot. After all forming operations are completed, a cold iron is touched to the glass at the end of the pipe, causing the glass to break away from the pipe. The glass is immediately put into an annealing furnace in order to remove the strains caused by the various sudden heating and cooling operations. The glass nearest the pipe is later removed from the object by sawcutting, use of a hot wire or narrow flame followed by application of a cold object at the heated point, melting off by means of a circular flame, or by cutting with a diamond. The top is then given whatever finish is desired.

One of the main reasons for the remarkable improvement in recent years in laboratory apparatus made from tubing has been the use of machine-drawn tubing. Formerly, a workman would obtain a quantity of molten glass on the end of a pipe, attach the bottom of the gather to a flat iron plate with a rod fastened to the other side, and draw the glass into a long tube by walking away from the plate held by a second worker. Even with very skillful workers, there were large variations in each draft. The men were paid for all tubing within plus or minus 1½ or 2 millimeters of the size desired.

Several mechanical methods for making tubing are now in use. The best known is the Danner tube drawing machine developed by the Libbey Glass Co. during the last war. In this system, illustrated in figure 19, glass from the refining end of a furnace flows onto a rotating hollow clay cylinder located in a small auxiliary furnace placed next to the refiner. Air is blown into the rear of the cylinder and the glass is drawn in a continuous tube from the front end by the Danner machine. This machine is located about 125 feet from the cylinder to allow the tubing to cool sufficiently to become rigid and cool somewhat before reaching the revolving jaws of the drawing device. At the machine, a cutting wheel severs the tubing into pieces having a convenient length of about 5 feet. With this machine, much greater uniformity of diameter, roundness, and wall thickness can be obtained than by any hand method.

The manipulation of glass tubing by softening in a gas flame and reshaping to form bulbs and to make seals and bends is familiar to

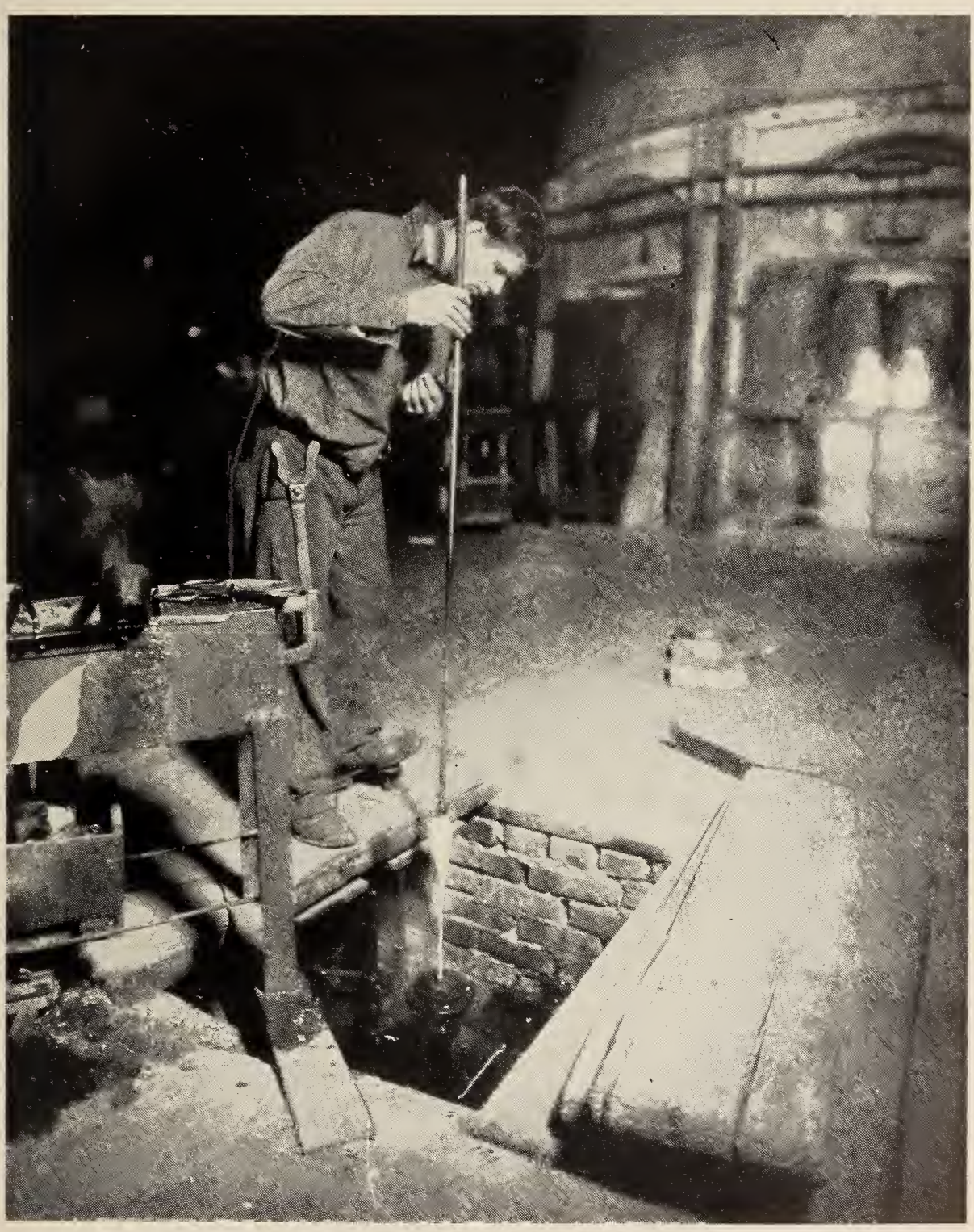

FIGURE 18.—*Glass blower about to insert blank into mold.*

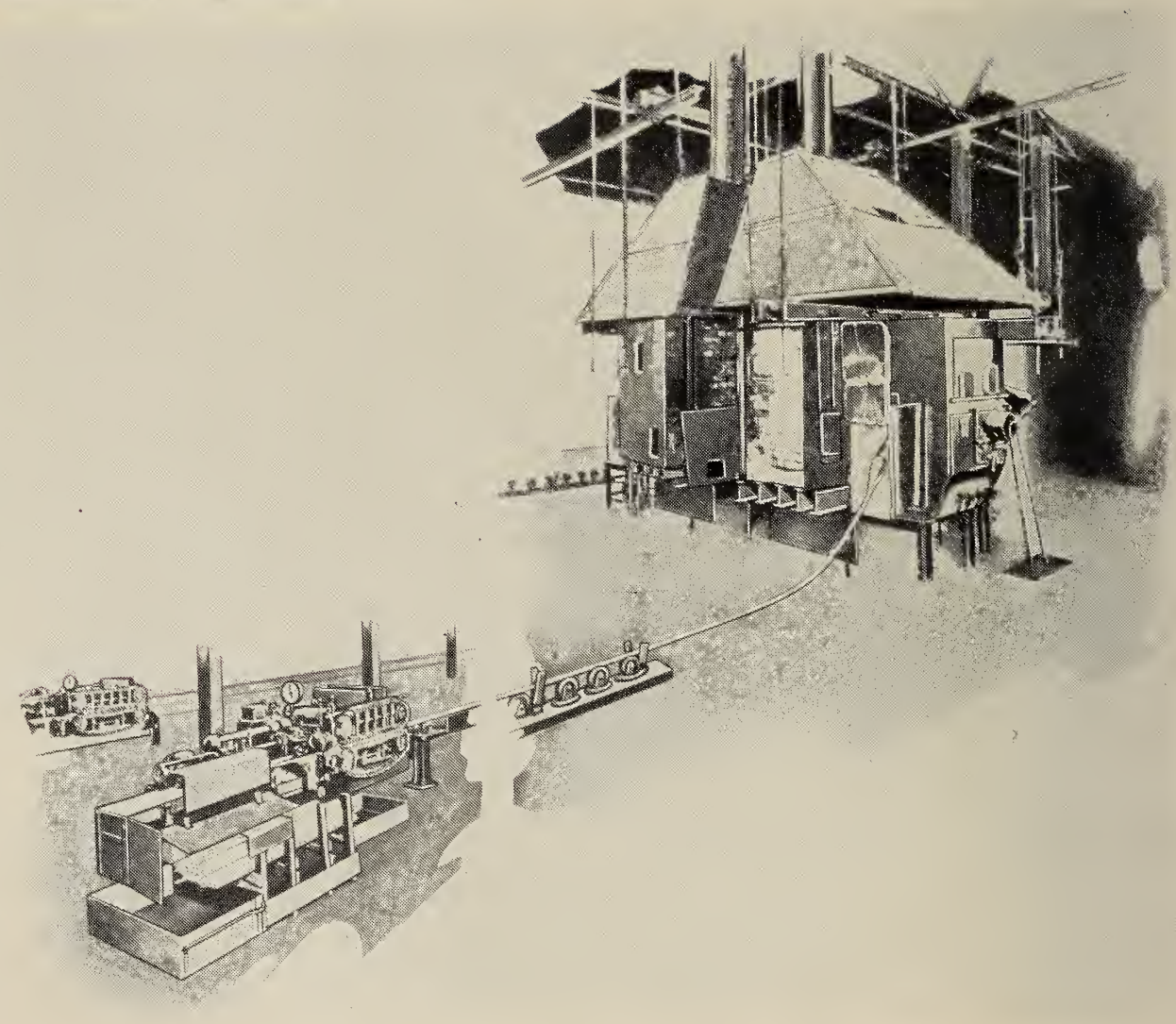

FIGURE 19.—*Danner tube drawing machine.*

most people, so that a description of the various steps will not be given. The tools used are quite simple and have not changed greatly for many years. Noteworthy improvements have been made, however, in the types of fuels and the burners. In Europe, the earliest fuels were fat and liquid butter, used with a wick. Coal gas burned in an old-fashioned Bunsen burner came next. Later still, the use of a foot bellows gave compressed air for a simple blast burner. Similar schemes were used in this country also. Compressors, of course, are now used to supply air, while the list of fuels includes natural gas, mixed gas, liquefied refinery gases, and acetylene, in addition to coal gas. For glasses with high softening points, oxygen is needed to obtain a sufficiently hot flame, and special burners have been developed for this purpose.

Annealing was mentioned in connection with articles made from molten glass. It is just as necessary to anneal tubing products to eliminate breakage.

In the foregoing the production of blanks for calibrated laboratory glassware has been discussed. Methods of calibration for instruments of precision are based on weighing the volume of liquid contained or delivered. Actually, to weigh out such volumes consumes much time and the cost is high. Further, the shape of some items is such that it would be difficult to secure an analytical balance which would accommodate them.

For production work, rapid methods are necessary. Formerly, it was common practice to take a sample of an item, made previously or purchased from a competitor, and use it to transfer testing volumes to a new lot of blanks. Any error in the volume of the sample was then present in the new lot of apparatus. Demands for higher accuracy caused a change in methods. The next step was selection of a blank and calibration of it by weighing the volume contained or delivered.

With this second type of standard, there was still one serious defect. At the calibration mark the diameter was the same as in the blanks, and any error was transferred in full effect. It is desirable that standards be so constructed that they can be calibrated 5 to 10 times as accurately as the ware to be tested. It has been possible to do this. Figure 20 shows one method of calibrating the necks for Babcock milk-fat test bottles. The blank neck is inserted in the rubber hose, alcohol admitted to a definite point, and the neck marked at this level by paint carried on a thin hair. Then the plunger is inserted displacing the alcohol. A line on the stem of the plunger denotes the volume desired. The neck is marked off when the plunger is submerged to this line. Since the diameter of the stem is so much smaller than the diameter of the neck, such a method of calibration can be very accurate.

Figure 21 shows the calibration of a measuring flask. The standard volume is delivered between the overflow, at the top, and a mark on the stem. Notice the small diameter of the stem compared with the diameter of the neck of the flask.

Cylinders and pharmaceutical graduates are made from blanks blown in molds. Despite the blower's best efforts, certain places have thicker walls than others. It is not sufficient to calibrate for over-all volume, as with the Babcock necks. Certain intermediate points

must also be individually calibrated to minimize the effects of such inequalities in inside diameter.

Figure 22 shows a typical setup for cylinders. The standard volumes are delivered from the bulbs into the blank being tested, and each volume is marked off on the blank. For this particular cylinder, four points are needed. It will be noticed that there are more calibration points in the lower portion, since the diameter varies more in this part.

Figure 23 shows the method used for small articles. Mercury is the calibrating liquid, and it is measured in small flasks with capillary-tube stoppers. The capacity is the over-all volume, including the space in the stopper.

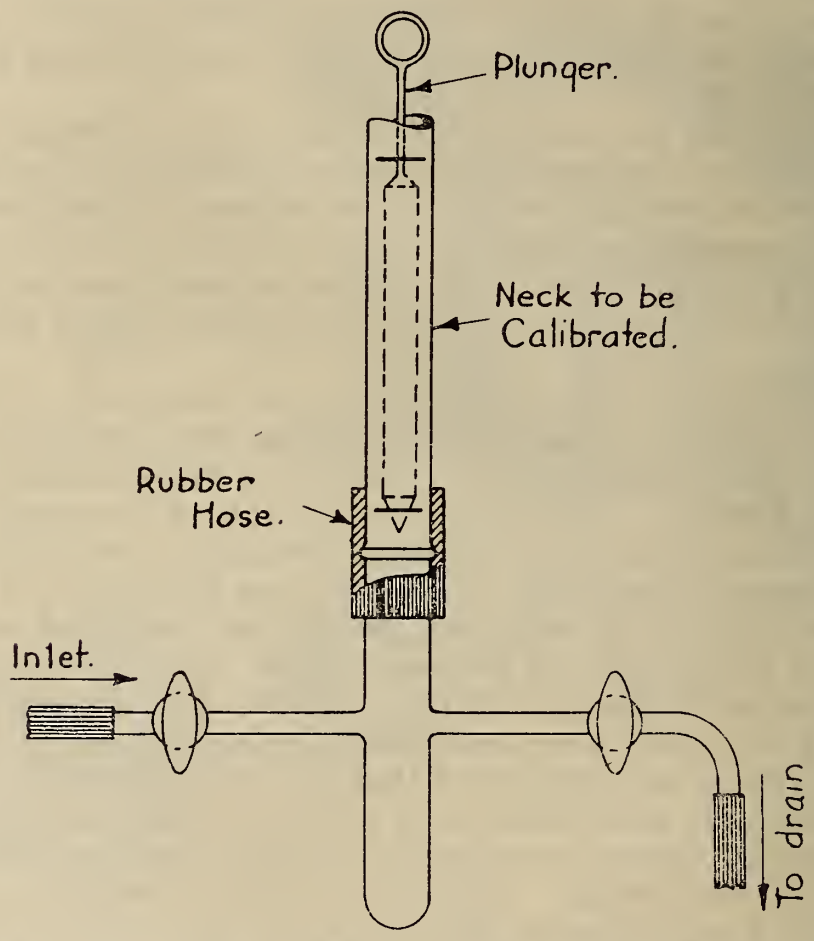

FIGURE 20.—*Method of calibrating necks for Babcock test bottles.*

Certain precautions must be observed when using these volumetric methods of calibration. First of all, the standard, the testing liquid, and the blank must be at approximately the same temperature. Otherwise, volume changes in the water may occur which will introduce errors into the calibration. Then the object must be clean, so that water will wet the walls uniformly, otherwise irregularities in capacity are caused by distortion of the meniscus. In instruments calibrated to deliver, dirty walls affect the amount of residue adhering to the walls. Fuming sulphuric acid, a mixture of chromic-sulphuric acids, and trisodium phosphate have been used as cleaning agents.

Further, if an instrument is calibrated to deliver, it must be filled and emptied before adding the standard volume to compensate for the amount which does adhere to the walls, unless this extra amount

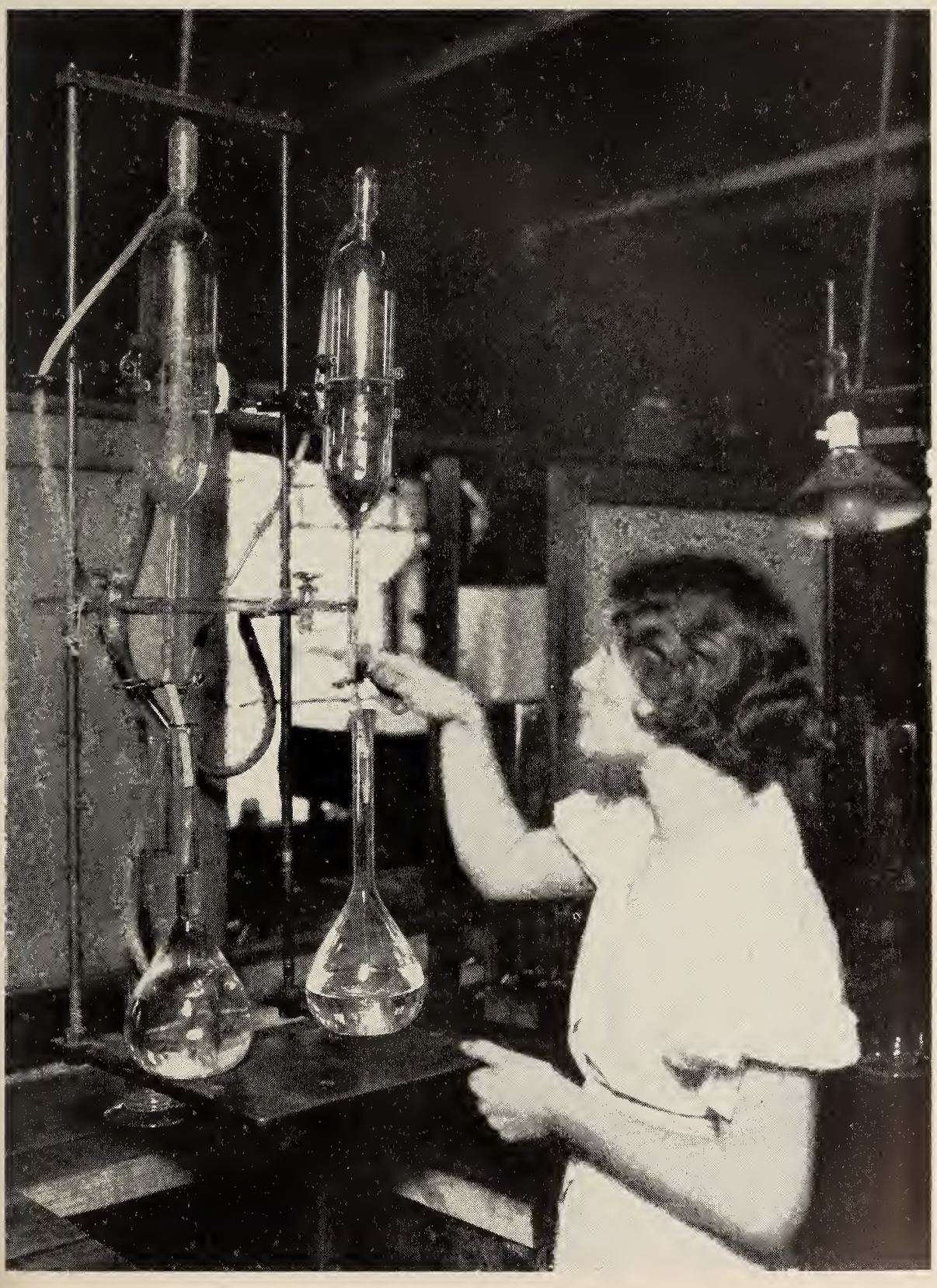

FIGURE 21.—*Calibration of measuring flask.*

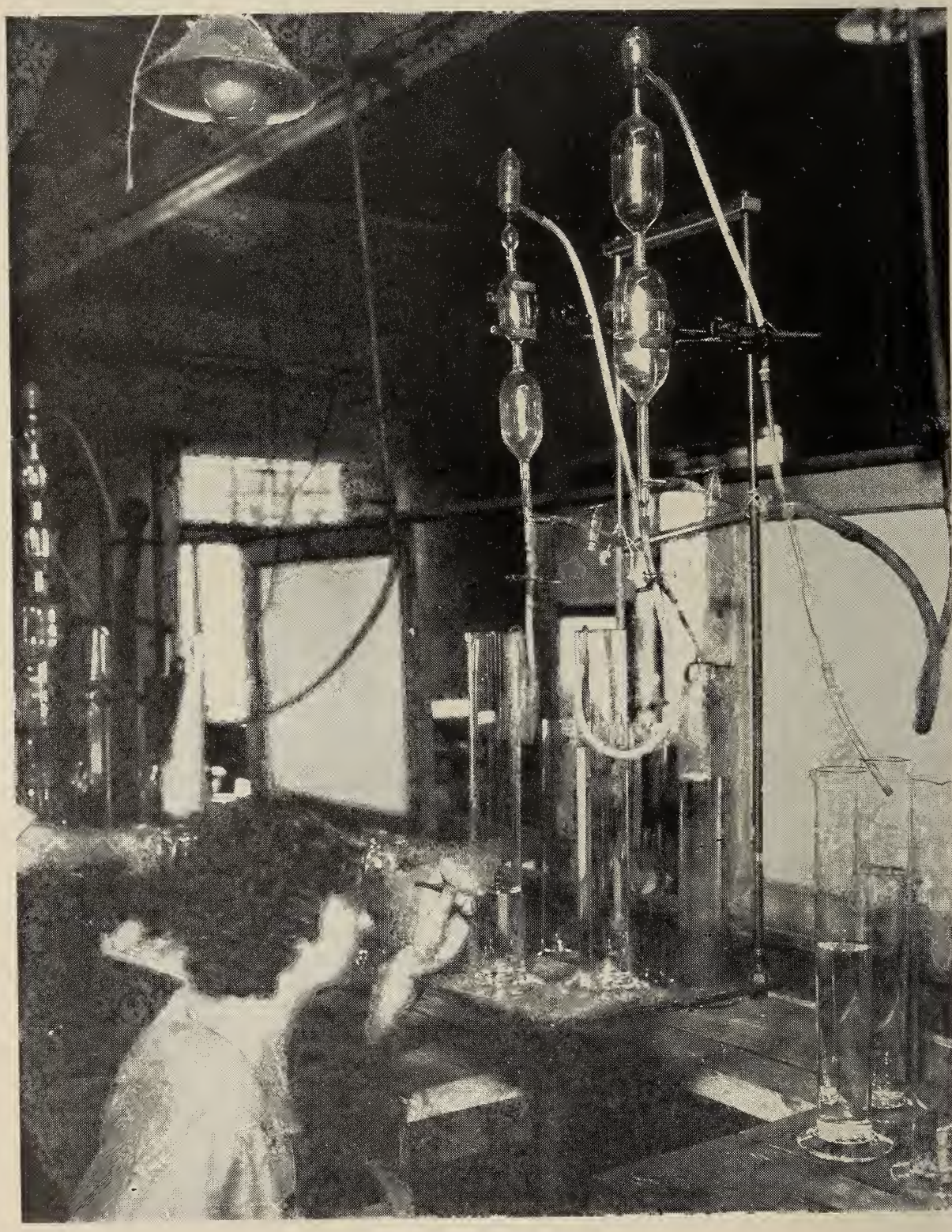

FIGURE 22.—*Calibration of cylinders.*

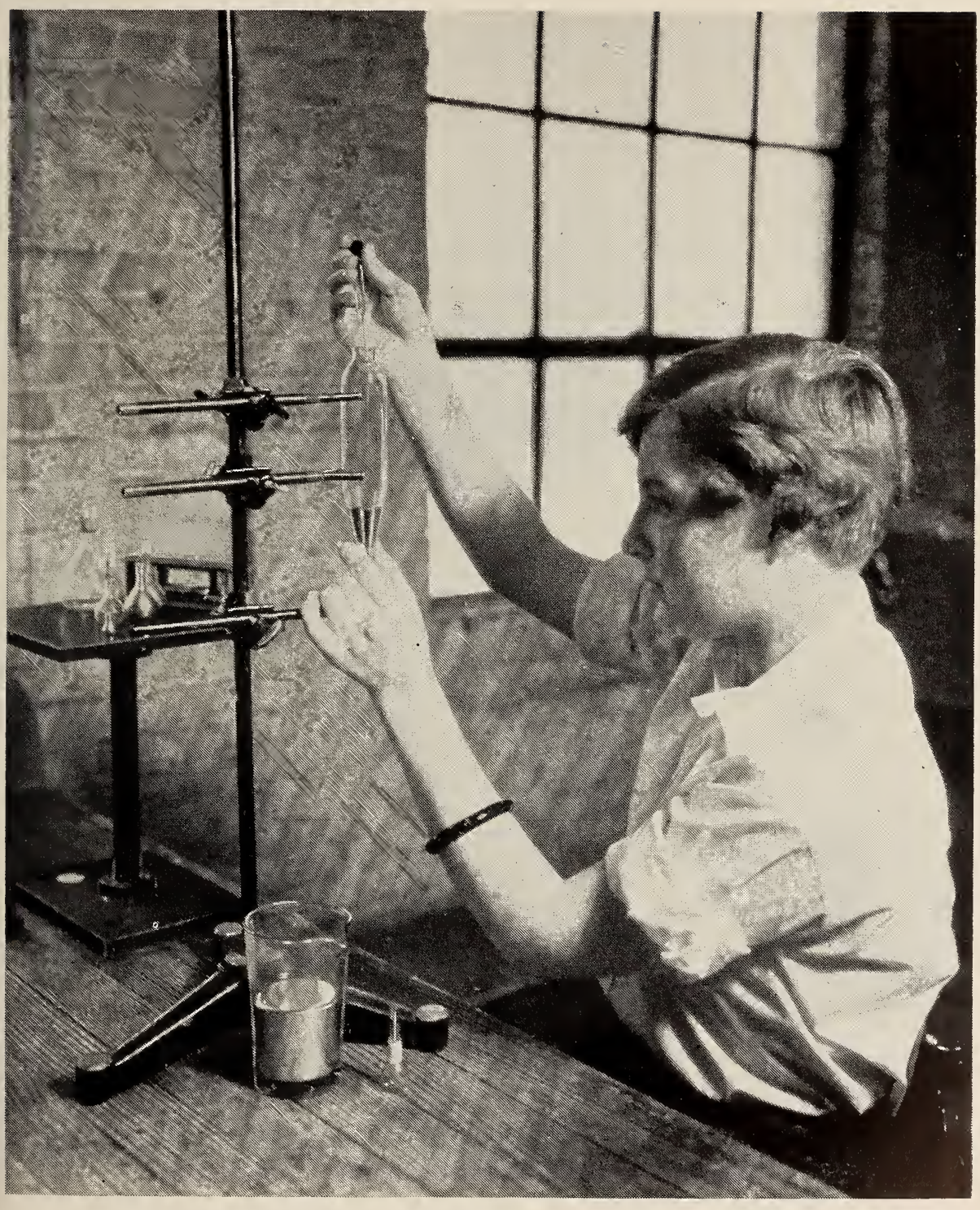

FIGURE 23.—*Calibration of small types of graduated glassware.*

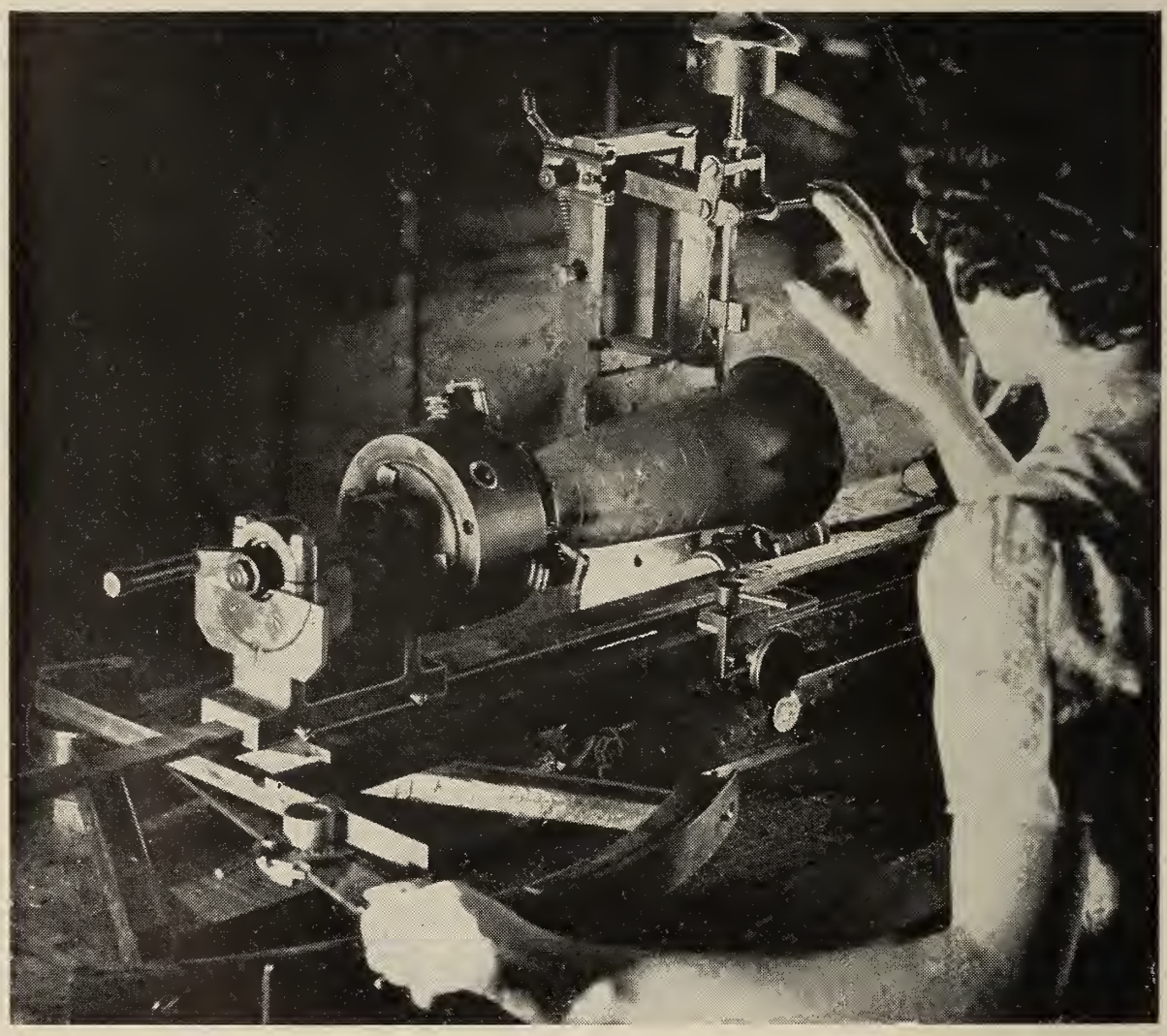

FIGURE 24.—*Graduating operation on conical graduate.*

has been provided for in the standard. Care must also be used in filling. Splashing, with possible loss of liquid, must be avoided. The liquid should be directed against the wall of the vessel a few millimeters above the point where the surface will rest, since this aids in the formation of a true maniscus.

Particular care must be taken in marking the liquid surface. The lowest point of a water meniscus is always used. In order to define it sharply, a shade of some dark material is placed just below the meniscus. Above all, the instrument must be vertical. Otherwise, serious errors may occur.

After the calibration marks are placed, the outside of the blank is coated with wax and the object is then placed in the dividing machine. Here the wax is scratched off at the places where lines and numbers are to appear.

Automatic machine made tubing which has very uniform bore is used for objects like Babcock neck blanks, so that the two marks which represent the ends of the scale are sufficient to permit the machine to mark off the intermediate portions accurately, using the end lines as guides.

With cylinders and pharmaceutical graduates, the machine is set between each pair of test marks separately. The problem is quite complicated, however, when conical pieces like pharmaceutical graduates are to be made. Here we have not only a blown item, but also one with constantly changing diameter. To calibrate every line would be impractical—no one would pay the cost. Equal spacing by ordinary dividing machines cannot be done, because equal lengths of scale do not represent equal volumes because of a constantly changing diameter. Only special machines which allow for this change should be used. Figure 24 shows this operation being performed on a graduate. The glass foot is set in a chuck and the position of the graduate in the machine is adjusted according to the calibration points. By means of the lever, the graduate is moved along under the knife and the wax scratched off by the knife which comes down and touches the wax surface. The amount of movement is gauged by notches cut in the segment in the foreground.

Following this, the glass is dipped in a bath of hydrofluoric acid where the surface of the exposed parts of the glass is eaten away to a depth of about 0.1 millimeter. The wax is then removed, and the etched portions are filled with an opaque material. In the past few years we have developed the use of powdered glass as a filler. The apparatus is then heated to fuse this filler to the apparatus, thus attaching it permanently.

Better grades of apparatus are recalibrated by the manufacturer before shipment. This work is similar to that which weights and measures officials are frequently called upon to do. While factory methods may be different, the general precautions mentioned in describing the original calibration hold both for factory work and for your work.

In this connection, it might be mentioned that the use of a pharmaceutical graduate to check those a druggist has in his prescription department is open to serious objection. Straight-sided cylindrical graduates should be used. This subject was fully covered by H. W. Bearce in a paper presented at the Ninth Annual Conference in 1914.

I realize that the presentation of this subject has been very sketchy; if one went into great detail it would require days to cover the subject. However, I have here some exhibits which show some of the steps in the manufacture of certain pieces of calibrated glassware.

(At this point Mr. Moran exhibited two panels, containing samples showing several stages in the manufacture of a pharmaceutical graduate and of a Babcock bottle, respectively.)

(At this point, at 12:10 p. m., the Conference took a recess until 2 p. m. The official Conference photograph was made in the meeting room during the recess.)

FOURTH SESSION—AFTERNOON OF WEDNESDAY, JUNE 4, 1941

(The Conference reassembled at 2:00 p. m., Tom Webb, Vice President of the Conference, in the chair.)

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

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

This report is the fifth and final report in the series begun in 1937, presenting statistical results and brief analyses of the tests which the National Bureau of Standards has made on vehicle scales in the cooperative program with the States. The results presented are cumulative, that is, they represent results from the beginning of the vehicle-scale testing service of the Bureau in 1936 and include all of the results through the completion of our scheduled program in May of this year.

It is a source of very great satisfaction to be able to report that the Bureau has been successful in carrying out in its entirety the plan which was begun in November 1936, and which contemplated visiting with our vehicle-scale testing unit every State in the United States which was not provided with adequate equipment for the testing of vehicle scales. In a few instances, States which have had in operation special vehicle-scale testing equipments have been visited, but the important thing is that each State which has not had such an equipment at the time the Bureau equipment arrived in its neighborhood has been visited.

The country-wide program was concluded with the testing in the State of Utah which was finished on May 17, 1941. Since the report made to the last Conference, testing schedules have been completed in the States of New Mexico, Arizona, Colorado, South Dakota, Montana, Washington, Oregon, Nevada, California, and Utah. A small amount of cooperative work was done in Wyoming and in Idaho. Thus there have been completed testing schedules in 40 States and in 2 large cities in other States. As before, the cooperating officials have been officials in charge of weights and measures departments, where such departments have been in operation; in the State of New Mexico the Bureau's program was carried on in cooperation with the Gasoline Tax Division of the State Bureau of Revenue, and in the State of Colorado the cooperating agency was the State Inspector of Oils.

During the 4½-year period of Bureau vehicle-scale testing activity, 2,973 tests of large-capacity platform scales have been made. However, this report is confined to the results of 2,840 tests, the remaining 133 tests being tests on scales owned by the Federal Government or on scales not properly classified as vehicle scales. In a very few instances particular scales have been tested twice. In these cases each retest has been considered as a separate test for statistical purposes. It is of interest to note that of the 2,840 scales covered by this report,

1,001 scales, or 35 percent, have been wagon scales and 1,839 scales, or 65 percent, have been motortruck scales. Scales to the number of 632, or 22 percent of the total number involved, have been equipped with automatic indicating devices; of these, 557, or 20 percent of the total number tested, have had automatic indicating devices with substantial weighing ranges, while the remaining 75 scales, or 3 percent of the total, have been equipped with attachments the weighing ranges of which represented only small proportions of the scale capacities.

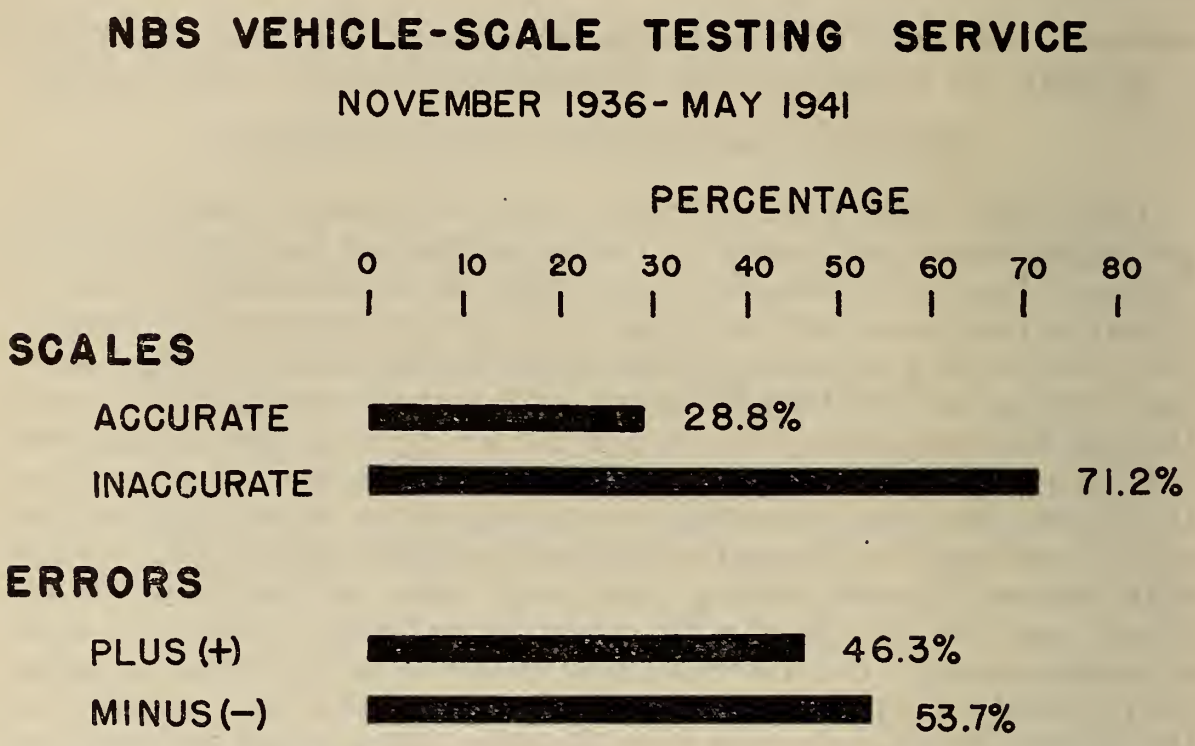

FIGURE 25.—*Percentages of accurate and inaccurate scales and distribution of plus and minus errors.*

Accuracy.—Statistical data are presented in table 1, scales being separated first on the basis of types, and second upon the basis of ownership or principal use. Certain data are presented graphically in figure 25. Mean percentage errors are computed from the maximum percentage errors developed in the tests, regardless of the size or position of the test-weight load. Scales are classified as accurate or inaccurate upon the basis of the maintenance tolerance adopted by the National Conference on Weights and Measures, which, in general, may be said to be ± 0.20 percent, applied to errors of the scale indications with respect to the standard-weight loads used.

When a comparison is made between the data presented in table 1 and the corresponding data presented in last year's report, there is found a very striking similarity between the figures representing the numerical mean of maximum percentage errors and between the percentages of scales found accurate. For instance, last year it was reported that of the 2,161 scales involved, 28.0 percent were found accurate, and the numerical mean of the maximum percentage errors was 1.13 percent; the corresponding figures this year are 28.8 percent and 1.10 percent.

The scales reported upon include 65 scales found to have maximum errors in excess of 5 percent of the test-weight loads, 16 such scales

TABLE 1.—*Vehicle-scale test results, November 1936 to May 1941*

Type, ownership, or use	Number tested	Found accurate		Found inaccurate		Numerical mean of maximum percentage errors
		Number	*Percent*	*Number*	*Percent*	
Wagon scales	1,001	191	19.1	810	80.9	1.32
Motortruck scales	1,839	626	34.0	1,213	66.0	0.98
State, city, town, or county	271	89	32.8	182	67.2	0.97
Coal or coke	1,418	369	26.0	1,049	74.0	1.01
Grain	356	143	40.2	213	59.8	0.96
Cotton or cotton products	248	73	29.4	175	70.6	1.42
Scrap materials	121	25	20.7	96	79.3	1.59
Miscellaneous farm products, including fruits and sugarcane	151	44	29.1	107	70.9	1.01
Stone, sand, or gravel	73	12	16.4	61	83.6	2.08
Public weighing	103	25	24.3	78	75.7	1.67
Miscellaneous	99	37	37.4	62	62.6	0.82
Total	2,840	817	28.8	2,023	71.2	1.10

having been encountered during the past year. Because of the abnormally large errors of these 65 scales and of the effects which their errors have upon the figures representing the numerical means of the maximum percentage errors, the figures for these numerical means have been recomputed excluding the 65 scales in question and these percentages are presented in table 2; the corresponding values computed on the basis of all scales tested are included for purposes of comparison.

TABLE 2.—*Numerical means of maximum percentage errors, November 1936 to May 1941*

Type, ownership, or use	All scales	Excluding 65 scales having abnormally large errors
	Percent	*Percent*
Wagon scales	1.32	0.94
Motortruck scales	0.98	.66
State, city, town, or county	0.97	0.77
Coal or coke	1.01	.77
Grain	0.96	.55
Cotton or cotton products	1.42	.68
Scrap materials	1.59	.91
Miscellaneous farm products, including fruit and sugarcane	1.01	.81
Stone, sand, or gravel	2.08	.94
Public weighing	1.67	.98
Miscellaneous	0.82	.77
Total	1.10	0.76

The agreement between the figures presented in the last column of table 2 with corresponding figures presented a year ago is very striking; the numerical mean of the maximum percentage errors for all scales, after excluding the 65 scales having abnormally large errors, is identical with the figure reported last year—0.76 percent.

Some of the facts brought out by an analysis of the test results may be noted as follows:

It is again found that in the case of approximately one-fourth of the scales tested there was faulty agreement among the several bars of the

weighbeams (on scales not utilizing counterpoise weights), weighbeam indications were inaccurate independent of scale-ratio errors (on scales utilizing counterpoise weights), or weighbeams which were subordinate to reading faces were inaccurate.

Only 40 scales were encountered last year on which regular counterpoise weights were utilized, bringing the total of such scales to 183, or 6 percent of the total number tested. Of the 923 regular counterpoise weights tested, 404, or 44 percent, were found to be accurate; 93, or 10 percent, were found to be heavy; and 426, or 46 percent, were found to be light. During the past year 32 scales were tested on which "extra" counterpoise weights were in use. These were usually home-made weights or weights belonging to some small scale of low multiple incorrectly marked for use on the scales on which they were being used.

In the matter of the sensitiveness of scales, sensibility reciprocal requirements were applicable to, and SR data are available for, 2,204 scales, or 78 percent of the total tested. Of these scales, 849, or 38 percent, were not sufficiently sensitive; 1,339, or 61 percent, were found to have SR values within the prescribed limits; and 16 scales, or 1 percent, were found to be in neutral or unstable equilibrium.

Information is available relative to the zero-load balance condition, as found, for 2,798 scales. Of this number, 921 scales, or 33 percent, were found to have zero-load balance errors in excess of 5 pounds; in addition, 64 scales, or 2 percent, were found to have been balanced at zero load by means of weighbeam poises, these scales being in reasonably good zero-load balance condition as found, but having serious zero-load balance errors when all poises were returned to zero positions.

Based upon the accepted criterion that a wagon scale is suitable for the weighing of motortruck loads only up to 60 percent of its "wagon" capacity, the percentage of wagon scales which have been overloaded in use has again risen slightly, the figure now being 74 percent, representing 736 of the total of 1,001 wagon scales tested. Motortruck loads equalling the "wagon" capacities of scales were reported as being weighed on 236, or 24 percent, of these wagon scales, and in 95 instances, or 9 percent, the motortruck loads weighed exceeded the "wagon" capacities of the scales. It is to be remembered that when the Bureau tests a wagon scale, the test loads are limited to those which would be applied under conditions of proper use in accordance with the loading criterion previously stated; we are without information as to the errors which may be developed when these scales are overloaded as stated.

At the opposite extreme, it is found that many vehicle scales are being used for the weighing of loads less than 1,000 pounds, a practice contrary to the regulation adopted by the National Conference in 1937. Such data are available on 2,205 scales; of this number, 1,063, or 48 percent, are reported as being used for the weighing of loads of less than 1,000 pounds; and in the case of 493 of these scales, or 22 percent, the weighing of loads of 100 pounds or less has been reported.

During the past year there were reported 128 instances of motor vehicles or tractor-trailer combinations being weighed on scales the platforms of which were shorter than the wheel bases of the vehicles or vehicle combinations in question.

From the beginning of the Bureau's testing of vehicle scales, an inspection of the lever system and other parts of each scale has been a regular part of the Bureau's testing routine. Inspections of lever systems are made in all cases where access to such parts may reasonably be had, but because of the absence of means for access to the scale pits or because of the presence of water, mud, or excessive accumulations of dirt in scale pits, no pit inspection, or only partial pit inspection, has been possible in the case of 252 scales, or 9 percent of those tested.

A statistical summary of inspection data is presented in table 3. In general, percentages are based upon the total number of scales examined, except in the case of automatic-indicating elements, where the basis is the number of scales equipped with such elements. However, data enclosed in brackets are for the past 2 years only, being based upon a total of 1,391 scales and a total of 282 scales equipped with automatic-indicating elements.

TABLE 3.—*Vehicle-scale inspection results, November 1936 to May 1941*

[Data in brackets are for period April 1939 to May 1941]

Condition	Occurrence	
	Number	Percentage
Accessibility of lever system:		
Reported as "bad"	164	6
Reported as "poor"	530	18
Reported as "fair"	1,016	36
Reported as "good"	901	32
Reported as "very good"	226	8
No provision for pit drainage or information not available on this factor	1,609	57
[Pit repairs needed	55	4]
Scale approaches:		
Rough	194	7
Curved	332	12
Inclined to scale platform	1,483	52
Inclined to scale platform at angle of 3° or more (included in preceding entry)	792	28
Water standing in scale pit and/or clogged pit drain	337	12
Accumulation of dirt in scale pit [1]	1,169	41
Rusting structural steel in scale pit	881	31
Pivots and bearings of the lever system:		
No protection against corrosion	1,334	47
Only partial protection against corrosion	175	6
Rusting or dirty	1,508	53
Worn	475	17
Displaced from proper relative positions, or displaced entirely from mutual contact	338	12
Levers out of level	496	17
Beam rod, bearing assemblies, and/or connections between levers out of plumb	1,050	37
Interference between, or inadequate clearance around elements of the lever system	371	13
Loose levers or lever extension arms	110	4
Faults associated with lever stands or supports	176	6
Faulty lever foundations	69	2
[Faults associated with weighbridge girders	51	4]
Faults associated with platform checking means [2]	529	18
Clearances between scale platform and coping too large, too small, or both	1,001	35
Platform in need of repair	741	28
Platform not in surface alinement with coping	301	11
Inadequate clearance around beam rod	109	4
Weighbeam assemblies:		
Dirty, rusted, or tarnished	691	24
Mechanical faults associated with some part of the assembly	499	18
Loose parts or insecure mounting	296	10
Automatic-indicating elements:		
Interference in the mechanism	110	17 [based on total of 632
Faulty indications (does not include weighing inaccuracy)	90	14
[Other faults associated with automatic-indicating elements—based on total of 282	58	20]

[1] During the past year, there were reported 104 instances (15 percent) of actual interference of foreign matter with lever systems.

[2] In addition, during the past year there were reported 76 instances, or 11 percent, of ball plates not being properly alined with lever systems.

As in the case of test data, the inspection data are in agreement to a surprising degree with the data presented a year ago. Of the 34 general percentages reported, 12 are the same as the corresponding percentages reported last year, and the others differ from last year's corresponding percentages as follows: 5 are 1 percent higher and 5 are 1 percent lower than before; 2 are 2 percent higher and 4 are 2 percent lower; 2 are 3 percent higher; 1 is 4 percent higher; 1 is 5 percent higher and 1 is 5 percent lower; and 1 is 6 percent lower.

Throughout the program of vehicle-scale testing which the National Bureau of Standards has conducted throughout the United States, a consistent effort has been made to select for test representative scales in each of the several States visited, so that the statistical results would truly represent average conditions. It is considered rather remarkable that as our equipment has moved from State to State and as progress reports have been prepared from year to year, results reported for succeeding periods have been in such close agreement. The conclusion is inescapable that the general level of accuracy of performance of vehicle scales and the general character of vehicle-scale maintenance are both distressingly low in all jurisdictions where adequate testing means are not provided and where comprehensive tests and inspections are not conducted. The conclusion that strenuous efforts should be made by weights and measures officials to improve these conditions is so obvious that it scarcely need be stated. In its summary reports to State officers upon the results of the tests made in their several jurisdictions the National Bureau of Standards has consistently recommended the procurement of proper equipment and the adoption of programs of comprehensive testing and inspection. That the Bureau program and the Bureau recommendations have been effective will be sharply brought home to you in the next item on our program this morning; there will be illustrated and described some of the new vehicle-scale testing equipments and other apparatus related to vehicle-scale testing which have recently been put into service. There still remain numerous jurisdictions in which similar steps should be taken, especially in those States in which there is not at the present time any active State agency enforcing weights and measures supervision.

During the coming year it is not anticipated that the Bureau vehicle-scale testing equipment will be in regular field service. We are going to conduct some investigations and research associated with vehicle scales and vehicle weighing, and a report upon these matters will be presented to the next National Conference on Weights and Measures. At that time we also propose to present to the National Conference a further analysis of some of the factors associated with this general subject, upon which comment has not been made in the series of reports of which this is the last. To what extent the Bureau may, at a later date, resume field operation of its vehicle-scale testing unit, will depend upon circumstances which cannot definitely be predicted now. I feel that I should say, however, that with the conclusion of the first phase of its vehicle-scale program the National Bureau of Standards has not terminated its interest in this subject, and hopes to continue its program in whatever way will be most effective in bringing about the improvement in vehicle scales and vehicle-scale weighing practices which our investigation up to now has shown to be so greatly needed.

RECENTLY COMMISSIONED VEHICLE-SCALE TESTING EQUIPMENTS

REMARKS OF C. L. KLOCKER, INSPECTOR OF WEIGHTS AND MEASURES, STATE OF CONNECTICUT

The device illustrated (see fig. 26) is one for the testing of our 1,000-pound weights. It provides a simple, effective, convenient, and accurate means for calibrating these weights. It is essentially an equal-arm balance, at the base of which, and immediately above the timber support, there is installed a 10-ton hydraulic jack. The weights are put into position on the floor and connected to the beam and then by the operation of the jack the entire beam assembly is elevated, thus suspending the weights from the beam. I believe the entire equipment cost us only about $350.

To round out the story of our vehicle-scale testing equipment, there is illustrated in figure 27 the field truck and its complement of 1,000-pound test weights. The gross weight of this equipment is 42,000 pounds. Experience has shown that our design was faulty in two respects: (1) The wheel base is somewhat too long; we can get the truck on an 18-foot scale platform, but not on a platform shorter than that. (2) At the rear end of the truck we allowed too much space for the bumper and between the weights and the tail gate, so that when the truck approaches a scale on a grade we sometimes have a little difficulty in clearing the bumper when unloading the weights.

REMARKS OF ROLLIN E. MEEK, CHIEF, BUREAU OF WEIGHTS AND MEASURES, STATE OF INDIANA

The vehicle-scale testing equipment (see fig. 28) purchased and placed in service during the past year by the Indiana State Bureau of Weights and Measures is a decided improvement over any similar equipment operated by the Bureau heretofore. This equipment consists of a truck, ten 1,000-pound weights, twenty 50-pound weights, and a dolly for moving the larger weights to different positions on the scale platform.

The gross weight of the truck is approximately 22,500 pounds. The cab-over-engine design was selected because it brought about a better load distribution. The shorter wheel base provided by this type of truck enables easier handling in places where turning space is inadequate. The truck is equipped with dual rear wheels.

The body of the truck is of van-type construction and is approximately 12 feet long, 8 feet wide, and 6½ feet high. The ten 1,000-pound weights are carried and locked in place in the base of the boom supporting structure. Suitable racks are installed on each side of the boom supporting structure to carry the twenty 50-pound weights. (See fig. 29.)

The 1,000-pound weights are lowered to the scale approach and reloaded by means of a power operated drum-type winch located under the forward end of the crane boom. The boom extends to the extreme inside rear of the body to allow for lowering and raising the weights through a trap door located at extreme rear of the body floor. Automatic stops are provided at both ends of the boom to limit trolley travel. The hoisting and traverse winches may be operated separately, or, to hasten the loading and unloading of the weights, they may be operated simultaneously.

Control levers are located at the left rear of the body in such a position as to be operated from the ground. There is little possibility of the operator being injured while unloading or loading the weights owing to his position being directly in front of the controls and away from the weights. With the controls located so they must be manipulated from the ground, one man can operate the equipment; however, it appears more economical to operate it with two men.

An additional accelerator is located adjacent to the controls. This enables the operator to increase and decrease the speed of the truck engine without returning to the cab each time. The exhaust pipe is extended to near the top of the body in order that fumes from the engine will not be blown directly into the faces of those handling the test weights.

Approximately three-quarters of an hour is required to test a vehicle scale. The usual procedure is to spot the truck at one end of the scale in such a manner that the weights may be unloaded on the scale approach rather than on the scale deck. After the scale has been properly balanced, five 1,000-pound weights are unloaded on corner No. 2, for example. After the reading has been taken, these weights are moved to corner No. 3. When this reading is taken, the remaining five weights are unloaded on corner No. 2. At this point, the end test reading is taken. The weights are then moved to the opposite end of the scale deck and distributed five on corner No. 1 and five on corner No. 4. The end test reading for that end of the scale is then taken. The five weights on corner No. 4, for example, are removed from the scale and the corner test reading for corner No. 1 is taken. The weights on corner No. 1 are then removed to corner No. 4 and the reading again taken. The weights on corner No. 4 are removed and the balance condition again checked.

The truck is then spotted on the scale in such a manner as to facilitate the loading of the test weights. When unusual conditions apparently warrant the most thorough test possible to make, the truck is weighed in as many as three positions on the scale platform. The weights are then loaded and reweighed in these same positions.

The equipment has been in operation less than eleven months and during that time approximately 1,300 scales have been tested. Of this number approximately two-thirds have been approved and approximately one-third condemned. We attribute the apparently small number of scales condemned to the fact that we have worked mostly in local jurisdictions where the scales have received annual inspections.

This equipment cost the State of Indiana approximately $6,000. For the benefit of those who might contemplate the purchase of equipment similar to ours, I may say that we have very thorough specifications covering the truck, equipment, weights, hoist, dolly, and motor, comprising some 8 or 10 pages, and we shall be glad to mail these to anyone who may desire to use them.

Mr. Fossett has asked me to remind you that the State of Illinois is purchasing two trucks very similar to those in operation in Indiana, only very slight modifications having been made from our design.

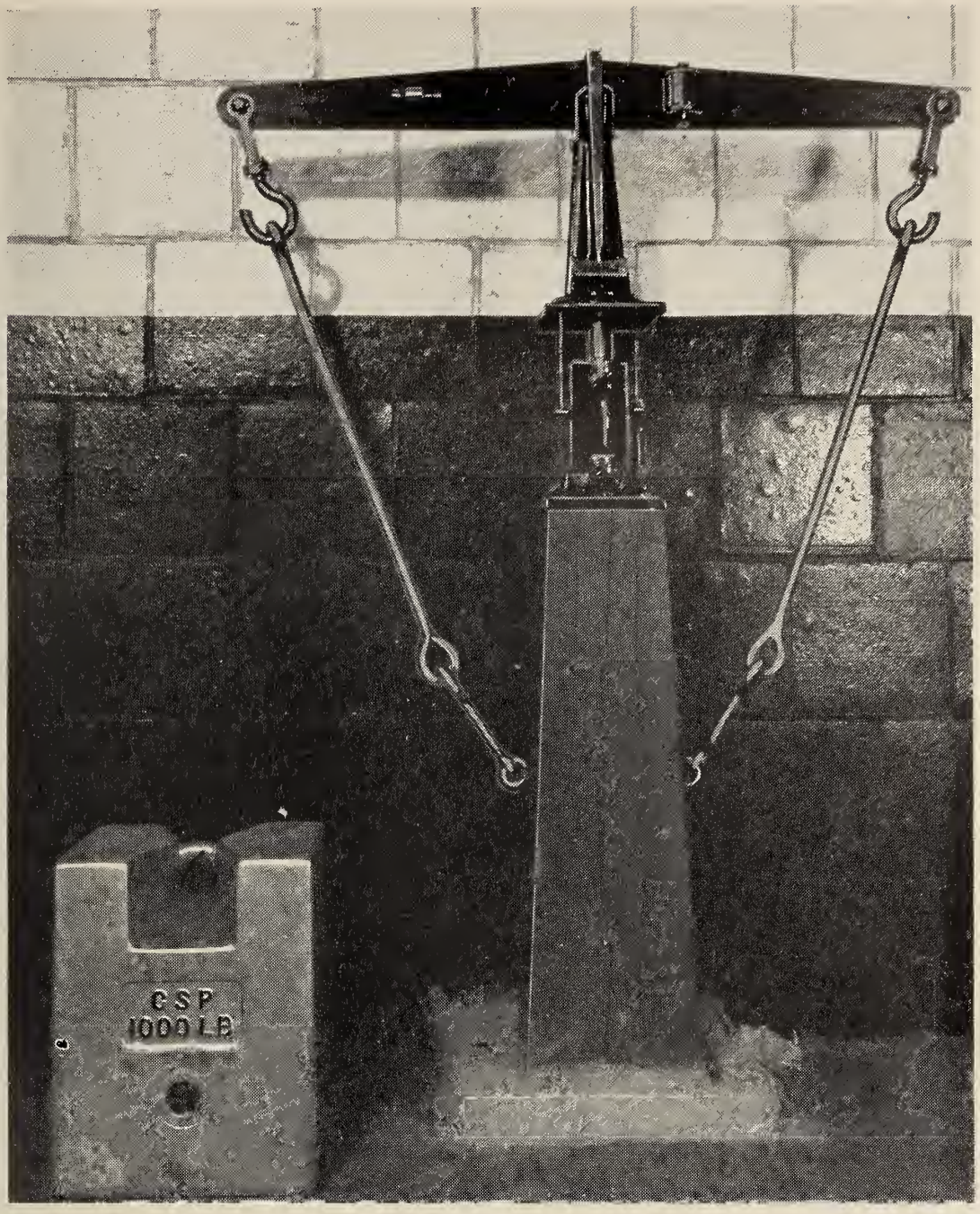

FIGURE 26.— *Testing beam for 1,000-pound weights, State of Connecticut.*

FIGURE 27.— *Vehicle-scale testing equipment, State of Connecticut.*

FIGURE 28.—*Vehicle-scale testing equipment, State of Indiana.*

FIGURE 29.—*Interior view, Indiana vehicle-scale testing equipment.*

FIGURE 30.—*Vehicle-scale testing equipment, State of North Carolina.*

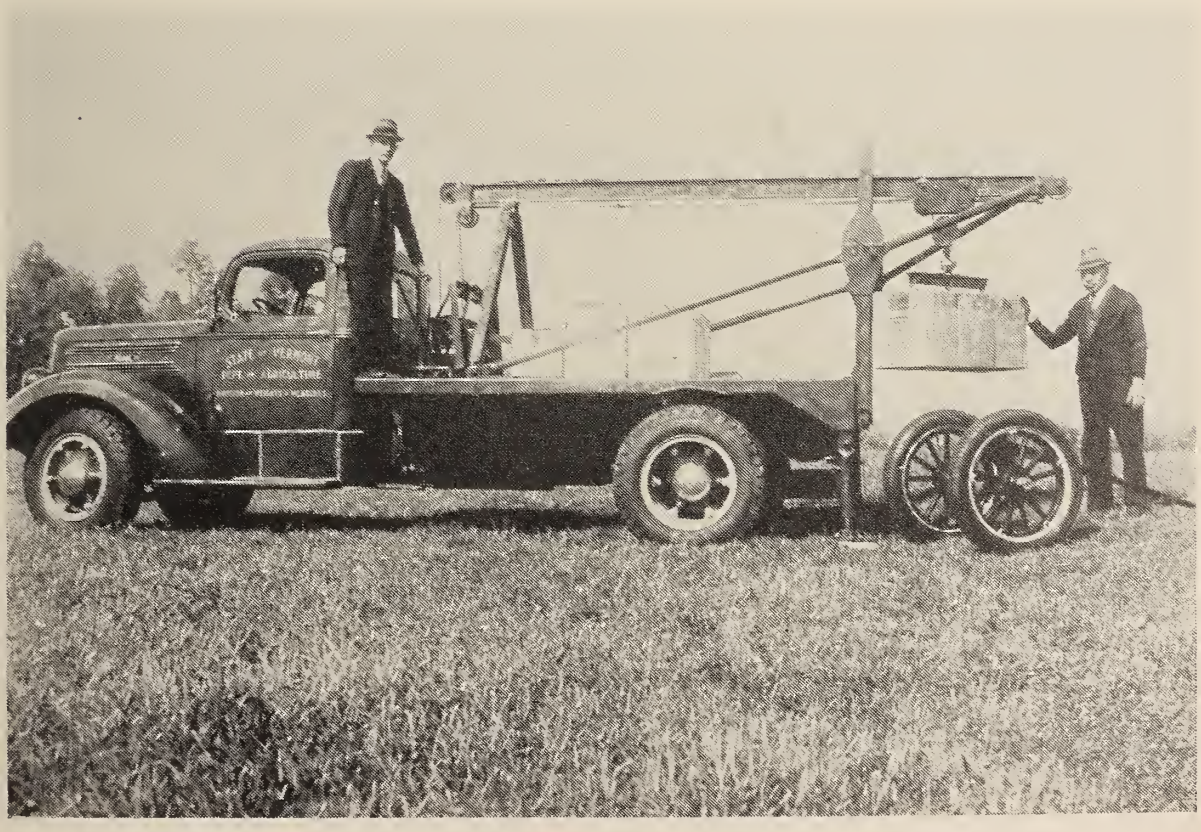

FIGURE 31.—*Vehicle-scale testing equipment, State of Vermont.*

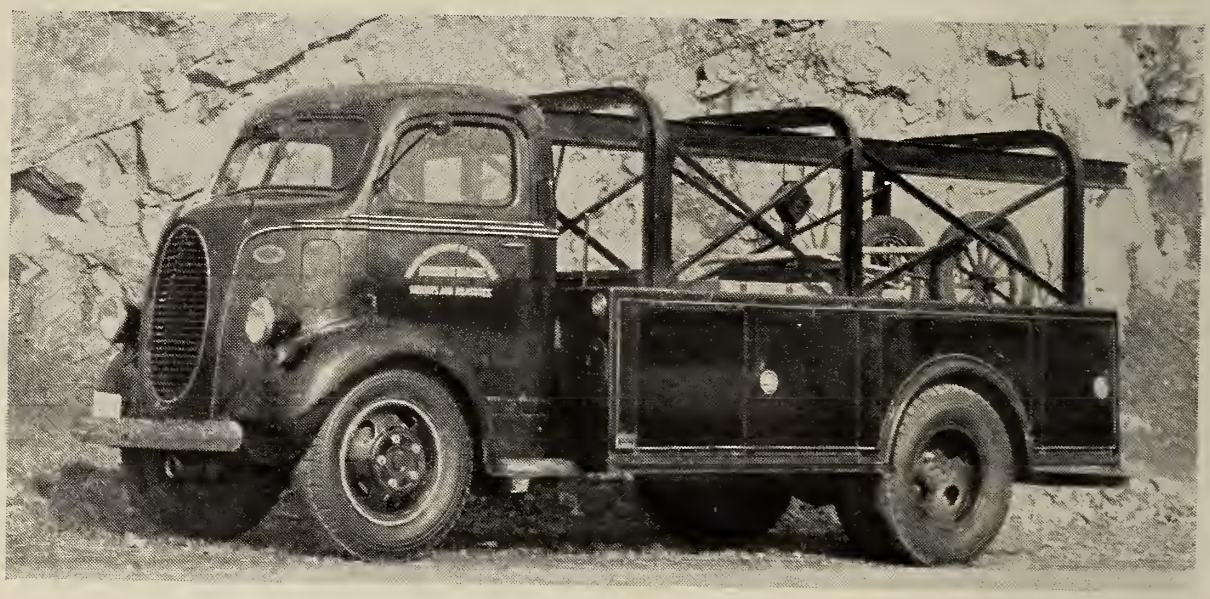

FIGURE 32.—*Vehicle-scale testing equipment, State of Virginia.*

FIGURE 33.—*Vehicle-scale testing equipments, city of Chicago, Ill.*

REMARKS OF C. D. BAUCOM, SUPERINTENDENT OF WEIGHTS AND MEASURES, STATE OF NORTH CAROLINA

Our equipment has been in service for nearly 3 years and has proved very economical in operation. It has a cruising speed of around 35 miles per hour. We carry 11,000 pounds of test weights in addition to small weights and the unit itself weighs about 11,000 pounds, thus making a total weight of around 22,000 pounds. The unit can be operated by one man, although we now run with a helper in addition to the inspector in charge.

The wheel base of the equipment is such that the truck can be placed on a 14-foot platform. It will be seen from figure 30 that the controls for the hoist are operated from the ground. We pick up three weights at a time, lowering these from the rear of the truck. The unit is designed to lift and lower the weights by power, making it unnecessary to depend upon a brake for holding the load. We carry a dolly for moving individual weights, modeled after the dolly used by the National Bureau of Standards.

The equipment cost us something less than $4,000; we believe that it is one of the least expensive of these equipments now in service. We had hoped to commission another similar unit this year, but the legislature did not provide the necessary funds. I may say, however, that the coal dealers of the State are practically demanding of the Governor that our department be given another of these testing units.

REMARKS OF H. N. DAVIS, SUPERVISOR, DIVISION OF WEIGHTS AND MEASURES, STATE OF VERMONT

Our equipment carries nine 1,000-pound weights, two 500-pound weights, twenty 50-pound weights, and the handling cart, and is illustrated in figure 31. The cost of this equipment was $3,995.95; the legislature appropriated $4,000, and we hewed pretty well to the line.

The total weight of the unit is about 20,000 pounds. Our testing method is essentially the same as the one described by Mr. Meek; we use the truck as a strain load only.

It is not feasible in Vermont to test wagon and motor-truck scales in the winter months, and accordingly we use our equipment only during the summer months. Last year we made our tests during July and August. It may interest you to know that during July we traveled 957 miles, using 195 gallons of gasoline and 6 quarts of oil and requiring 2 lubrications, at a total operating cost of $44.50. In August we traveled 917 miles. On these tests we sealed 64.5 percent of the scales tested and condemned 35.5 percent. On reinspections, about 25 percent of the scales originally condemned were condemned a second time.

We find that the testing of these large-capacity scales meets with the approval of nearly all the people in our State. A number of years ago Mr. Smith came to Vermont and tried to interest us in providing an equipment of this kind; he did interest us, but it took a number of years before the legislature could be persuaded to appropriate the necessary funds. We feel sure that we are giving the citizens of the State of Vermont good value for the money they are spending for this service.

REMARKS OF M. A. HUBBARD, SUPERVISOR OF WEIGHTS AND MEASURES, STATE OF VIRGINIA

Our scale-testing unit (see fig. 32) may be said to be a grandson of the vehicle-scale testing unit of the National Bureau of Standards, and it resulted directly from the bad conditions which the Bureau unit uncovered in Virginia. They found some 76 percent of our scales in poor condition.

Our unit was designed by the Engineering Department of the Virginia Polytechnic Institute with what help we could give them. We think it is well designed and adequately strong. It was built at a cost of approximately $4,000. The unit carries 9,000 pounds of test weights and the truck itself weighs approximately 9,000 pounds, making a total weight of about 18,000 pounds. Although our test-weight load is not as great as the loads carried in some other States, we believe that our unit is a very pratical one for conidtions in Virginia, because we have in use many scales of such small capacities that we could not use a heavy truck as a strain load.

There are compartments along the sides of our truck, in which baggage and necessary equipment are carried. The controls for the handling of the weights are located directly behind the cab. The floor of the truck is of 2-inch oak covered with heavy rubber belting that prevents shifting of the weights in transit and also protects the weights from wear. The truck is operated by an inspector and a helper.

We put this unit into operation last August, and since that time we have found that 57 percent of the scales which we have tested have been inaccurate and that the numerical mean of the maximum percentage errors developed is about 15 pounds per thousand. Our mean error is higher than it should be because of a few scales which had abnormally large errors. We tested a coal dealer's scale which I think had not been tested before and found that it developed a 4,000-pound error on an 8,000-pound test load!

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

We have two equipments, built to about the same specifications as those followed in the Indiana units which Mr. Meek has already described. (See fig. 33.) The loaded weight of each equipment is about 20,000 pounds. The cost of these units was approximately $5,000 each.

REMARKS OF R. W. SMITH, SECRETARY OF THE CONFERENCE, RELATIVE TO VEHICLE-SCALE TESTING UNITS OF THE STATES OF OREGON AND WYOMING

Two States, Oregon and Wyoming, have recently acquired vehicle-scale testing equipments, but neither of these States is represented at our meeting. So that our record may be complete, I wish to describe these equipments briefly. The information has been supplied in each case by the head of the State weights and measures office.

The Oregon equipment, illustrated in figures 34 and 35, is a combination unit, equipped for the testing of large-capacity scales and for carrying on tests of large-capacity meters and doing other volumetric work. The unit carries four 1,000-pound weights, twelve

FIGURE 34.— *Vehicle-scale testing equipment, State of Oregon.*

FIGURE 35.—*Oregon vehicle-scale testing equipment, showing auxiliary volumetric apparatus.*

FIGURE 36.— *Vehicle-scale testing equipment, State of Wyoming.*

500-pound weights, twelve 50-pound weights, and the necessary complement of small weights. An air compressor is mounted in the forward part of the body for use in case of tire emergencies and also for purposes of cleaning the body of the truck and the working parts of scales which are being tested. The volumetric equipment comprises standards in denominations of 50 gallons, 5 gallons, 1 gallon, and fractional parts of the gallon.

The weights are loaded and unloaded by power; the controls are operated from the ground from a position at the right rear of the truck body. The total weight of the unit is slightly less than 24,000 pounds. The appropriation granted for the procurement of this unit was $6,500, but the completed cost of the equipment was only $5,983.00; the balance of $517.00 was sufficient to permit equipping a light truck for scale testing in areas where the large unit cannot be used.

The equipment of the State of Wyoming is illustrated in figure 36, and is of the conventional type with which you are familiar, the controls for the power operation of the crane being at the forward end of the body on the left side. The unit carries fifteen 1,000-pound weights, one 500-pound weight, and ten 50-pound weights. The total weight of the unit is approximately 27,500 pounds.

WEIGHBEAMS

By M. J. J. Harrison, *Supervisor of Scales and Weighing, Pennsylvania Railroad*

It is the purpose of this presentation to describe in simple language a knife-edge weighbeam and its essential characteristics and elements, and to review certain phases of its design and construction which may not be clearly or generally understood, rather than to advance any necessarily new ideas on the subject.

At the beginning, it would seem that we should have a definite understanding of what we are talking about; therefore, let us turn to the January 1, 1939, issue of the National Scale Men's Association glossary, where we find:

> *Weighbeam*, n. In a scale of other than the automatic-indicating or automatic recording types, that element whose angular position denotes the balance condition. In a more restricted sense, the device or assembly upon which, by the manipulation of poises and/or counterpoise weights, the applied load is counterpoised and its weight value indicated. Sometimes also colloquially called *Beam*.

Now, clearly, the definition just quoted is both fundamental and inclusive. It covers that element of an equal-arm balance from whose end pivots the pans are suspended; it covers the horizontal lever of a trip scale; it covers the steelyard; and it covers that element of a platform, hopper, vehicle, or track scale which is customarily referred to as its weighbeam (or beam). And all of these have one general, common characteristic—in each case the device is said to be "in balance" when the weighbeam either remains at or oscillates about a horizontal position of equilibrium.

With this preamble, let us examine into the essential characteristics of a weighbeam. These are three in number: (1) Truth, (2) stability, and (3) sensitiveness.

For the reason that a discussion of these three points is simpler of presentation when directed especially to the weighbeam of an equal-

arm balance, and since nothing is lost thereby—the principles being readily susceptible of extension to other forms of weighbeams—let us consider briefly the equal-arm balance and its characteristics.

The weighbeam in this case (and therefore the entire device) is truthful when three separate conditions are simultaneously satisfied: (1) The moment of the weight of the horizontal weighbeam about the knife-edge of its fulcrum pivot is zero; that is, the center of gravity of the unloaded weighbeam lies in the vertical plane through the fulcrum knife-edge when the plane through the knife-edges of the end pivots is horizontal; (2) the two pans, with their appurtenances, are of equal weight; and (3) the distances L and L' of figure 37 are equal.

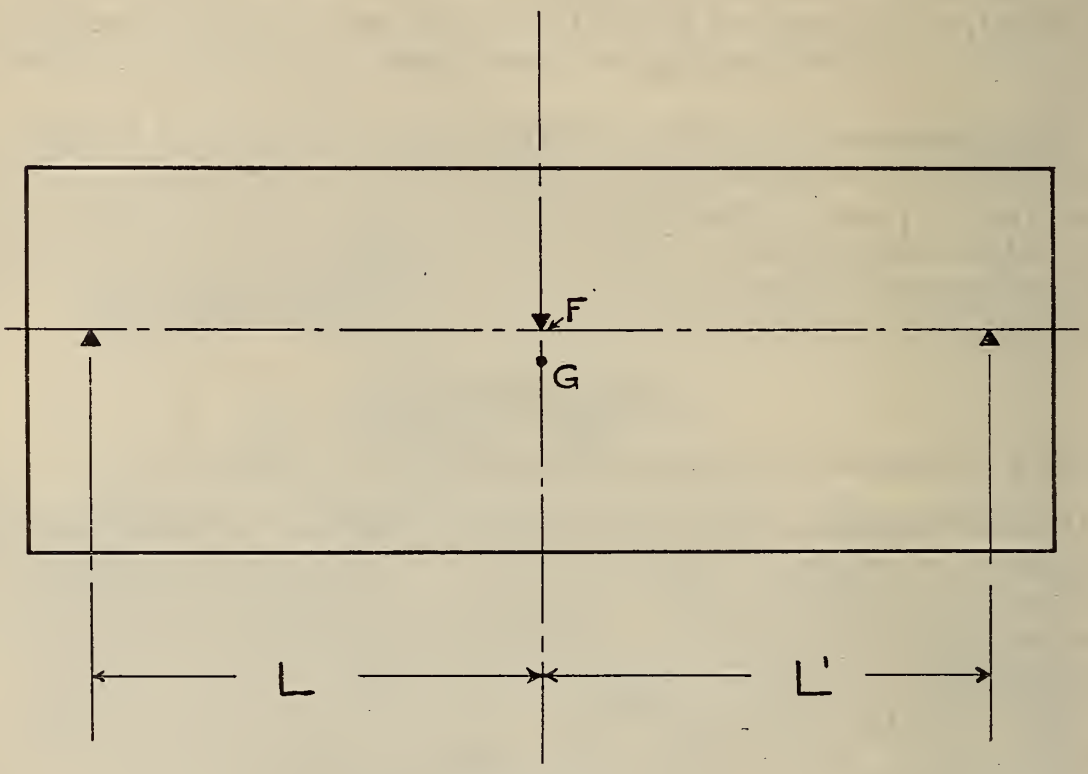

FIGURE 37.

If condition (1) is not met, the unloaded weighbeam will not balance; that is, it will fall or tend to fall to either the right or the left. If condition (2) is not met, the application of the pans and their appurtenances to the end knife-edges of the perfectly balanced, unloaded weighbeam will similarly throw it off balance. (It may be noted here that a deviation from condition (1) may be exactly offset by a deviation from condition (2), and this is one case wherein two wrongs make a right, only, however, if the same pan and appurtenances are always applied to the same end knife-edge.) And if condition (3) is not met, the application of equal loads to the pans of the perfectly balanced assembly will similarly throw it off balance.

Stability, the second essential characteristic, is obtained when the center of gravity of the weighbeam assembly lies below the point or line about which the weighbeam oscillates. Referring again to the NSMA glossary, we find:

Stable Equilibrium, n. A condition of balance in which, when a weighbeam or indicator is displaced from its position of equlilbrium and left free without disturbance, it either returns to its original position or oscillates about it.

It is probably unnecessary for me to remind you that all commercial weighing devices in this country are required to be in stable equilibrium under practical conditions of use.

Referring again to figure 37, it will be readily apparent that, if the center of gravity coincides with the knife-edge of the fulcrum pivot, the weighbeam will remain in any position where it is placed—a condition known as neutral equilibrium. If the center of gravity lies above the knife-edge of the fulcrum pivot, then the weighbeam will tend to overturn upon the slightest displacement from the horizontal—a condition known as unstable equilibrium. But if the center of gravity lies below the knife-edge of the fulcrum pivot, the weighbeam will, when displaced from the horizontal,

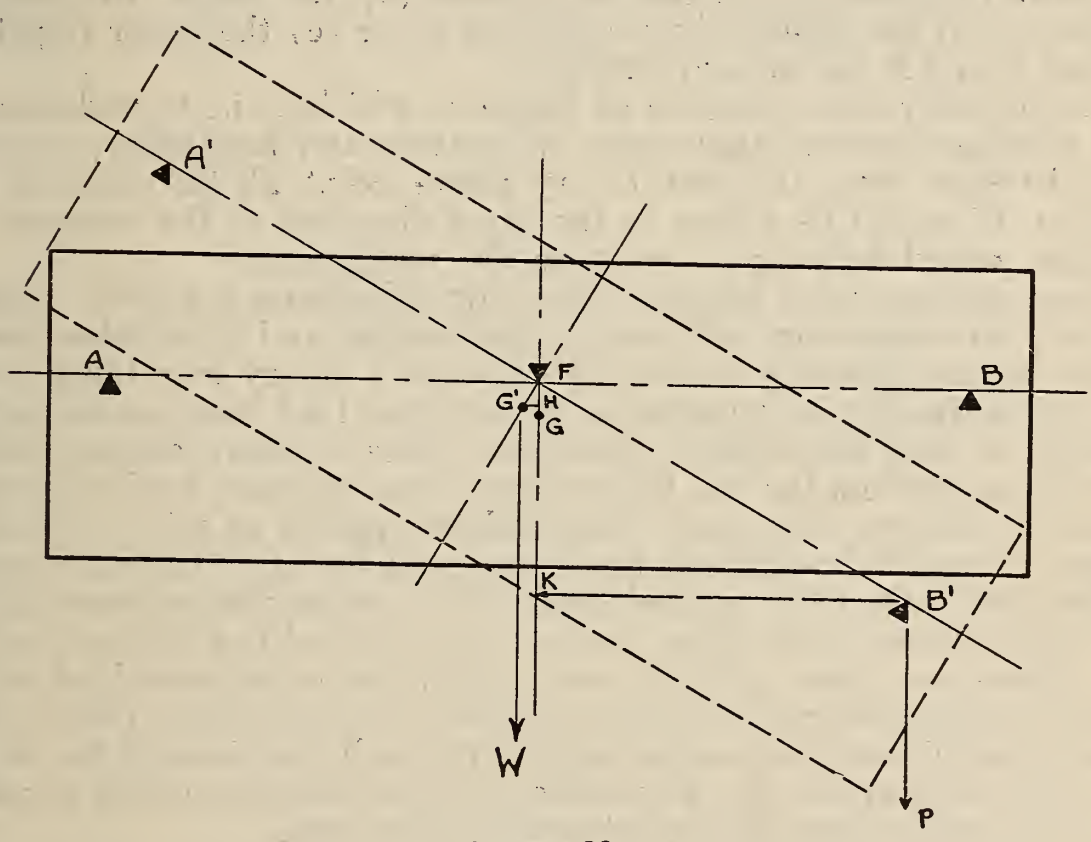

FIGURE 38.

tend to return to the horizontal, and it is this condition, already defined as stable equilibrium, which is required.

Sensitiveness, or the responsiveness of the weighbeam to a small change in load, is the third essential characteristic, and is quite closely related to the second essential characteristic, stability. Without taking your time to explore the mathematics of the matter, your attention is invited to a few diagrams, from which some general conclusions may readily be drawn.

In figure 38, let point G represent the center of gravity of the unloaded weighbeam. We have already seen that, for stability, point G must lie below the knife-edge, F, of the fulcrum pivot, and, for truthfulness, point G must lie in the vertical line through point F when the weighbeam is horizontal. Now, assume a small weight, p, applied at the knife-edge of the right-hand end pivot. This weight has a definite moment about point F, and tends to turn the weighbeam in a clockwise direction to some new position, which

we can assume is represented by the dotted lines. (The conditions shown in all of these figures are purposely exaggerated.) It will be obvious that weight p remains constant, and that W, the weight of the weighbeam (considered as concentrated at point G, its center of gravity) likewise remains constant. However, as the weighbeam is turned from the horizontal, point G is moved to a new location, which we will call G', where it has a moment arm with respect to point F equal to the distance $G'H$, and at the same time the moment arm of weight p decreases to the distance $B'K$. Equilibrium results when the moments of W and p about point F become equal. This being so, it becomes obvious by inspection that a given weight or force acting at the knife-edge of pivot B will produce a greater angular displacement of the weighbeam (a) the longer the weighbeam is, (b) the lighter the weighbeam is, or (c) the closer together points G and F are to each other.

Incidentally, consideration of figure 38 will help us to understand the relation between high center of gravity and instability, since it will be seen that, if point G lay above point F, the moment of weight W would be acting in the same direction as the moment of weight p and helping to overturn the weighbeam.

Now let us see what happens when this weighbeam is loaded. Since we are here assuming both perfect knife-edges and frictionless bearings, we may properly assume that the effect of any load hung from an end knife-edge is the same as though that load were concentrated exactly at that knife-edge. Moreover, since we have assumed that the distances from the end knife-edges to the fulcrum knife-edge are equal, it follows that equal load will be applied to the end knife-edges to keep the weighbeam horizontal, and therefore that the center of gravity of the total applied load will lie where the horizontal line through the end knife-edges intersects the vertical line through point F. There are three general cases which are to be examined—(1) where the knife-edges of the three pivots lie in the same plane; (2) where the fulcrum knife-edge projects through the plane of the other two knife-edges; and (3) where the fulcrum knife-edge fails to meet or cut the plane through the other two knife-edges.

In figure 39, the knife-edges of all three pivots are seen to lie in the same plane. The center of gravity of the unloaded weighbeam is, as before, at point G. The center of gravity of the applied load lies at point Q, which in this case coincides with point F. The resultant center of gravity of the entire assembly lies at point R, which is somewhere between points G and Q. The weighbeam has been turned from the horizontal by the same small weight p which we used in the previous case. Now let us assume that the total applied load exactly equals the weight of the unloaded weighbeam. The effect of this assumption is to locate point R exactly midway between points G and Q, and to concentrate at point R exactly twice the weight which we previously considered as being concentrated at point G. From this we can prove that the moment tending to restore the weighbeam to the horizontal is exactly the same as it was in the previous case, and the moment tending to displace the weighbeam from the horizontal is exactly the same as it was in the previous case. In other words, this weighbeam will theoretically be equally sensitive under all loads and will be stable under all loads.

In figure 40, we use the same designations as were used in figure 39, but here the knife-edge of the fulcrum pivot is seen to project through the plane of the knife-edges of the end pivots, and the weighbeam is said to have "closed range." Point R falls between

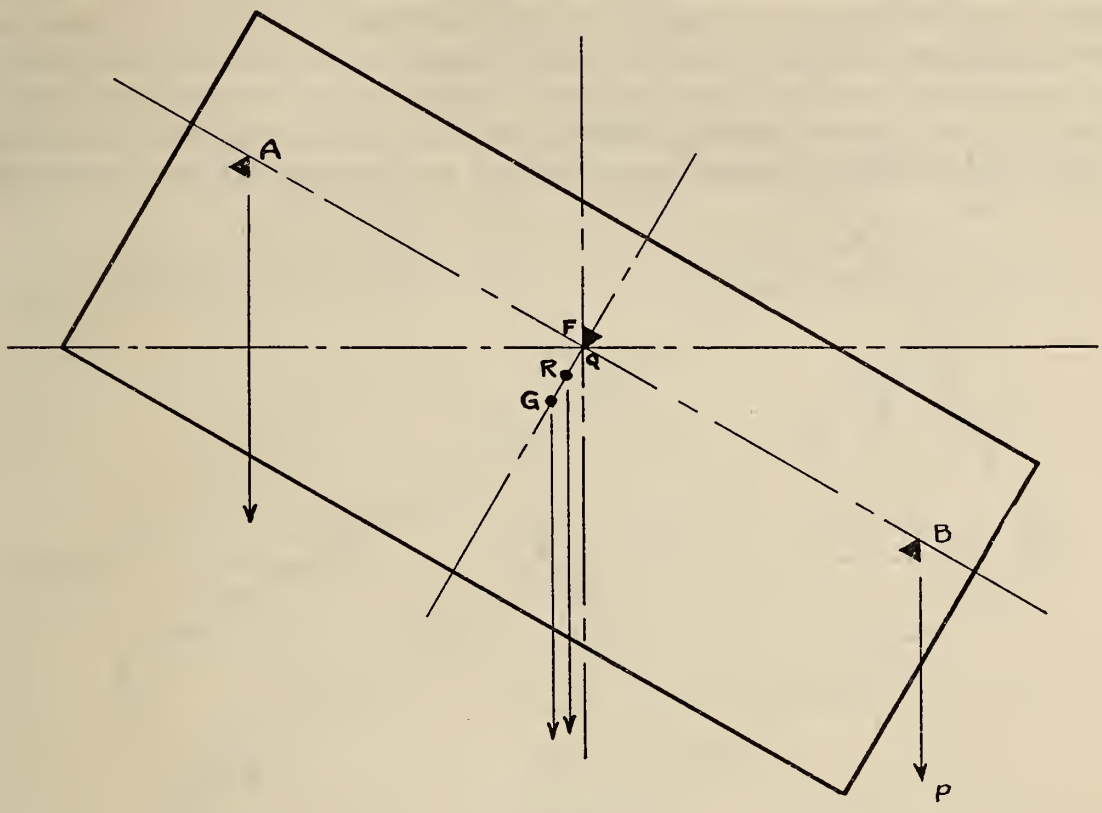

FIGURE 39.

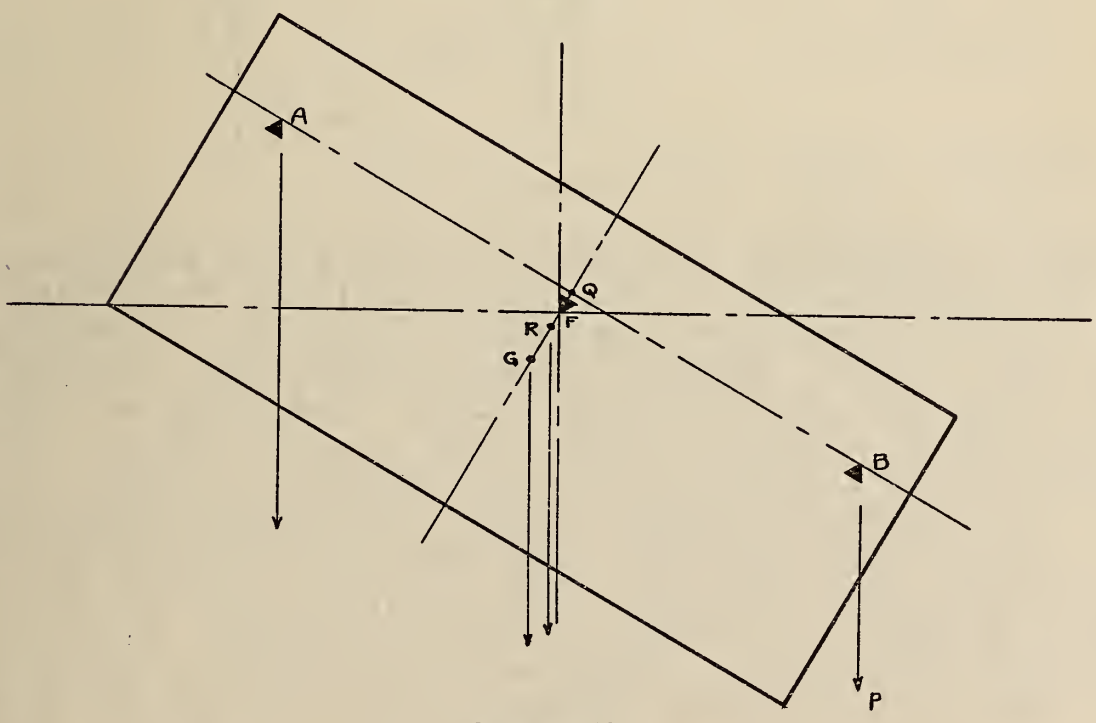

FIGURE 40.

points G and Q, as before, but point F already lies between points G and Q. Hence, with increase in applied load, point R moves toward point Q, and up to the time that points R and F coincide, this weighbeam becomes more sensitive as load is applied to it. However, if enough load is applied to make points R and F coincide, neutral

equilibrium will result; and if the load be still further increased, the position of point R will be above that of point F, and we will have unstable equilibrium.

In figure 41, we again use the designations that were used in figures 39 and 40, but here the knife-edge of the fulcrum pivot is at all times above the plane through the knife-edges of the end pivots, and the weighbeam is said to have "open range." In this case, no matter how great the applied load, point R can never lie quite as high as point Q, and investigation will show that the weighbeam, though always stable, will become less sensitive as the applied load increases.

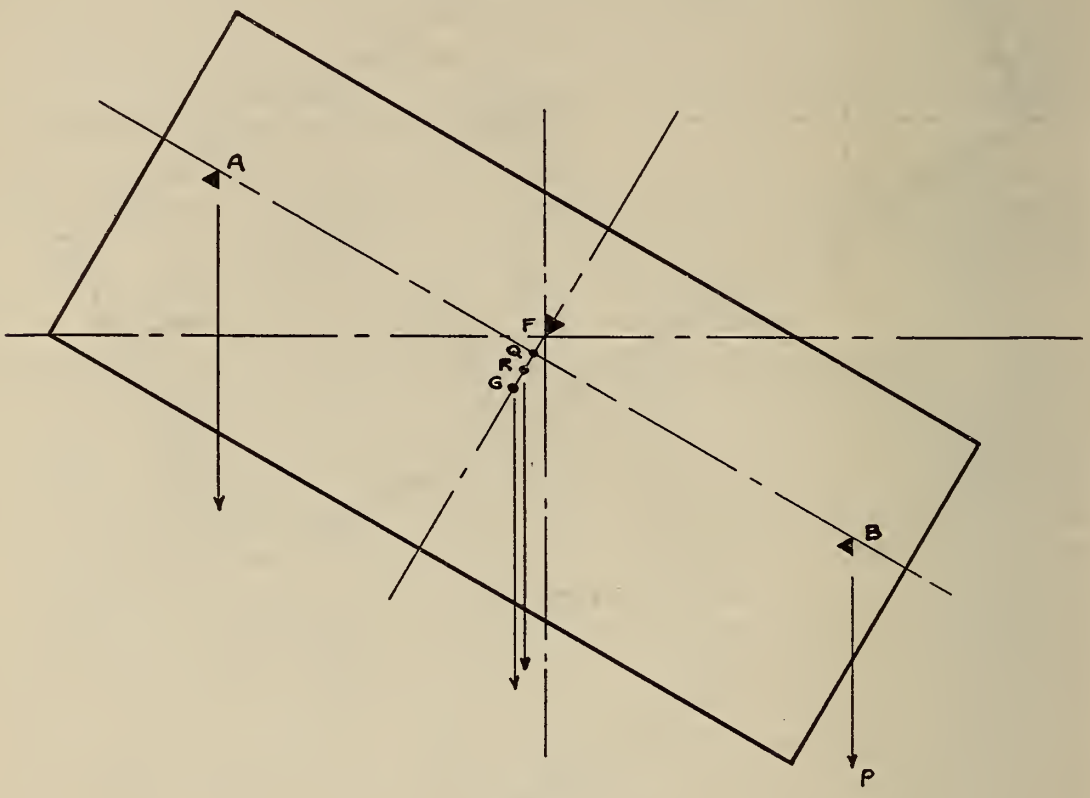

FIGURE 41.

From a consideration of figures 39, 40, and 41, the positioning of all three knife-edges in the same plane would seem theoretically to be the best construction, and, as a matter of fact, many delicate balances are so made. However, constant stability and sensitiveness are, in general, only theoretically possible. Practically, we have a certain amount of friction between even apparently perfect knife-edges and their opposing bearings, and, in addition, a slight bending of the weighbeam as load is applied. A weighbeam constructed with all three knife-edges in the same plane when unloaded, develops open range when even slightly distorted by applied load, and becomes less sensitive as the applied load is increased. In practice, therefore, it is customary to position the fulcrum pivot so that its knife-edge projects slightly through the plane of the end knife-edges, and this has the added advantage of permitting a slight amount of wear of the knife-edges before the weighbeam becomes unusable.

It is of some interest at this point to note that, in the manufacturing development of a new pattern of weighbeam, it frequently happens that the precise vertical position of the pivot knife-edges will

not be indicated on the detail drawings until after a specimen weighbeam has been made up and its action, both unloaded and loaded, has been exhaustively observed.

Also of interest, and of somewhat greater practical importance to some of you gentlemen, is another point. We often hear the expression "sharpen (or resharpen) the pivots" of some element of a scale. Admittedly, the pivot knife-edges of a weighbeam must be relatively sharp, but, if they do become dull, "open range" immediately tends to result, and "sharpening" will not only never correct this, but may even increase the openness of the range, thus making the weighbeam actually less sensitive, both unloaded and loaded.

Not even a preliminary discussion of weighbeams, such as this, would be complete without some consideration of pivots and bearings. The shape of pivot used in the commercial weighbeam will

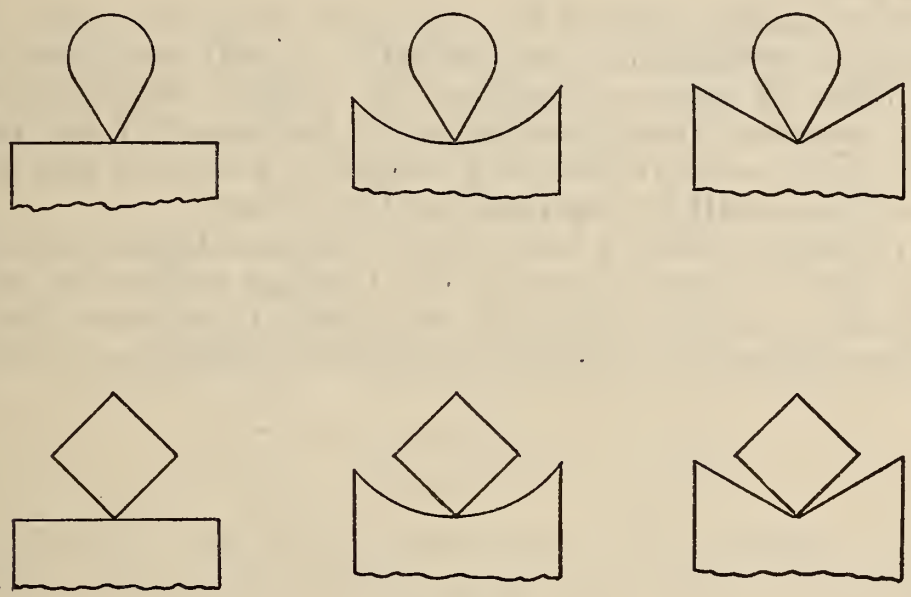

FIGURE 42

usually be either "chestnut" or nominally "square", depending to some extent on the maker's manufacturing methods. Either shape is readily adaptable to the formation of an acceptable knife-edge, and it will be seen from figure 42 that the knife-edge angle will approximate 90 degrees (never more than that in this country) for the square pivot, and from 50 to 60 degrees for the chestnut pivot. The angle selected will be to some extent influenced by the anticipated load intensity and the abuse to which the knife-edge may be subjected; in general, the larger the knife-edge angle, the more load per inch the knife-edge will be able to carry, and the more abuse it will withstand, but the less sensitive the weighbeam is apt to be.

Bearing surfaces used to oppose pivot knife-edges are usually of one of the three forms indicated in figure 42, and these are known, respectively, as "flat", "concave", and "V." Two modifications of the V-bearing are often found, where the bottom of the V is, respectively, either concave or a narrow flat.

Perfect sharpness of a knife-edge is possible only in theory—never in practice—even in manufacture. Moreover, even if a perfect knife-edge were commercially producible, it would remain so only until the first load was applied to it. Several years ago, some very interesting experiments with hardened steel knife-edges and bearing sur-

faces, performed at the University of Illinois, indicated that, when the knife-edge of a pivot is pressed against an opposing bearing of equal or greater hardness, the knife-edge will flatten by plastic flow until it develops a finite area, sufficient to transmit the applied load without exceeding the critical unit bearing stress which is peculiar to the material, hardness, and included angle of the knife-edge. For 90-degree knife-edges of hardened steel, this critical unit bearing stress was found to be about two-thirds of a million pounds per square inch. Now, this figure is impressive in size, and with so large a unit stress, only a relatively small area in contact is required to carry the applied load, but—and this is the essential point—even though small, the area is finite, and its dimensions are therefore finite—from which it follows that even a new knife-edge has a finite width which tends to increase through wear and corrosion as the device is used.

The actual design figures for allowable loads per linear inch of knife-edges in weighbeams are probably largely empirical and, for a given class of scale as produced by a given manufacturer, will probably represent that manufacturer's judgment of the matter in the light of the sensitiveness and longevity which he may claim, or which he knows will be required, for the device.

Now, of course, when a knife-edge is pressed against an opposing bearing, there is deformation of the hearing surface as well as of the knife-edge, and it is probably reasonable to represent the adjoining surfaces somewhat as shown in figure 43, which, as you are again

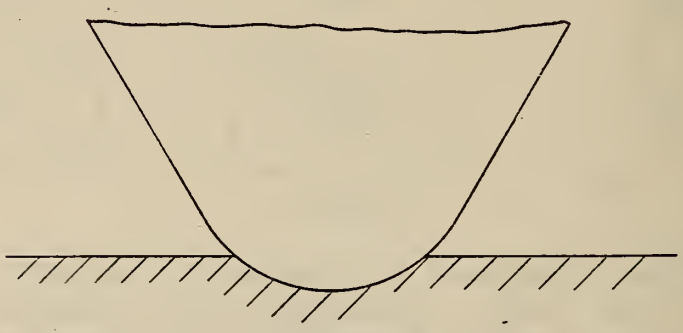

FIGURE 43.

reminded, greatly exaggerates the matter. If the reasonableness of this representation be admitted, then oscillation of either part with reference to the other will be seen to have the characteristics of a shaft turning in a journal bearing—and this justifies the often-heard expression, "knife-edge friction."

Let us see now what may happen if the knife-edge of figure 43 is opposed by other than a flat bearing. Figure 44 illustrates in greatly exaggerated form a pivot whose knife-edge is slightly rounded, as in the previous case, but opposed by a concave bearing. The knife-edge has been forced up the arc of the bearing and is prevented by sliding friction from resuming its designed position. Since the knife-edge is slightly rounded, its actual contact with the bearing surface is through the line xx', rather than through the line yy', and the effective length of the lever arm is accordingly changed by the small distance a. Herein we see the clue to many cases of "balance change" and failure to repeat weight indications exactly.

From this, it would appear that a flat bearing surface is theoretically ideal. In practice, however, the presence of horizontal forces makes the use of flat bearings entirely impracticable (except in certain special classes of devices), and the concave or V-bearing, even with objectionable features, has to be adopted.

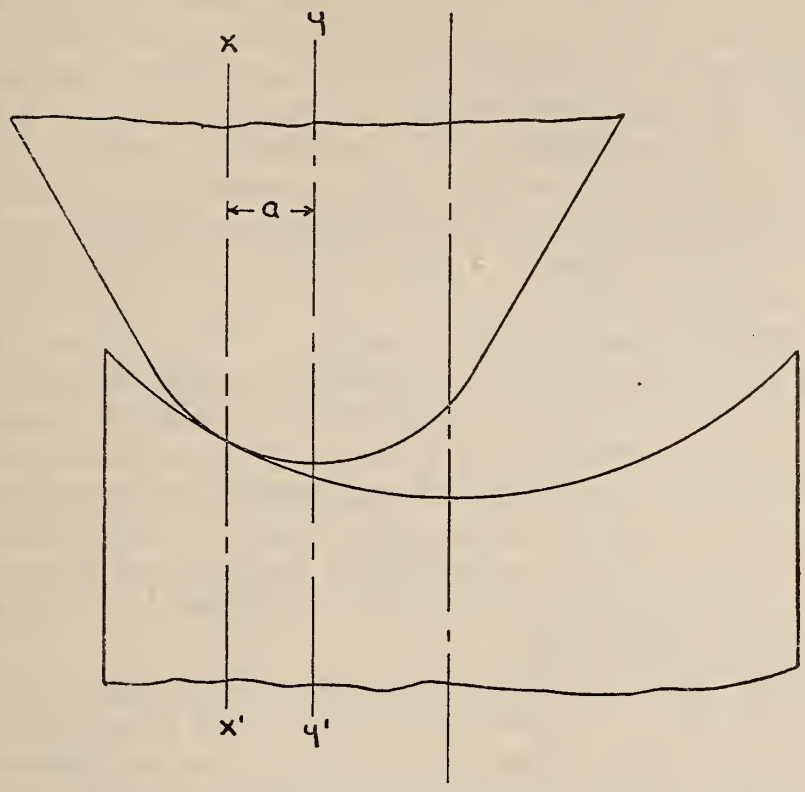

FIGURE 44.

From this brief and sketchy discussion of fundamentals of weighbeam design, let us turn to what we more usually think of when we use the term "weighbeam." In figure 45 we have a diagrammatic

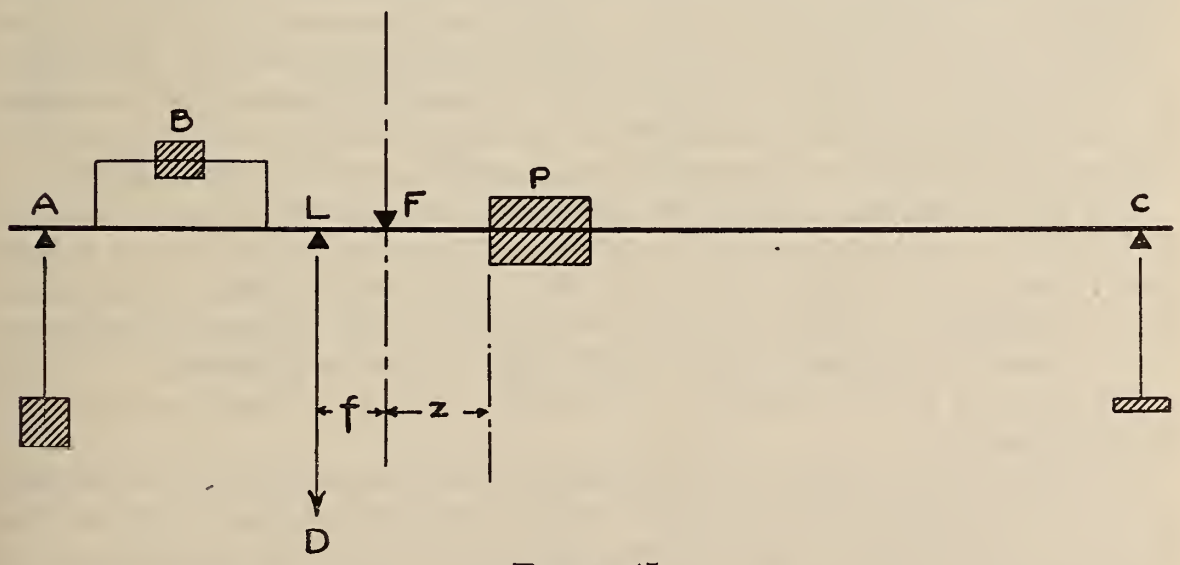

FIGURE 45.

representation of a generalized conventional weighbeam, with four pivots, a balance ball, a poise, a counterbalance hanger, and a counterpoise hanger. All weighbeams need not have all of these elements, but they will all be discussed here, even if briefly, for the sake of relative completeness.

Starting at the left side of the figure, we first note pivot A, known as the counterbalance-hanger pivot. The horizontal position of this pivot is usually not a matter of primary importance, since weight applied to it will serve only to aid in balancing the assembly under zero applied load, and will ordinarily not be altered after the device is placed in service. However, it has already been pointed out, that, in general, the effective weight of the weighbeam assembly should be as small as consistent, if sensitiveness is to be readily attained. Hence, the knife-edge of this pivot will be as distant from the knife-edge of fulcrum pivot F as convenience of manufacture will permit (thus affording any weight applied at this pivot as long a moment arm as practicable), and in any event far enough away from the knife-edge of load pivot L that a hanger applied to pivot A will be entirely clear of the beam rod and its hook.

Next in order, we note balance ball B. This device, usually movable along a threaded spindle (by manual rotation of, preferably, the spindle), is provided to aid in balancing the assembly exactly under zero load. It is important that there be no accidental change in the position of the balance ball after the assembly has been balanced, and equally important that the arrangement permit convenient rebalancing at any time, especially when scales are located where the actual weight of the load-receiving element is subject to frequent change due to moisture, spillage, etc.

Another and more incidental function which many balance balls have is that of vertical adjustability, and this permits slight alterations in the height of the center of gravity of the weighbeam assembly. It should be kept in mind, however, that such alterations can be only slight, since their sole purpose in the field would be to make the assembly more sensitive, and, at the same time, the more sensitive the assembly is, the lighter the balance ball must be in order to be practically convenient for balancing purposes. Therefore, the actual weight of the balance ball must be relatively small as compared with the effective weight of the entire weighbeam; moreover, circumstances of design tend to limit the vertical distance through which the height of the balance ball may be adjustable. Therefore, raising or lowering the balance ball is not "cure-all" for a weighbeam having unsatisfactory action, and at best is effective only within very narrow limits.

The next essential element to be noted in figure 45 is load pivot L. This pivot exactly corresponds to one of the end pivots of an equal-arm balance, and the distance of the knife-edge of this pivot from the knife-edge of fulcrum pivot F (known as the fulcrum distance) is the most important linear dimension of the weighbeam. If the weighbeam is to be truthful, this distance must be made and maintained exactly.

It is to the knife-edge of load pivot L that the beam rod is connected, and it is consequently this pivot which receives the pull due to the weight of the empty load-receiving element and the levers themselves (the dead-load pull), and also the additional pull due to the applied load. Conventional design practice requires that, for all large-capacity scales other than portable scales, a definite multiple be established to the knife-edge of this pivot; that is, depending on the type of scale, a pull of, say, 1 pound on the beam rod must correspond to some definite applied load on the load-receiving element of the scale, as, for

example, 10 pounds, 50 pounds, 100 pounds, 400 pounds, etc. The actual multiple to the beam rod will, of course, be the product of the ratios of the levers in train between it and the load-receiving element. Thus taking merely for example a certain railway track scale, it is found that the designed ratios of the levers in train are: Main levers, 6:1; longitudinal extension levers, 8⅓:1; transverse extension lever, 2:1; shelf lever, 5:1. The product of these ratios is 500:1. Hence, assuming mechanical perfection in the assembly, 500 pounds applied to the load-receiving element will produce a pull of exactly 1 pound in the beam rod; and, hence, any weighbeam designed for a multiple of 500:1 at the knife-edge of its load pivot, and being otherwise appropriately designed, will indicate correct weights if connected to this lever system—subject, of course, to slight adjustment to compensate for unavoidable mechanical imperfection. It is this standardization which permits the ready and convenient interchange or replacement of weighbeams, or permits the shop overhauling of a weighbeam by itself without requiring the entire lever system to be sent to the shop with the weighbeam.

It is understood that some scales are in service where each weighbeam is individually sealed to its respective lever system, with no attempt to maintain a definite multiple at the beam rod. Such a scale is susceptible of being made to weigh as accurately as the type just discussed, but is not readily or economically repairable when this becomes necessary.

Fulcrum pivot *F* is next noted in the weighbeam of figure 45. This corresponds exactly to the fulcrum pivot of the equal-arm weighbeam discussed earlier, and all of the observations previously offered will apply here by extension.

Next in order in figure 45 is noted the poise, *P*. This, primarily and importantly, is an element of definite weight, movable longitudinally along the weighbeam, and having a definite terminal position (known usually as its zero position). The poise will ordinarily be provided with an index, cooperating with a series of uniformly spaced graduations on the bar along which the poise is movable, arranged and marked appropriately to represent weight values. Especially in large-capacity scales poises are not interchangeable, but are individually sealed to the weighbeams with which they are respectively furnished.

It has already been mentioned that the poise will be of definite weight, and that it is important that it be so. True enough, the scale owner or the weigher will rarely care and may never know how much the poise actually weighs. However, consider that a scale is a mechanical device for ascertaining the weight of a certain quantity of material. If a poise indication contributes in any way to that ascertainment (and it often does), then we should revise our definition of a scale and say that it is a mechanical device for ascertaining the relation between the weight of the poise and the weight value which we are seeking, and indicating that relation in some convenient system of weight units. Obviously, then, if the weight of the poise is at all different from what its designer intended it to be, its value as a standard for comparison is destroyed, and the scale is inaccurate. A poise is entitled to all the respect becoming to a formal mass standard.

Let us take just a moment to see how the proper weight of a poise is arrived at by a designer. Four factors are involved—(1) the

multiple to the knife-edge of the load pivot of the weighbeam; (2) the fulcrum distance of the weighbeam; (3) the distance through which the poise shall move from its zero position to the position at which it indicates its greatest weight value; and (4) the difference in weight indications corresponding to that linear movement. (Since the scale is required to be truthful, the difference in weight indications just mentioned must equal the change in the weight value of whatever is on the load-receiving element.)

Now, assume the weighbeam of fig. 45 to be weightless, except for the poise. On this assumption, and when the weighbeam is in perfect balance with the poise at its zero position, the "dead-load pull" times the "fulcrum distance" must be exactly equal to the "poise weight" times the "distance from its zero position to the knife-edge of fulcrum pivot F." Expressing this in simple algebra, we have:

$$Df=Pz.$$

Now, assume that a load equal to the desired weighbeam or poise capacity is applied to the load-receiving element, and that the poise is moved away from its zero position by the contemplated distance (known as the "run" of the poise, and here designated as r), and so that its weight indication equals the applied load. This gives us the basis for a new equation. The total force acting on the knife-edge of load pivot L has been increased by the amount C/M (where C is the applied load equal to the weighbeam capacity and M is the multiple to load pivot L), and the distance from the poise to the fulcrum knife-edge is now $z+r$ instead of z. Assuming the weighbeam again to be in perfect balance, our new relation may be expressed:

$$(D+C/M)f=P(z+r),$$

which may be rewritten as

$$(Df)+(C/Mf)=(Pz)+(Pr).$$

From the first equation, however, we know that $(Df)=(Pz)$, so these terms may be cancelled from our newest equation, and this leaves us with

$$C/Mf=Pr,$$

which becomes, by transposition

$$P=\frac{Cf}{Mr},$$

which may be expressed as "poise weight" equals the product of "weighbeam capacity" times "fulcrum distance," divided by the product of "multiple at load knife-edge" times "poise run."

It may be observed here that this simple little equation applies to any poise—main, tare, or fractional—as long as proper selection of C and r are made—M and f being, of course, fixed for a specific weighbeam. Moreover, since distance z from the zero position of the poise to the fulcrum knife-edge completely disappeared in the development of the equation, it is apparent that the actual location of the zero position does not affect the situation, and from this it is apparent that the zero position may be to the right or to the left of or at the fulcrum knife-edge, and that the permissible poise travel may lie

entirely on one side of the fulcrum knife-edge, or may extend from a point on one side of that knife-edge to some point on the other side of it—all without disturbing the equation. And, finally, the equation still holds for an unloading weighbeam—that is, one where the zero position of the poise is at that end of its travel which is farther from the weighbeam fulcrum, and where the weight indications represent load removed, rather than load applied as in conventional arrangements.

Expressed in words, our equation tells us that the weight of our poise must increase exactly in proportion as the weighbeam or poise capacity is increased, or as the fulcrum distance is increased, or as the multiple at the knife-edge of the load pivot is decreased, or as the run of the poise is decreased. Different people have different ways of remembering this relation; a weighbeam designer recently commented to me that he liked to remember "poise weight" times "poise run" times "multiple at load knife-edge" equals "weighbeam capacity" times "fulcrum distance."

A moment ago, passing mention was made of fractional poises, and these and the circumstances which necessitate them should be briefly considered. Especially for large-capacity scales of the beam type, it is rather common to furnish full-capacity weighbeams—that is, weighbeams on whose bars the entire nominal capacity of the scale is represented and with which no counterpoise weights are intended to be used. As is the case with any other weighbeam, the value of the minimal graduation will be dictated by custom, trade demands, or purchase specifications. However, the necessity of representing the entire nominal capacity of the scale on the weighbeam itself, in conjunction with the requirements of "clear interval between graduations," readability, precision of positioning the poise at individual graduations, economical and/or convenient length of weighbeam, and other considerations, have led to two solutions, slightly different in appearance but fundamentally alike. These two solutions have in common the provision of a relatively heavy poise, known as a main poise, cooperating with a series of main graduations, and a relatively light poise, known as a fractional poise, cooperating with a series of subordinate graduations marked on a separate bar and, further, the requirement that the indications of both poises must be added to arrive at the weight value indicated. The essential difference between the two solutions lies in the fact that, in the one (see fig. 46) the fractional poise and the bar along which it is movable are parts of the main poise, while, in the other (see fig. 47) the two poises are not mechanically related, although both bars are necessarily integral parts of the weighbeam assembly.

The bar along which the fractional poise is movable may be either notched or smooth (sometimes the notches are formed in the fractional poise itself), but the bar along which the main poise is movable will practically without exception be notched. This is done in order to attain for the main poise a convenience of use and a ready and accurate means of positioning it at any normal weighing position which will be consistent with the precision of positioning the much lighter fractional poise and reading its weight indications. When notches are provided for any poise, of course, the seating of the pawl or latch into the notch, rather than the coincidence of index and graduation, governs

the position of the poise for any individual weight indication. For this reason, on a notched weighbeam bar, it is not strictly necessary that there be perfect coincidence of index and graduation when the poise is at any normal weighing position; however, in no case should the lack of absolute coincidence be such as to cause any question as to the indicated weight value.

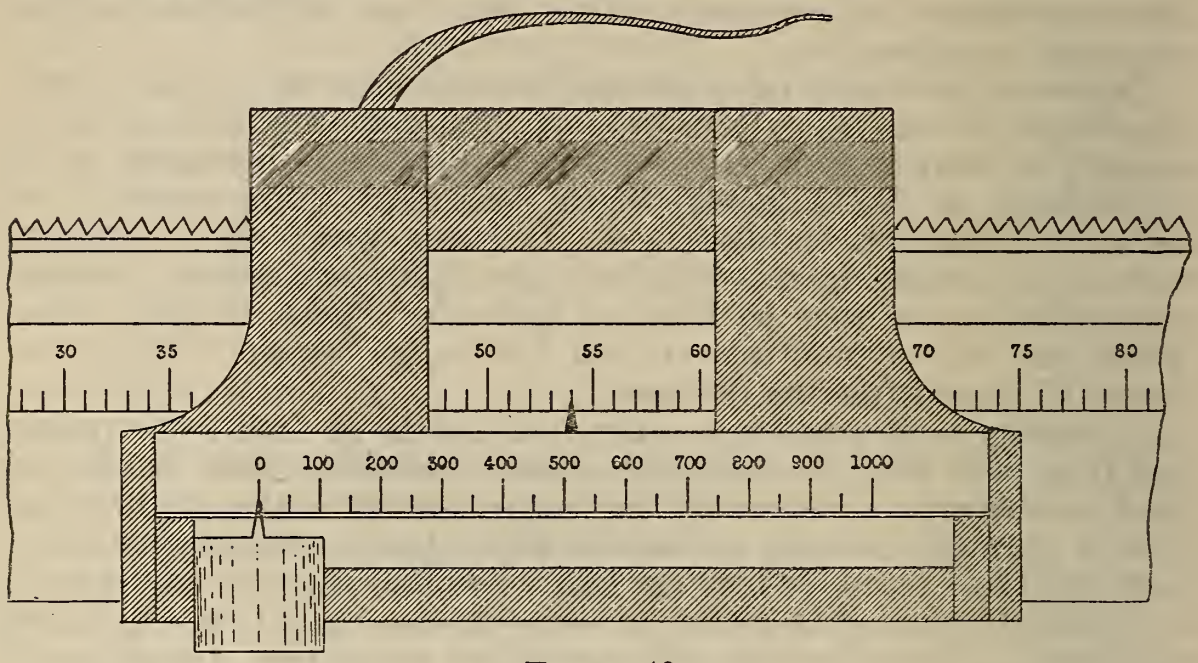

FIGURE 46.

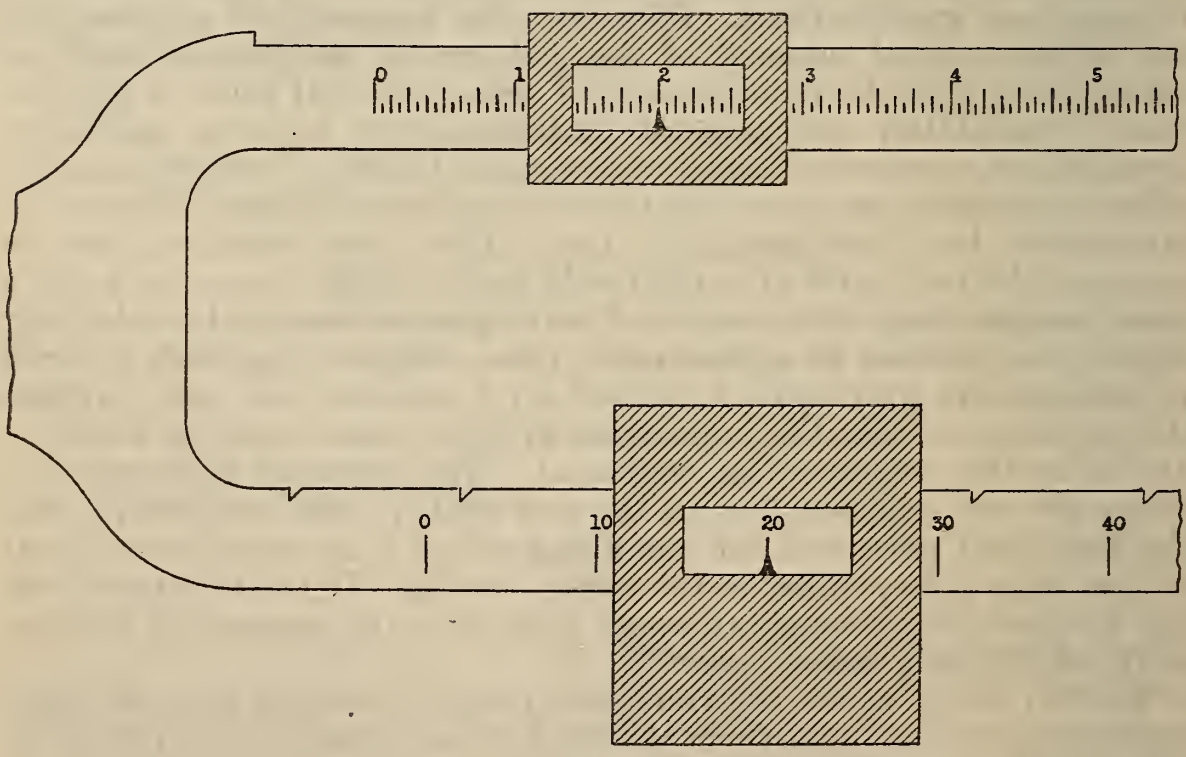

FIGURE 47.

For notched weighbeams of large-capacity scales, it is customary and proper to make the main notches at 1,000-pound intervals or 100-pound intervals and then to make the fractional-poise capacity equal to that interval—or, sometimes, to that interval minus one graduation on the fractional poise or bar. The latter is always done when the weighbeam is to be provided with type-registering means, due to practical con-

struction requirements. Occasionally, what is known as a double-slide poise will be found, embodying two fractional poises; for example, if a small value is required for the minimal graduation and a relatively large value is assigned to the notch increment for the main poise, an unduly long fractional poise might result if this were to be single; in this case, the designer may elect to provide an intermediate fractional poise, the graduation interval of which will equal the total capacity of the smaller fractional bar, and the total capacity of which will equal the notch interval for the main poise.

On notched weighbeams, the distance center to center of notches on the same bar or poise will always be found to be some simple fraction of an inch (that is, for example, ½ inch rather than $^{15}/_{32}$ inch or $^{17}/_{32}$ inch), and this is so on account of the characteristics of the machines used in this country for forming the notches. On main bars of large capacity scales, no closer spacing than six notches to the inch will ordinarily be found—this spacing being standard on weighbeams of railway track scales of modern design. Vehicle-scale weighbeams may be found with two, two and one-half, three, four, or five notches to the inch. On some small-capacity scales with notched weighbeams and single poises, a notch spacing of eight to the inch has been observed.

It may be noted in connection with notch-value and notch-spacing that a notched weighbeam will not and can not be made to indicate weight values in two different systems of weight units, as, for example, in both pounds or multiples thereof and kilograms or multiples thereof.

It is important that notch contour be uniform and that the pawl or latch tip fit snugly into each notch. After all, notches and pawls are but means to the end that successive normal poise positions be equidistiant within close limits. Most poises on notched weighbeams are provided with pawls which engage but one notch at a time, although a few poises will be found with what are known as multiple-notch pawls. As now being marketed, it is understood that the latter type of pawl will engage simultaneously some 15 separate notches, and it is obvious that, as compared with a poise having a single-notch pawl, the position of a poise provided with a multiple-notch pawl will be much less affected by wear, distortion, or imperfect location of any one individual notch.

And, finally, in figure 45, we note pivot *C*, known as the tip pivot or the counterpoise-hanger pivot. This pivot will not necessarily be found in weighbeams of the full-capacity type, but will be found in all weighbeams when all or part of the nominal capacity of the scale is represented by counterpoise weights. In any event, when this pivot is provided, the total multiple to its knife-edge should be a simple, definite, and known or readily determinable figure. Multiples such as 50, 100, 500, or 1,000 will be found to predominate, and in general are to be preferred. However, a few scales are understood to be in service where the multiple to the knife-edge of this pivot is 7,000 (or one of its larger factors)—the advantage of this figure being that the number of grains applied on the counterpoise hanger will balance exactly the same number of pounds applied on the load-receiving element, with resulting convenience in certain test routines, especially if the inspector has a set of grain weights but no decimal weights.

The counterpoise weights belonging to the scale and intended to be applied as necessary to the knife-edge of this pivot by means of the counterpoise hanger—and sometimes the hanger itself—are in the same category as the poise of which we have already spoken, in that they are mass standards, and that the scale itself is merely the means of comparison of the weight of the applied load with their weight. The scale may tell us—truthfully, withal—that a certain applied load weighs exactly 1,000 times as much as a certain counterpoise weight—but that does not particularly enlighten us as to the actual weight of the applied load unless we first know two things about the counterpoise weight—(1) that it is accurate, and (2) that it is being used on a scale for which it was designed. Counterpoise weights, like poises, are essentially standards for comparison, and should be duly and accordingly respected.

Now, just a few observations as to the weighbeam in general. For reasons outlined earlier in our discussion, the knife-edges of the several pivots will not necessarily all lie in the same plane; in fact, if they did, the weighbeam probably would not function satisfactorily. However, it is absolutely essential that each knife-edge be straight, and that all the knife-edges be parallel under any normal condition of loading—and, just as a reminder, this includes parallelism both vertically and horizontally. Pivots must be securely fixed in their respective positions in the weighbeam. The knife-edge line of the fulcrum bearing must be level, so that in use, the weighbeam will not tend to "walk" sidewise. There should be continuous contact between knife-edges and bearing surfaces for the full designed length, and for this a really self-alining type of bearing is essential. The bearing steels should be smooth, especially where they are intended to contact the knife-edges, and should be so formed as not to "pinch" the knife-edges. There should be no contact except along knife-edge lines between the weighbeam and any stand, loop, or bearing steel, or any interfering object. The beam rod should pull vertically against the knife-edge of the load pivot, and the beam rod, together with the shelf lever and the steelyard rod (when a shelf lever is used), must be clear of all interference. The contacts between loops and any hooks which may engage them should be flexible. No magnetism should be present in either the weighbeam or the trig loop. And the beam shelf should not deflect under load to an extent that will affect the weighing performance.

Obviously, there are many things about weighbeams which deserve careful attention, but which are outside of the scope of this presentation as announced in its introductory paragraph. If the interest of the members of the Conference warrants, it is to be hoped that this introduction to the subject may be followed up by treatment at subsequent Conferences of matters not discussed here. "Maintenance," "testing and adjusting," and "use" are three general, untouched subjects which suggest themselves at this time.

Even in this preliminary discussion, it has been necessary to cover a relatively large field in an extremely limited time, and many interesting and important matters have merely been mentioned in passing. To those in search of further written information on the subject or specific phases of it, I can commend two books, neither of which, however, is readily available in this country, especially under present conditions. I refer to H. C. Walters' excellent translation of Dr. Brauer's

"The Construction of the Balance" (published by the Incorporated Society of Inspectors of Weights and Measures, London), and to "A Treatise on Weighing Machines" by the late George A. Owen (published by Messrs. Charles Griffin & Co., Ltd., London). Mr. Owen's method of presenting some of the fundamentals of weighbeam design has been followed in this paper. In the reports of this Conference will be found much interesting and informative material, and particular reference is here made to "Notes on Scales" by C. A. Briggs (appearing on pages 135–175 of the report of the Eighth National Conference, held in 1913) and to "A Demonstration Showing the Necessity of Maintaining Scale Levers Level and the Lever Connections Plumb" by Charles C. Neale (appearing on pages 34–39 of the report of the Ninth National Conference, held in 1914).

LOCAL "MASTER" VEHICLE SCALES

PAPER OF LOUIS E. WITT, SEALER OF WEIGHTS AND MEASURES, CITY OF MILWAUKEE, WISCONSIN

The value of a local master vehicle scale is, of course, patently manifest to all of you as experienced weights and measures officials. Its applications to augment good weights and measures supervision are many and varied. It is the purpose of this paper to cite to you a few concrete examples of how such a master scale may be used to promote accuracy in large-capacity weighing and also how it may be used to safeguard the interests of the local or city government itself.

The Weights and Measures Department in the city of Milwaukee has had in operation a master motor-truck scale for more than 20 years. The scale is a 20-ton single-beam scale. It is in charge of an official in the Bureau of Weights and Measures who is known as the City Weighmaster. The Weighmaster is bonded and issues official city weight certificates, in duplicate, for each load weighed for a small fee. (We do not have in effect in Milwaukee a fee system for our regular weights and measures inspection service.) This master scale is maintained at a high degree of accuracy and efficiency. It is truly a master scale.

We in Milwaukee do not have a large-capacity vehicle-scale testing equiment of the type owned and operated by the National Bureau of Standards and which has recently been acquired by some of the State jurisdictions. Our heavy-duty testing equipment consists of a 2-ton truck with 5,000 pounds of 50-pound test weights. Our vehicle-scale tests, as a result, are made by sheer man power. This work of testing all the commercial heavy-duty scales and vehicle scales in the city takes a little more than 2 months each year, using a crew of two weights and measures inspectors and two temporary laborers who have been hired for that purpose. The inspectors assigned to this duty give each vehicle scale in the city a very careful and thorough inspection, and test most of these scales almost to capacity by the use of heavy strain loads which are usually available.

This brings us to the first use to which our scale is put as a "master scale." Each morning, before starting out on the work of testing vehicle scales, the inspector in charge of the work obtains the gross weight of our vehicle-scale testing outfit by weighing it on the master scale. It is obvious that this gross weight must be accurate because it is used as a test weight.

Most of the large coal companies in the city, rail and dock operators alike, regularly, several times a week, will weigh a large-capacity truck, heavily loaded with coal, over their own scales and will then send the truck to the master city scale to be reweighed, in this manner keeping a constant check on the accuracy of their own scales at all times.

Asphalt-paving contractors who use large-capacity hopper scales to weigh the various ingredients, such as sand, asphalt, tar, etc., which make up the paving mixture, frequently send a heavy truck load of their paving mixture, which has been weighed in their own hopper scales, to be reweighed on the master city scale, in this way checking the accuracy of their hopper scales at frequent intervals. The value of such check-weighing is apparent when we consider the adverse conditions under which these hopper scales are used: bearings, pivots, and levers are constantly collecting an accumulation of tar, sand, cement, etc., with resultant serious impairment of the efficiency and accuracy of the scale.

In the same manner, and for the same reasons, the operators of our large cement storage elevators check the accuracy of their hopper loading scales.

The large breweries in the city check their hopper scales against our master scale by the same method. It is vitally important that these hopper scales be kept accurate, not only because of the high cost of the grains and malts which are weighed in them, but because accuracy is necessary in blending the various types and kinds of beer.

Our Purchasing Board, in letting contracts each year for the thousands of tons of coal used by the city, specifies in these contracts that every load delivered to the city must be accompanied by a "city" weight certificate instead of the usual delivery tickets which are issued by the companies for the protection of the consumer in compliance with our weights and measures ordinance. A large percentage of the coal purchased by the city is actually weighed over the master scale. In addition, however, we do have, located at strategic points throughout the city, other scales, privately owned, which have been designated by action of the Common Council as "city" scales, which are in charge of experienced, bonded weighers who also issue "city" certified weight tickets. These privately owned, so-called "city" scales are, of course, kept under the constant scrutiny of the Bureau of Weights and Measures and the weighers in charge of these scales frequently check their scales with the master city scale as hereinbefore described. The use of these so-called "city" scales by vendors who are selling coal to the city materially cuts the vendors' hauling costs because in many instances the vendor's dock or yard or the point of delivery itself might be a considerable distance from the central location of the master scale.

The city also sells large quantities of salvaged scrap metals, such as iron, steel, copper, brass, etc. This scrap metal is sold by the various boards, commissions, and city departments, such as the School Board, Buildings and Bridges Department, Water Department, Bureau of Electrical Service, etc. Every single load of the salvaged scrap material, which is purchased by large scrap-metal dealers, must be weighed on the master city scale to protect the interests of the city.

The general public also utilize the master scale. Many thousands of loads of materials of all kinds are weighed on the scale each year; an official "city" weight ticket is issued for each load for a small fee, as has been previously mentioned in this paper. Such use of the master scale almost entirely eliminates disputes and claims on the part of buyers or sellers—claims which would otherwise, very likely, be brought to the Sealer's office for investigation and settlement or adjustment.

Most of the motor-transport companies operating out of or through Milwaukee, weigh all of their loads, or weigh each portion of the load as it is made up from the various shippers, on the master city scale. The official city weight certificates issued to these transport truckers are also very important from the standpoint that they protect the transport companies and their drivers against highway overload violations in Wisconsin and other States. Highway-load inspectors usually accept our official weight certificates at their face value without making further check of the loaded transport trucks.

In conclusion, then I would say that our local master scale has proved to be a valuable adjunct to our weights and measures supervision and inspection in promoting accuracy in large-capacity weighing.

PAPER OF P. J. HUNTER, CHIEF INSPECTOR, BUREAU OF WEIGHTS AND MEASURES, COUNTY OF ALLEGHENY, PENNSYLVANIA

The subject assigned me, "Local Master Vehicle Scales," is one that I may exhaust in considerably less than the 7 minutes allotted, principally because I, too, am seeking more light and information on the subject.

I recall that in 1939 the National Bureau of Standards installed a new master autotruck weighing scale which they bought on open bidding, based on AREA specifications for the use of the bureau in basic weight studies and for referee weighings. The bureau's recommendations are covered thoroughly in form NBS 256, entitled "Selection, Installation, and Maintenance of Vehicle Scales." These recommendations should be carefully followed by any State, county, or city weights and measures activity having in mind the purchase of a "master scale." However, I believe the members of this Conference would be deeply interested in having the bureau relate their experience with and the use of the "master scale" in the work of the bureau.

The desirability of having a "local master scale" is a subject on which I can give little light. The duties of a weights and measures inspector vary widely from those of the National Bureau. Ours is more a "police" task than "basic weight studies and referee weighings." Possibly some of the members of this Conference now have a local master scale, and I should be interested in knowing how effectively this is applied to their work in the field.

Neither the County of Allegheny nor the metropolitan city of Pittsburgh, which is within its boundaries, has a local master scale. Allegheny County and the city of Pittsburgh are properly bracketed as the industrial metropolis of the world wherein heavy-duty weighing is a very prominent factor. When heavy-duty weight controversies arise in our own area, it is our custom to test the scales involved with stand-

ard test weights. In my opinion, this simple but practical method serves a more flexible purpose than a local master scale. However, that is an opinion I should like to have discussed by this Conference.

The major industrial and mining activities in Allegheny County are scattered over an area approximating 30 miles, and I should like to hear suggestions as to the practicability of bringing disputed weight cases to a centrally located local master scale. Frankly, if I were to be asked by my superiors where such a scale should be located in Allegheny County, I would find the question a very difficult one to answer, because our industrial coal and iron establishments are scattered over such a great area. However, if the experience of others indicates that more effective enforcement of weights and measures can be obtained through local master scales, the problem of convenient location is secondary.

I realize that my observations on this subject are not constructive, but I must bear in mind that, like many others here, I am seeking information rather than appearing as an authority on this subject.

PAPER OF H. V. HAYMAN, ASSISTANT SEALER OF WEIGHTS AND MEASURES, CITY OF NORFOLK, VIRGINIA

For the purpose of this discussion, I wish to define a local master scale as a large-capacity vehicle scale owned and operated by a city, county, or other political subdivision.

There is a very acute need for scales of this character in many cities and counties. In the absence of such a scale, the local weights and measures official necessarily must depend on some privately owned scale for all check weighing operations. Since a privately owned scale is not maintained and operated under constant supervision of the local weights and measures official, the accuracy of the scale may be questioned, except in cases where the official has been able to make an adequate test immediately preceding any check-weighing operation.

The average city or county is not in a position to provide itself with adequate facilities for making proper tests on scales of large capacity. Generally speaking, most cities and counties are dependent upon the State testing unit for the inspection of their heavy-duty scales. These inspections are usually made on an annual or semiannual basis. In the meantime, the local official is without any suitable yardstick by which to gauge the performance or the use of the privately owned scales in his jurisdiction. Certainly most cities and counties are large purchasers of bulky materials, such as coal, sand, gravel, ready-mixed asphalt, and other commodities of a similar nature. It would seem that it would be nothing more than sound business practice to provide the necessary facilities to check on the accuracy of weights delivered.

One can easily conceive of circumstances where a scale used for this purpose might very readily pay for itself in a short time. Purchases made by local governments are usually made on bid. For this reason, the margin of profit is necessarily small, and this may present a strong temptation for the low bidder to increase his profit by delivering short weight.

In many instances it is necessary for transportation agencies to obtain an official certificate of weight, especially on interstate ship-

ments. In a great many localities it is impossible to secure these official certificates owing to lack of adequate weighing facilities, and the certificates must then be obtained en route or at destination, which may result in misunderstandings.

Private individuals naturally purchase scales to suit their particular needs. A local master scale should be of such design, construction, and capacity as to adequately take care of any load which may legally be moved over the public highway. A local master scale should not be just any standard type, but should conform to certain well established requirements in design, construction, and installation. A recording beam device perhaps should be considered because of its obvious advantages. For this reason, we believe that if a scale is to be designated as a master scale for any locality, the installation should serve two purposes: First, that of affording a means of check-weighing loads to verify the accuracy of scales, or for law enforcement; and second, to provide an exhibit of a motor-truck-scale installation which, if followed by commercial scale owners, will provide them with scales and installations which will insure correct weights and satisfactory service.

We would therefore recommend that the scale pit be made sufficiently deep, with easy access and proper lighting, to permit a clear observance of all the essential details of the scale design and installation; for such an installation would not only establish confidence in the equipment but woud be of great educational value to those contemplating new scale installations.

I do not think it is necessary for me to reiterate all of the factors that should be considered in connection with local master scales. I cannot emphasize too strongly the importance of pamphlet NBS 256 issued by the National Bureau of Standards and the current specifications of the American Railway Engineering Association, usually referred to as the AREA.

In closing, I wish to urge all cities, counties, and other political subdivisions to maintain local master scales of large capacity and long platforms, properly installed in all respects so that the installations will be regarded as models for others and as scales of which the weights and measures officials may be justly proud.

Mr. Spinks. You men are supposed to set a standard for scale users, and you have gone on record as approving the AREA scale. I think you should go on record as approving the AREA scale for a master scale, and not approve any scale as a master scale unless it is an AREA scale.

Another point that you could include would be a requirement for a 5-pound minimum graduation on a master-scale weighbeam. The Packers and Stockyards Division of the Department of Agriculture have specified that for stockyard scales, the scale manufacturers have produced scales that will weigh accurately to 5 pounds, and there are hundreds of them in successful operation throughout the country.

It has been suggested that you pick out a good commercial installation and designate that as your master scale in the absence of a State-owned or city-owned master scale. I think this Conference should go on record officially as opposed to designating any scale as a master scale unless it is an AREA scale.

PLATFORM OVERHANG OF VEHICLE SCALES

By C. L. Richard, *National Bureau of Standards*

The subject of "Platform Overhang of Vehicle Scales" was scheduled for discussion at this Conference, first, because a technical study has indicated that the factor of platform overhang, or projection of the platform beyond the main load bearings, causes or contributes to some of the mechanical faults common to many vehicle scales now being marketed, and second, because our field investigations have disclosed several instances where improvised or modified vehicle scales, because of excessive platform overhang, may be grossly inaccurate under some circumstances of use even though they are found to be substantially accurate under ordinary methods of test. Accordingly, it seemed advisable to present the subject to you in order that you might be better enabled to judge the desirability and feasibility of formulating regulations to control construction and use of scales with excessive platform overhang.

Objective study of the subject and decision as to what constitutes excessive platform overhang involve a consideration of the rather special functions which a vehicle-scale platform must perform and an analysis of the forces to which the component parts of the platform structure are subjected when vehicle loads move on, across, and off a vehicle scale. For vehicle scales differ from all other forms of weighing machines with respect to the manner in which their platform loads are imposed, sustained, and relieved. Thus (1) loading and unloading of a vehicle scale is effected, not gradually or in numerous successive stages, but abruptly in but two, or sometimes three or four, stages of considerable magnitude as wheel and axle loads move on or off the scale. (2) Throughout the entire cycle of loading, weighing, and unloading, the load forces applied to the platform are in the form of highly concentrated wheel-loads and there is no semblance of uniform load distribution. (3) The circumstances of use are such that considerable eccentricity of loading with respect to the scale sections and parts of the lever system is inevitable. It will be important to bear in mind throughout this discussion that the platform of a vehicle scale must not only properly sustain static loads during weighing procedure and transmit the true load forces to the scale lever system, but must also comprise a bridge or section of the roadway which permits heavy traffic intended for weighing to move on and off the scale without damage, derangement, or other abuse of the scale parts. The degree of adequacy with which the platform performs both these functions is materially influenced by the platform overhang factor, as will be demonstrated presently.

To simplify presentation of the subject there have been prepared a few drawings which will illustrate graphically the load forces on the platform supports when motor vehicles are driven on, across, and off some typical vehicle scales with overhanging platforms. Unless otherwise stated, the load forces I shall mention are static live-load forces, and the dead load of platform and weighbridge will be disregarded. The platform will be understood, in each case, to include the weighbridge structure. With respect to platform lengths and overhangs, vehicle wheel bases, and axle-load concentrations, the data

from which the drawings were prepared were taken from reports submitted by our field inspectors or from observations made independently by the author of these remarks.

Figure 48 shows in graphic form the reactions at the platform supports, or the static load forces on each end section of a scale, when a two-axle motor truck is driven across the scale from left to right. The platform is 18 feet long and has an overhang of 18 inches at each end. The motortruck has a wheel base of 12 feet and carries 80 percent of the gross load on the rear axle. The full line represents the left end reactions, or load on the left end section, and the dotted line represents the corresponding right end reactions, or load on the right end section of the scale. Horizontal coordinates represent successive positions of the front wheels and vertical coordinates measure

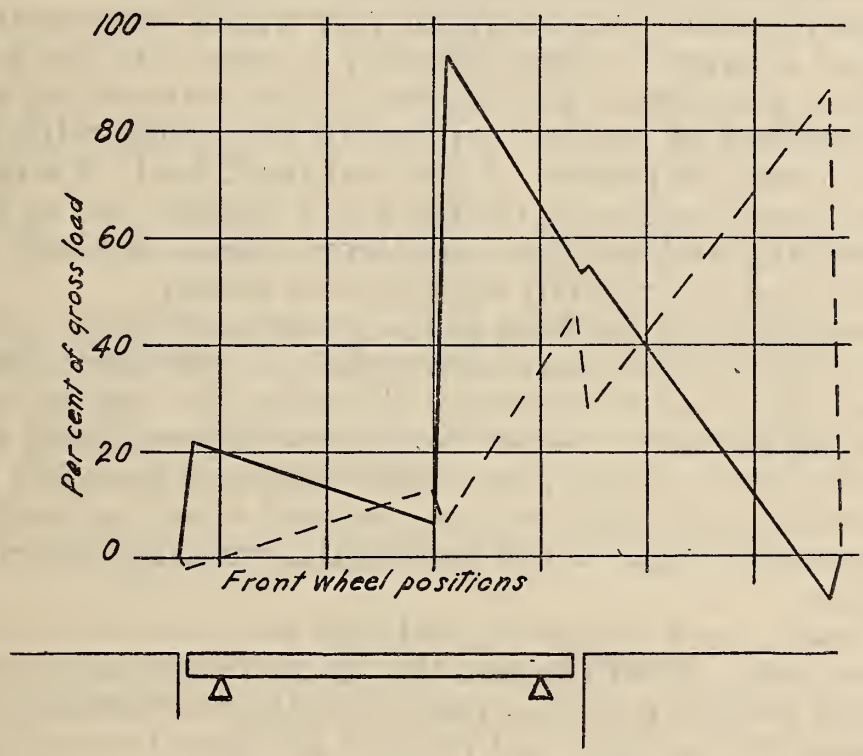

FIGURE 48.—*Reactions at end sections.*

Eighteen-foot motor-truck scale, fifteen-foot span. Two-axle truck, twelve-foot wheel base, 80-percent rear-axle load.

the computed end reactions in terms of percentage of gross vehicle load. Thus to find what percentage of the gross live load is carried by each section when the front wheels are at any position on or off the scale, we need only follow the coordinate for that position up to its intersection with the plotted lines and read the percentages on the vertical scale. This will be apparent as we proceed.

In figure 48, if you imagine the truck to advance from the left approach, you will observe that:

1. As the front wheels of the truck, carrying 20 percent of the gross load, come on the end of the scale platform, the left end support is subjected abruptly to a vertical load force equal to some 22 percent of the gross load of the truck. This is because of the platform overhang and the consequent cantilever action which causes part of the platform dead load to be relieved from the right support and transposed to the left support. You will note that with the front wheels

on the extreme left end of the platform a negative reaction of some 2 percent (shown by dotted line) develops at the right support; that is to say, the weighbridge tends to rise from the right end section.

2. When the front wheel has advanced to a position immediately over the left support, we note, as would be expected of course, that the entire front-axle load, representing 20 percent of the gross truck load, is carried by the left end section, the live load on the right end being zero. From that position, as the truck continues to advance, we observe a progressive decrease in the left end reaction and a corresponding increase in the right end reaction until, when the front wheels are midway of the platform ends, the lines intersect to show half of the axle load, or 10 percent of the gross load, carried by each section. From that point on, the greater part of the axle load is on the right end and the lesser part on the left end.

3. Please note that just before the rear wheels come on to the scale the left end is carrying approximately 7 percent of the gross truck load. Then, as the rear wheels come on the extreme left end of the scale the reaction at the left support of the weighbridge is at once increased to some 94 percent of the total truck load. Coincidentally, there is a minor decrease in the right end reaction due to the weighbridge overhang and resultant cantilever action, and only 6 percent of the gross load is carried by the right end section.

4. From that point forward as the truck continues to advance, the left end reaction decreases and the right end reaction increases until, just before the front wheels leave the scale, the loading on the left and right end sections is respectively about 54 percent and 46 percent. Then, as the front wheels pass to the right end approach there is a sharp decrease in the right end reaction and a very minor increase at the left end as the front wheels pass off the overhanging section of the weighbridge.

5. The scale is now supporting only the rear axle load, or 80 percent of the gross load. It will be seen that as the rear wheels approach the right end of the platform and pass on to the overhanging portion of the weighbridge, the right end reaction increases to some 88 percent, while a negative reaction equal to 8 percent of the gross load develops at the left end because of cantilever action. This is the critical point in the cycle of loading and unloading, for unless the platform structure be of sufficient mass—equal to more than 16 percent of the gross vehicle load—it will tilt and the left end of the platform will rise from its supports, with results which will be discussed later.

6. Finally, as the rear wheels pass from the platform to the right approach there is an abrupt release of load from the right end section, and the dead load again is equally supported by the two sections.

Figure 49 illustrates the occurrence and magnitude of the loading increments and decrements as the same scale is loaded with a two-axle truck of somewhat longer wheel base, the wheel base in this case being 16 feet instead of 12 feet. This represents a condition which is very common at fuel yards, where relatively short scales are in use and where truck wheel bases are commonly almost equal to the scale platform length. The axle-load concentrations are typical of those obtaining in loading trucks with coal for retail sales deliveries.

The general characteristics of the reaction changes resemble those illustrated in figure 48, but attention is directed to one conspicuous difference. You will note that after the rear wheels have come on the scale platform and increased the left-end loading from about 3 percent of the gross load to some 89 percent, the truck can move forward only 2 feet before the front wheels go off the platform; consequently, the load must be weighed at some position in this limited range of movement and, as you will observe, will be weighed while from 76 to 88 percent of the entire load is on the left-end section and from 24 to 12 percent is on the right end.

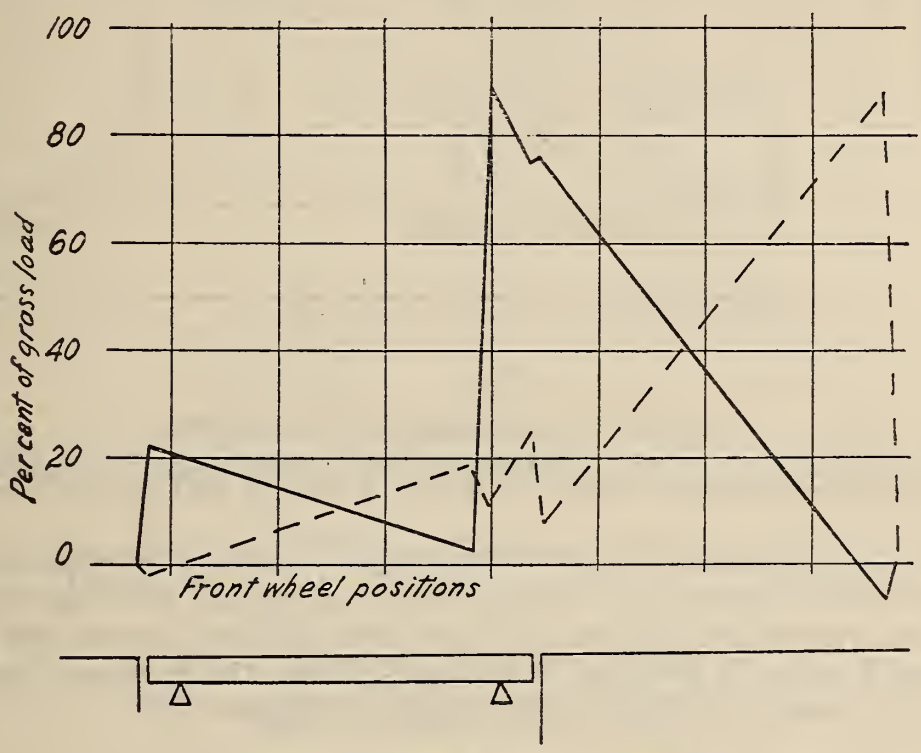

FIGURE 49.—*Reactions at end sections.*

Eighteen-foot motortruck scale, fifteen-foot span. Two-axle truck, sixteen-foot wheel base, 80-percent rear-axle load.

Figure 50 presents a somewhat different picture. It illustrates loading on the ends of a 22-foot motortruck scale over which is driven a motortruck of 16-foot over-all wheel base with tandem rear axles spaced 4 feet between centers and carrying 40 percent of the load on each rear axle with 20 percent on the front axle. The weighbridge overhangs the center of each section by 2 feet.

The significant differences between this case and the two preceding ones are that (1) loading is applied and released in more stages, and (2) each increment or decrement is of a smaller order. That is to say, loading and unloading is effected less abruptly and load concentrations on the end sections are less. Incidentally, of course, the negative reactions caused by overhang and cantilever action are less acute. It may also be noted, in passing, that unless the load is weighed with the front wheels at the extreme right end of the platform, loading on the sections of the lever system is very unequally distributed.

Figure 51 illustrates the case of a relatively long scale over which passes a tractor-semitrailer combination of the type now widely employed for merchandise transportation. The scale is 28 feet long and has an overhang of 2 feet at each end. The over-all wheel base of the

vehicle combination is 22 feet, the tractor wheel base being 8 feet. Loading is distributed 40 percent on the trailer axle, 40 percent on the so-called "fifth wheel" over the tractor rear axle, and 20 percent on

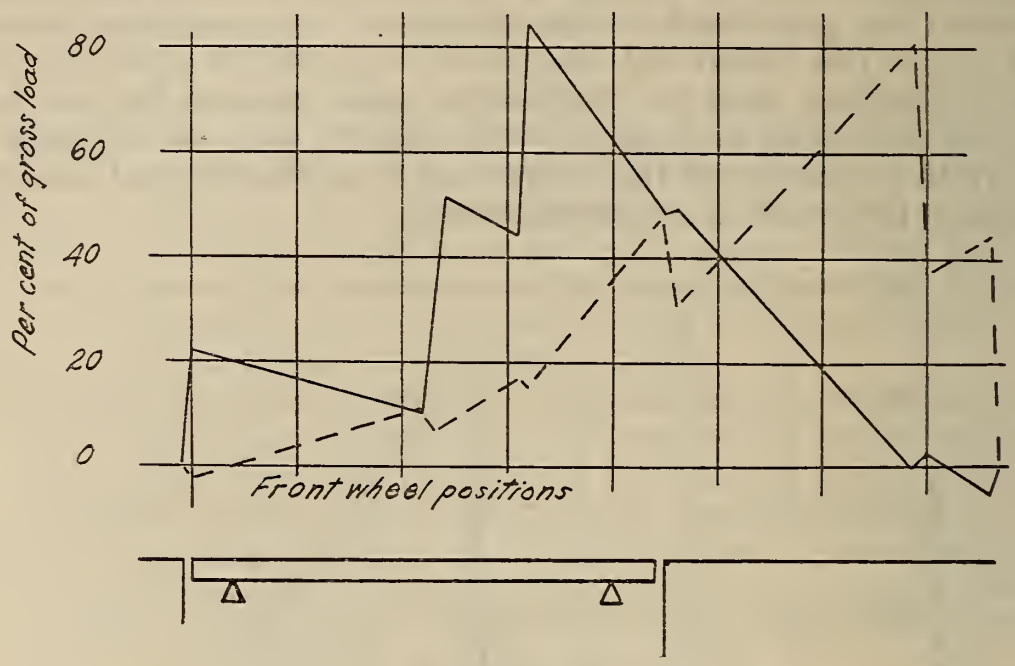

FIGURE 50.—*Reactions at end sections*

Twenty-two-foot motortruck scale, eighteen-foot span. Three-axle truck, sixteen-foot over-all wheel base, four-foot tandem wheel base, 40-percent load on each rear axle.

the front tractor axle. Except for longer intervals between successive increments and decrements of platform loading and with the additional important exception that at no time does the loading on one end section exceed some 66 percent of the gross load, the general characteristics of this case are similar to those shown in figure 50.

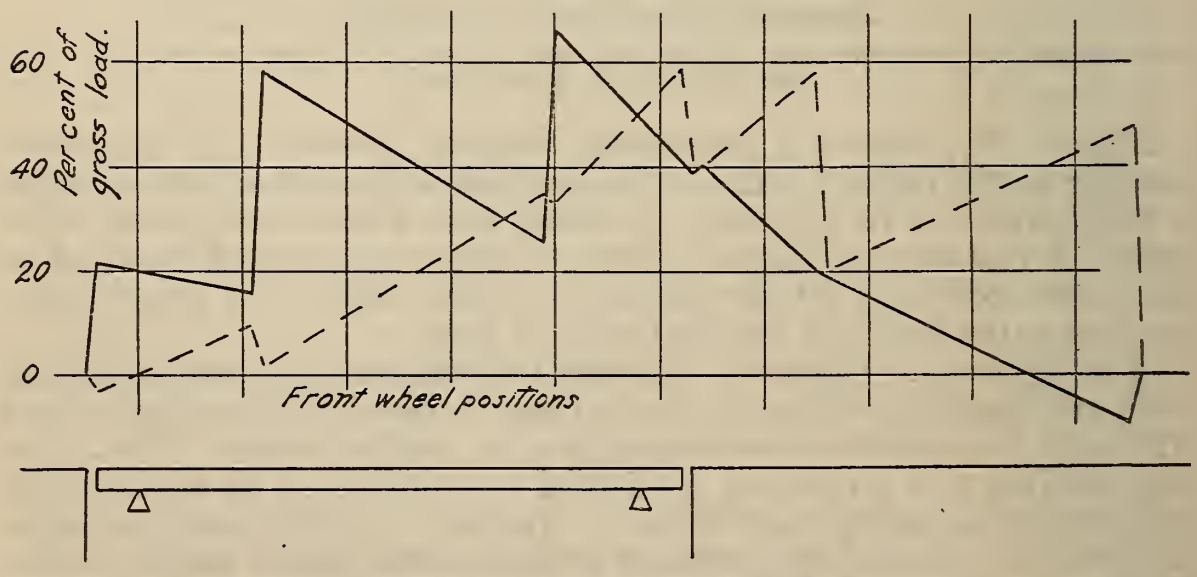

FIGURE 51.—*Reactions at end sections.*

Twenty-eight-foot motortruck scale, twenty-four-foot span. Tractor-trailer combination, over-all wheel base twenty-two feet, tractor wheel base eight feet, 40-percent load on each rear axle.

Figure 52 illustrates the case of a scale which was originally 18 feet long with a 15-foot span, but was lengthened by increasing the end overhangs, so that the scale is now 21 feet long with an overhang of 3 feet at each end of the platform. It will be seen that, because of the

excessive overhang, when a 20-foot truck is driven on, across, and off the scale, the negative reactions at the platform supports are about 4 percent of the gross load when the front wheels come on, about 5 percent when the front wheels go off, and as great as 16 percent just before the rear wheels go off. You will readily appreciate that if the truck is a heavily loaded one, and unless the platform structure is exceptionally massive, the left end will rise from its supports and allow a tilting of the platform just before the rear wheels leave the platform.

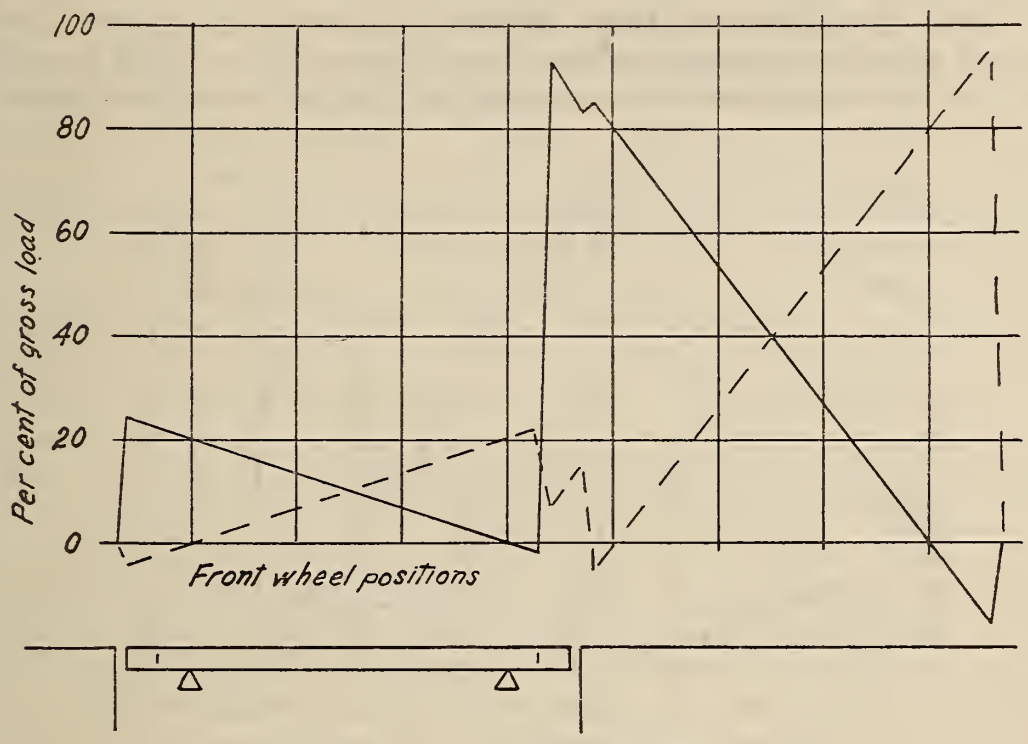

FIGURE 52.—*Reactions at end sections.*

Twenty-one-foot motortruck scale, fifteen-foot span. Two-axle truck, twenty-foot wheel base, 80-percent rear-axle load.

Figure 53 illustrates the case of the same scale we have just considered, loaded with a truck of 12-foot wheel base. Note that in this case as much as 103 percent of the gross load is supported by the left end of the scale just as the rear wheels come on. Note, too, that if the load is weighed in that position, the platform, if not sufficiently heavy or if not restrained in some way, will be raised from its right support. Finally it should be noted that there is a very strong upward reaction at the left end of the platform at the very instant when the rear wheels, as they leave the platform, are transmitting severe thrusts in a horizontal plane and tending to displace the platform.

Before proceeding to a summary of the subject it should be understood that the load-position curves on all the graphs represent the theoretical computed values. A true picture of the actual loading would differ somewhat because the cushioning effect of the vehicle wheel tires would effect a somewhat less abrupt imposition and release of loading and the plotted lines would have more rounded contours. Nevertheless there are other factors, such as impact caused by sudden load application, differences between platform and coping levels, and tractive effort of vehicle driving wheels on the platform, whose effect probably neutralizes or exceeds the cushioning effect of the tires.

Thus the graphic data may be accepted as illustrating approximately the order of the forces in question.

Summarizing the effects of platform overhang, we have seen:

(1) That projection of a vehicle scale platform beyond the end supports has the effect of increasing the loading on the platform supports and end sections of the lever system beyond the loading which would otherwise develop.

(2) That loads applied to the overhanging sections of a vehicle scale produce a cantilever action and overturning moment, which tends to raise the opposite end of the platform from the lever system.

(3) That the extent of these effects is in relation to the live-load value and axle-load concentration, the amount of overhang in relation to span between scale sections, and the spacing between axle loads.

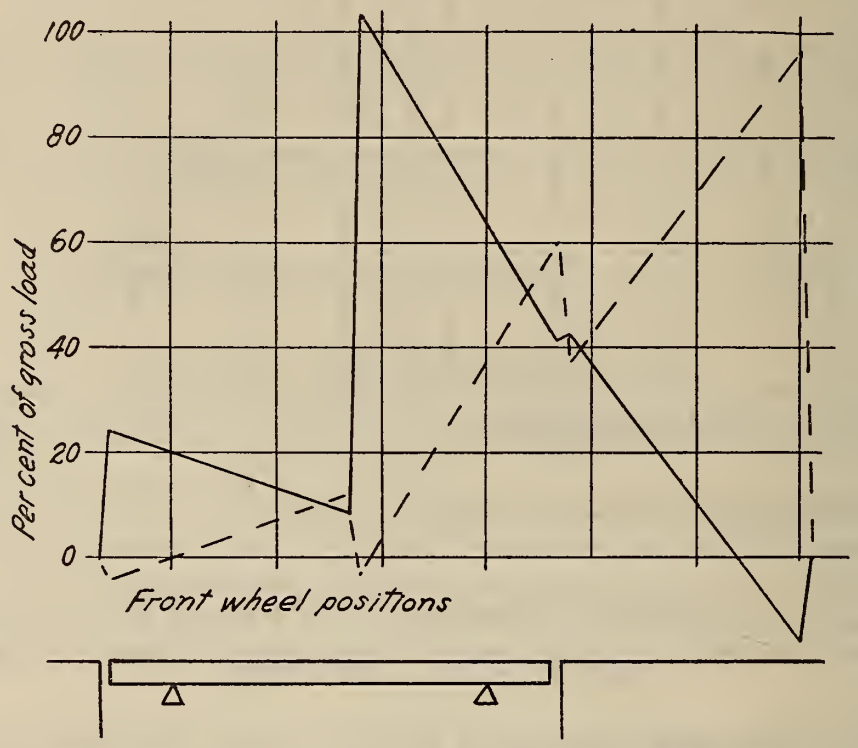

FIGURE 53.—*Reactions at end sections.*

Twenty-one-foot motortruck scale, fifteen-foot span. Two-axle truck, twelve-foot wheel base, 80-percent rear-axle load.

What are the practical consequences of these effects? At the beginning of these remarks it was stated that the factor of platform overhang was believed to be a primary or contributing cause of some mechanical faults characteristic of many scales now being produced. That opinion may be verified by any one who cares to remain in a vehicle-scale pit and observe developments when heavily loaded vehicles move on and off a scale which has a considerable amount of end overhang. As the heavy axle loads move on and off the platform, the levers and lever connections will be seen to react, sometimes quite violently, to the abrupt changes in loading; in some cases where overhang is excessive and the platform structure too light, the platform will be seen to rise perceptibly at one end and subsequently descend with great impact. Incidental vibrations and impacts transmitted to the lever system will cause a whipping action in extension levers and their connections with resultant derangement of parts and impaired alinement of connections; in some instances the pivots become com-

pletely displaced from contact with their bearings and cases are known of levers becoming disconnected from the train. It will be appreciated that repeated occurrence of these effects, causing overloading, derangement, or other abuse of vital parts in the scale, are ultimately reflected in various mechanical faults and in the weighing performance.

It was also stated, early in this discussion, that field investigations had disclosed instances where the factor of overhang, in modified or improvised installations, caused gross inaccuracies in some circumstances of loading, although the scale might prove substantially accurate when tested in the usual manner. This phase of the general subject may be illustrated by citing examples of some scales whose platforms had been extended by excessive amounts and whose owners, to prevent tilting of the platforms under heavy loads, had taken measures to limit or restrain tilting of the weighbridge and platform. In one case the owner had attached large masses of concrete to the weighbridge to increase the dead load of the platform structure. In another case the owner had fitted the ends of the platform with vertical rods attached to eyebolts anchored to the pit floor. In still another case there had been installed pillars or columns whose top surfaces were slightly below the platform structure. On consideration of these latter two cases, you will appreciate that application of test loads in the normal test positions might develop no interference with the vertical checking elements or safety pillars but that, if a heavy load were weighed in such positions that tilting of the platform developed, the constraint or interference introduced by those devices might very seriously affect the weighing accuracy.

Thus far discussion has been confined to end overhang, or longitudinal projection of the platform beyond the main load bearings. To consider the element of side overhang, or transverse projection of the platform beyond the main load bearings, it will be said that, generally speaking, side overhang is not an important factor because (1) the transverse distribution of vehicle loads is almost invariably equalized within small limits, and (2) in the case of scales designed for weighing motor vehicles the relation between platform width, vehicle wheel gage and transverse distance between main load bearings is such that no off-center positioning of a vehicle load will cause transverse tilting of the platform or serious overloading of the parts at one side of the scale; thus the adverse effects of side overhang would appear to be limited to those which might occur when one wheel of a vehicle being driven on to the end of the platform at an angle bears for a moment on one corner of the platform. However, in the case of a railway-track scale converted for use as a motor-vehicle scale the factor of transverse overhang is a more serious one because of the relatively smaller distance between main-load bearings; to insure proper centering of loads with respect to the longitudinal axis of such a scale and to prevent any transverse tilting caused by vehicle wheels passing over one corner of a scale at an angle, suitable curbing or guides should be installed on the platforms or approaches.

To conclude, in theory, the ideal vehicle scale is one without platform overhang; it may interest you to know that one manufacturer, producing vehicle scales for use in grain-weighing service in a jurisdiction where large-capacity-scale construction is exceptionally well

supervised by official agency, has adopted that design. In general practice, however, a moderate amount of end overhang is essential to economical construction and is permissible if in proper relation to the span between sections and the dead load of the platform structure.

The essential requirement is that the end overhang of the platform be so limited, and the platform structure be so massive, that application of any vehicle load within the capacity of the scale will not produce a tilting of the platform structure. To meet that requirement is the responsibility of the scale manufacturer, and it is presumed that reputable manufacturers will control design and construction accordingly.

So many variable factors are involved in a consideration of what constitutes a permissible amount of platform overhang that no definite and practicable formulas may be established for the guidance of the weights and measures official in his appraisal of individual cases. However, in cases where the issue arises, the official may resort to the expedient of carefully observing the reaction of the platform when loads approximating the scale capacity are driven on and off the scale and when they are weighed.

With respect to makeshift extensions of scale platforms by parties unfamiliar with scale design and construction considerations, it may be said that correspondence on this subject was exchanged with the leading manufacturers of vehicle scales. The views expressed by those manufacturers agree with the Bureau's opinion that extension of the platform structure beyond the limits established by the original manufacturer constitutes a serious structural fault. Such extensions should not be made without consulting the manufacturer and without approval of the weights and measures official. Moreover, the official should take all reasonable measures to prevent the practice.

(At this point, at 4:10 p. m., the Conference adjourned, to meet at 10:00 a. m., Thursday, June 5, 1941.)

FIFTH SESSION—MORNING OF THURSDAY, JUNE 5, 1941

(The Conference reassembled at 10:05 a.m., Joseph G. Rogers, Vice President of the Conference, in the chair.)

ANNOUNCEMENTS

The CHAIRMAN. The Secretary has a few announcements to make preliminary to the opening of the regular program.

Mr. R. W. SMITH. I have a few communications which have reached me since the Conference began, and I wish to mention them briefly.

We have a wire this morning from Mr. Tucker, of California, in which he extends his greetings and best wishes for a successful meeting.

I have a letter from Mr. Wilson, of Georgia, who writes regretting that circumstances prevent his attendance this year, but hoping that he will be able to be with us at our next meeting, and extended his greetings and best wishes.

Mr. Campbell, of Ohio, writes that his plans to attend the meeting were necessarily abandoned because of failure to procure authorization for the necessary travel. To show Mr. Campbell's very sincere interest in our proceedings, he encloses his registration dues even though he cannot be with us in person.

A message from Mr. Warner, of Wisconsin, expresses his regrets that he cannot be with us here.

I have an announcement to make on behalf of J. A. Meek, of Virginia. Mr. Meek writes that a short conference on the indentification of quality in foods from producers to consumers will be held in the Mayflower Hotel on Friday afternoon, June 6. Anyone interested is invited to attend and participate in the meeting. As an outline of the purposes of the meeting, Mr. Meek enclosed a mimeographed sheet, a portion of which reads as follows:

> What kind of information do consumers want to get most for their money? What kind of information do consumers want on the label in order to distinguish quality, which will also enable distributors to better serve producers, consumers, and the general welfare?
>
> The Division of Markets of the Virginia Department of Agriculture has answered these questions with the "Virginia Quality Labels." These unique and distinctive labels have been developed by the Division to represent official continuous grading or inspection and to simplify identificaion of quality.
>
> Confusion in labels has often mystified housewives, and loose practices in grading, or no grading at all, has resulted in a mixture of good and bad which is detrimental to producers and better dealers as well as to consumers. The Virginia Quality Labels are arresting and attractive. Their use under continuous official inspection justly inspires confidence, as they stand for dependable, uniform quality.
>
> Virginia Quality Labels are now used on eggs, dressed turkeys, canned tomatoes, and white potatoes. Efforts are now being made to develop them for use on other foods, particularly dressed chickens, oysters, cured sweet potatoes, herring (fish roe), and possibly flour.

THE CHAIRMAN. It is very gratifying, and it is certainly commendable, that so many of you are on hand for the opening of our session this morning. I think there is better cooperation in this respect this year than ever before.

The first report for the day is that of the Conference Committee on Specifications and Tolerances, which will be presented by Mr. McBride, Committee Chairman.

MR. MCBRIDE. On Tuesday morning there were available about 300 copies of the Committee report, so each of you should have a copy.

REPORT OF COMMITTEE ON SPECIFICATIONS AND TOLERANCES PRESENTED BY JOHN P. MCBRIDE, CHAIRMAN, AND DISCUSSION THEREON

The Committee on Specifications and Tolerances recommends to the Thirty-first National Conference on Weights and Measures the adoption of the additions and amendments to the specifications, tolerances, and regulations for commercial weighing and measuring devices, which are set forth below. As these recommendations are read, explanatory comments will be interpolated from time to time.

(Signed) JOHN P. MCBRIDE, *Chairman*,
CHARLES M. FULLER,
JOSEPH G. ROGERS,
GEORGE F. AUSTIN, JR.,
RALPH W. SMITH,
Committee on Specifications and Tolerances.

SECTION ON MEASURE-CONTAINERS

MR. MCBRIDE. The first material to be presented is the Committee recommendation for final action upon the Code for Single-Service Measure-Containers, which was adopted in tentative form in 1940. Criticisms of the tentative code reached the Committee from only one source; the suggestions for modifications were carefully considered, and the Committee agreed to some of these. It is now recommended that the code be finally adopted in the following form. [Reading:]

SINGLE-SERVICE MEASURE-CONTAINERS (EXCEPT MILK BOTTLES)

Notes.—The following specifications and tolerances are not to be construed to apply to measure-containers used for milk, cream, and buttermilk, these being covered by the code for milk bottles.

The following specifications and tolerances shall not become effective prior to July 1, 1942.

DEFINITION

A single-service measure-container, hereinafter referred to as a measure-container, is a container intended to be used once only, to determine at the time of sale the quantity of commodity comprising a retail sale made on the basis of liquid measure and to serve as the container for the delivery of the commodity to the customer.

SPECIFICATIONS

1. Capacity.—Measure-containers shall not be subdivided and shall be of one of the following capacities only: 1 gallon, ½ gallon, 1 quart, 1 pint, ½ pint, and 1 gill standard liquid measure.

2. Proportions.—The over-all inside height of a measure-container shall not be more than twice (a) the mean inside diameter (if conical or cylindrical) or (b) the length of the short side of a mid-section (if of rectangular cross section).

3. Filling point.—The capacity of a measure-container shall be determined to a definite filling point, which shall be (a) the top edge, (b) a graduation near the top edge, or (c) the lowest portion of a shoulder, cap seat, lid seat, or indentation near the top edge, of the measure-container. The filling point

shall be sharply defined and it shall extend at least halfway around the circumference or across two opposite sides.

4. Marking.—A measure-container shall have its capacity conspicuously marked on the side in combination with the word "Liquid" or the letters "Liq" when the word "Quart" or "Pint" occurs. If the filling point is below the top edge, there shall be on the side of the measure-container a conspicuous and suitable statement clearly identifying the filling point provided. On the side or bottom of the measure-container shall appear the name, initials, or trade mark of the manufacturer. All required marking shall be clear and legible.

TOLERANCES

The tolerances to be allowed in excess of deficiency on measure-containers shall be the values shown in the following table:

Capacity	Tolerance	
	Liquid drams	*Cubic inches*
1 gallon	6	1. 4
½ gallon	4. 5	1. 0
1 quart	3	0. 7
1 pint	2	. 5
½ pint	1. 5	. 3
1 gill	1. 5	. 3

Mr. McBride. The changes from the form in which the code was adopted in 1940 consist in the addition of the second paragraph under "Notes", the insertion of the words "lid seat" in specification No. 3, and the substitution of the word "statement" for the word "inscription" in specification No. 4. Relative to "lid seat" it may be said that this term is used in the trade as often as "cap seat", the covering element being known as a "lid" rather than as a "cap"; accordingly, we have retained both phrases. The word "statement" appeared to the Committee to be preferable to "inscription" in specification No. 4, in view of the character of the requirement in connection with which the word is used.

[Secretary's Note.—At this point there ensued brief discussion on the method to be followed in acting upon the report of the Committee. Upon motion, duly seconded and adopted, it was decided that the report should be acted upon by the Conference, item by item.]

Mr. Saybolt. Am I correct in understanding that sealed cans of lubricating oil are not included in the definition of measure-containers?

Mr. McBride. That is right, unless the can is used as a measure "to determine at the time of sale the quantity of commodity comprising a retail sale made on the basis of liquid measure and to serve as the container for the delivery of the commodity to the customer."

(The code as proposed by the Committee was duly adopted.)

SECTION ON MILK BOTTLES

Mr. McBride (reading):

Add a new specification for milk bottles, to be numbered 4, to read as follows:

4. When a milk bottle is designed for optional, or "multiple", types of bottle closure, the plane of the lowest sealing surface shall govern for purposes of the

application of specification requirements and tolerances except when there is a clearly defined filling line below the plane of the lowest sealing surface, in which case such filling line shall so govern.

The purpose of that specification is to meet a situation which has resulted from recent developments in milk bottles; there are now on the market bottles which may employ a screw-top cap, or an over-all clamp cap, or a paper cap. The new specification proposed establishes the definite filling point for such bottles. The bottles may be used in any way desired, but the manufacturer is charged with the responsibility of making a bottle which will meet the accuracy requirements set forth in the specification.

(The amendment as proposed by the Committee was duly adopted.)

SECTION ON LIQUID-MEASURING DEVICES

MR. MCBRIDE (reading):

Amend the third paragraph under "Definitions" by changing the figure "50" to "100", making the paragraph read as follows:

A liquid-measuring device of the wholesale type, hereinafter referred to as a "wholesale device", is a liquid-measuring device which, on account of the character of its primary indicating elements, is obviously designed for single deliveries of 100 gallons or more.

The purpose of this change is to make our definition for a "wholesale device" consistent with our definition for a "retail device." In its present form, with the 50-gallon limitation, there is a contradiction between the definitions and devices which are on the market; computing types of gasoline dispensing devices are capable of registering up to 99.9 gallons, and these are the principal retail devices.

(The amendment as proposed by the Committee was duly adopted.)

MR. MCBRIDE (reading):

Add a new nonretroactive paragraph to be the third paragraph of specification No. 20, to read as follows:

A pressure-operated liquid-measuring device, that is, a liquid-measuring device not designed for discharge by gravity, when designed and constructed to be operated with the hose full of liquid at all times shall be equipped with an effective anti-drain valve, incorporated in the discharge valve at the outlet end of the hose or installed immediately adjacent thereto, to prevent drainage of the hose.

This is a nonretroactive provision, applicable to wet hose, power-operated, liquid-measuring devices. Many States are already enforcing a requirement for an antidrain valve, and it is now proposed to include that requirement in our code.

(The amendment as proposed by the Committee was duly adopted.)

SECTION ON GREASE-MEASURING DEVICES

MR. MCBRIDE (reading):

Amend specification No. 17 by adding at the end thereof a new nonretroactive requirement for antidrain valves, making the paragraph read as follows:

17. ASSURANCE OF COMPLETE DELIVERY.—All grease-measuring devices shall be so designed and constructed that there shall be no means provided by which any of the measured lubricant can be diverted from the measuring chamber or the discharge line to the supply tank or elsewhere during the period of operation of the device. All valves in the supply line intended to prevent the reversal of flow of the lubricant shall be of such design and construction that their closure is automatically effected in the use of the device. *Each grease-measuring device shall be*

equipped with an effective anti-drain valve installed immediately adjacent to the outlet end of the hose, to prevent drainage of the hose.

(The amendment as proposed by the Committee was duly adopted.)

SECTION ON SCALES

MR. MCBRIDE (reading):

The first portion of specification B-2w under "General Specifications" now reads as follows:

B–2w. SHIFT TEST OF SCALES.—A scale having four main load bearings shall give results accurate within tolerance when a load of one-quarter capacity or less is placed so that its center of gravity lies as nearly as may be over any one of the main load bearings, as indicated by the points designated 1 in the following diagram, and when a load of one-half capacity or more is so placed at the center of any quarter of the platform, as indicated by the points designated 2 in the following diagram:

Amend this material by deleting the words "or more" in line 8, making the paragraph read as follows:

B–2w. SHIFT TEST OF SCALES.—A scale having four main load bearings shall give results accurate within tolerance when a load of one-quarter capacity or less is placed so that its center of gravity lies as nearly as may be over any one of the main load bearings, as indicated by the points designated 1 in the following diagram, and when a load of one-half capacity is so placed at the center of any quarter of the platform, as indicated by the points designated 2 in the following diagram:

It is considered that under the original language it would be permissible to exceed a proper corner loading on a vehicle scale, with possible damage to the scale. The Committee believes that all purposes will be satisfied by limiting the loading at the designated points to one-half the nominal capacity of the scale. Accordingly, it is recommended that the words "or more" be deleted from the original form of the specification.

(The amendment as proposed by the Committee was duly adopted.)

MR. MCBRIDE (reading):

Paragraph C–2c (under the heading "Spring Scales") now reads as follows:

C–2c. GRADUATIONS.—The value and spacing of the graduations of a straight-face spring scale shall satisfy the requirements of the following table:

Capacity	Maximum value of interval	Minimum distance between graduations
Pounds	*Pounds*	*Inch*
25	½	0. 03
50	1	. 03
100	1	. 03
200	2	. 03
300	5	. 04
400	5	. 04
500	5	. 04

Amend this specification to read as follows:

C–2c. GRADUATIONS.—On a straight-face spring scale *the clear intervals between graduations shall not be less than 0.04 inch* and values of the graduations shall satisfy the requirements of the following table:

Capacity	Maximum value of interval
Pounds	*Pounds*
25	½
50	1
100	1
200	2
300	5
400	5
500	5

The effect of the proposed change is to require a clear interval between graduations of not less than 0.04 inch, regardless of the capacity of the scale. This will make the requirement for straight-faced spring scales consistent with the requirements for scales of other types. By "clear interval between graduations" is meant the interval between adjacent edges of consecutive graduation lines.

(The amendment as proposed by the Committee was duly adopted.)

Mr. McBride (reading):

Add at the end of paragraph I–1a (under the heading "Sensibility Reciprocal (SR) Requirements") a new proviso, making the paragraph read as follows:

I–1a. Large-Capacity Scales Except Railway Track Scales.—The maximum maintenance SR allowable [applicable to scales in use], at the capacity of the scale or at any lesser load, shall be the value of two of the minimum weighbeam graduations, except that the maximum maintenance SR allowable on a vehicle scale shall in no case be less than 10 pounds. The maximum acceptance and adjustment SR allowable [applicable to "new" scales as defined in paragraph A–2q], whether or not the scale is a vehicle scale, shall be the value of one of the minimum weighbeam graduations: Provided, however, That in the case of a scale of a capacity of more than 60,000 pounds, the maximum maintenance SR allowable shall in no case exceed 40 pounds, and the maximum acceptance and adjustment SR allowable shall in no case exceed 20 pounds.

Add a new proviso to paragraph J–1a (under the heading "Tolerances—For Large Capacity Scales Except Railway Track Scales") to be numbered 6 and to read as follows:

6. In the case of a scale of more than 60,000 pounds, the value of the minimum tolerance shall in no case be greater than 20 pounds for a scale in use and 10 pounds for a new scale.

The same reason underlies both of these proposed changes. We have already provided, in General Scale Regulation K–6b, that a vehicle scale having a capacity of not more than 60,000 pounds shall have minimum weight graduations not exceeding 20 pounds. There have been encountered instances of vehicle scales of a capacity greater than 60,000 pounds, on which the value of the minimum weight graduations has been 100 pounds. The present SR requirements and the minimum tolerances for large-capacity scales depend upon the value, in any particular case, of the minimum weight graduations on the scale. The effect of the present Committee recommendations is to require that scales having minimum weight graduations which are in excess of 20 pounds shall be required to comply with the same SR and minimum tolerance requirements as scales on which the minimum

weight graduations are 20 pounds, thus avoiding the absurdly large values which would otherwise be arrived at.

(The amendment as proposed by the Committee was duly adopted.)

Mr. McBride. The final recommendation of the Committee is for a new general scale regulation to be known as regulation K–11. At a meeting of the Committee held last evening an addition was made to the text of this proposed regulation, as compared with the text shown in the mimeographed report in your hands. As now recommended by the Committee, the proposed regulation reads as follows. [Reading:]

K–11. Lengthening of Scale Platforms.—The length of the platform of a vehicle scale shall not be increased beyond the manufacturer's designed dimension except when the modification has been approved by competent scale-engineering authority, preferably that of the engineering department of the manufacturer of the scale.

The alteration of scale platforms by scale owners has become a troublesome problem. You heard yesterday afternoon the very able paper by Mr. Richard, who went into this problem at length; if it were practicable to set up dimensional requirements to control the situation, I think Mr. Richard would have made such a recommendation. Since it appears that such a solution is not practicable, your Committee feels that the regulation proposed is about the best that can be offered.

Mr. Quinn. What effect would this regulation have on scales which are already in use and which have already had their platforms lengthened?

Mr. McBride. I assume that those which have already been changed would not be subject to the regulation, because the regulation is intended to require preliminary approval for such changes. The only thing to do with scales that have been changed is to rely upon test results to disclose reasons for rejection.

Mr. Engelhard. Why should we not incorporate in the regulation requirements for measurements on parts other than the platform? In our county, with the consent of the manufacturer, we lengthened the platform of a scale; later the scale broke down and without our knowledge the local blacksmith added about 18 inches to one arm of the transverse lever, and then we wondered why the scale developed a 1,600-pound error. It seems to me that we could very properly prohibit changes in any of the essential parts of the scale as originally manufactured.

Mr. McBride. The proposed regulation is directed solely to the particular problem of the lengthening of scale platforms. We think that there is a tendency among scale owners to lengthen scale platforms to meet new weighing conditions, without making any other changes in the installations; this is what we are trying to control.

Mr. Engelhard. Then it is the sense of the proposed regulation that not only should such changes be designed and made by the manufacturer or some other competent person, but that this should only be done with the consent of the weights and measures official?

Mr. McBride. That is correct.

(It was moved and seconded that the regulation proposed by the Committee be adopted.)

Mr. Spinks. I think you should not put on the weights and measures officials of the country the responsibility for deciding who is a competent engineer. I believe that the regulation should read:

The length of the platform of a vehicle scale should not be increased beyond the manufacturer's designed dimensions except when the modification has been approved by the engineering department of the manufacturer of the scale.

That would put the responsibility in competent hands.

Mr. McBride. No human authority can guarantee the continuity of any particular scale company. Under the language proposed by Mr. Spinks, if a particular scale company were to go out of business, there would be no place for a scale owner to go for what might be a perfectly proper modification of his scale. We must certainly provide an alternative procedure, and not demand that the scale manufacturer be called in in every case, something which may be impossible.

(The question was taken, and the regulation proposed by the Committee was adopted.)

MISCELLANEOUS COMMITTEE ACTIVITIES

Mr. McBride. That completes the recommendations of the Committee. There are, however, several matters which were considered by the Committee but upon which no specific recommendations are being made. I wish to discuss these briefly.

The Committee considered the question of gasoline-measuring devices designed with very low housings, on which it may be difficult, under certain conditions, to read the indications. It appears that these special designs have been developed as a result of the demands of particular customers and are not being marketed by choice of the manufacturers. That makes no difference, however, and the Committee feels that it should anticipate trends; although at present this is something of an isolated case, we bring it to your attention because of possible development along these lines. Our present code for liquid-measuring devices contains a provision that the reading elements shall be visible through an angle of 120 degrees, but is silent in relation to maximum or minimum height of the reading elements. A factor in the present problem is whether the device should be so designed that the indicating elements will be visible to a purchaser from a seated position in his automobile. The Committee has considered a requirement prescribing a vertical range of 30 to 60 inches from the roadway level as the area within which the indicating elements should lie, but has come to no definite conclusion. The Committee proposes to give this question further consideration during the coming year, and it is brought to your attention at this time so that you may critically observe this class of installation in your own territories.

The Committee gave consideration during the year to a particular type of laundry scale which presented some special problems because of the character of its load-receiving element which was constructed with sloping sides. The conclusion was reached that the requirements of scale specification B–2w, which prescribes performance requirements under "shift test," should be applied on the basis of the bottom area of the load-receiving element of the scale; assuming satisfactory performance on such tests, it was the recommendation of the Committee that the performance of several of the scales in question

should then be critically observed under actual service conditions, check weighings being made on a sufficient number of large lots of laundry to establish the accuracy of the commercial weights previously recorded. Final approval would be contingent upon satisfactory results on this series of check observations. If approval were found to be justified, subsequent testing could be confined to tests made with test weights alone.

Another question which arose was whether or not paper milk bottles should be construed to be containers or measures. Information has been gathered showing that in particular cases measuring machines are used to fill these paper containers and that these measuring machines are susceptible of being sealed. The opinion of the Committee is that in such cases the paper bottles are not measures because the quantity of the contents is determined by a measuring machine; hence such paper bottles are merely containers, and when these containers are filled with milk they become "packages," and should be subject only to such requirements as normally apply to packages. On the other hand, if the paper bottle is the measure by means of which the quantity of the contents is determined, then the bottle should meet the requirements of the milk-bottle code.

PATTERN-APPROVAL PLAN

You will recall that at the last Conference, after considerable discussion, the Committee on Specifications and Tolerances was given the assignment of developing a plan to promote uniformity in the matter of pattern approval among pattern-approving jurisdictions. The Committee evolved what in its best judgment was the only feasible plan which would meet the conditions developed in the debate last year. An outline of this plan was supplied to more than 90 equipment manufacturers and to all weights and measures authorities having type-approval functions. Briefly, this plan was to defer final approval until all approval authorities had had an opportunity to observe a particular device and to contact each other, so that each might have the benefit of the others' reactions.

Letters outlining the plan were sent out under dates of October 30 and September 3, 1940. The thanks of the Committee are extended to those who complied with its request for comments and suggestions. The responses were fewer in number than the Committee desired and expected. A study of all comments and suggestions received demonstrated that there was a preponderance of opposition to the proposed plan on the part of equipment manufacturers, ranging from mild objection to vigorously adverse criticism, and that those manufacturers who favored the plan were not particularly enthusiastic or hopeful that the plan would produce the desired results. Since it was the object of the plan to provide means for assisting not only weights and measures officials, but also the equipment manufacturers in matters of official pattern approval, and since it appeared that a majority of the equipment manufacturers felt that the plan would be burdensome and unproductive of constructive results and that no change should be made in the present methods of accomplishing pattern approval, the Committee felt that it would be unwise to urge that the proposed plan be put into effect.

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From one source the Committee received an outline of a substitute plan based upon the utilization of a private engineering agency as an approving authority. Although this plan appears to have some commendable features, it is not believed that it would prove workable or acceptable to weights and measures officials, because it involves, in effect, a delegation of official authority which would hardly be proper and which might be illegal.

Accordingly, the Committee now reports that it has failed to evolve any plan which appears to offer reasonable certainty of accomplishing the desired results and at the same time provide the desired safeguards for the interests of equipment manufacturers, and believes that no such plan can be worked out at this time within the limits established by the debate on this subject at the Thirtieth National Conference.

That concludes the matters upon which the Committee on Specifications and Tolerances has to report. It is suggested that when matters within the field of the Committee on Specifications and Tolerances arise during the course of any year, you let the Committee know of these by writing to the Committee Secretary, R. W. Smith, at the National Bureau of Standards; the Committee can then give these matters unhurried consideration, something which is not practicable when your problems are presented to us only a few days or perhaps only a few hours before the Conference opens. The Committee desires to avoid hasty or precipitate judgment, and your cooperation in giving us ample time to study your problems will be conducive to sound conclusions, most helpful to all parties concerned.

REPORT OF COMMITTEE ON LEGISLATION, PRESENTED BY ROLLIN E. MEEK, CHAIRMAN, AND DISCUSSION THEREON

Your Committee on Legislation begs to report that it has given careful consideration during the past year to all proposed Federal legislation which, if enacted, would affect the work and duties of the weights and measures officials throughout the country. The proposed legislation, which has received the attention of the Committee, pertains to the use of net weights in interstate and foreign commerce transactions in cotton, and to food-package standardization.

The first part of this report will be limited to recommendations on the proposed legislation requiring the use of net weights in interstate and foreign commerce transactions in cotton. Proposed legislation of this character has been introduced into both branches of the Federal Congress and is known as H. R. 968 and S. 181. The second part of the report will be limited to recommendations on a proposed bill for food-package standardization which has been prepared by members of this Committee who were ably advised and assisted by others equally interested in this important proposed legislation.

The text of H. R. 968 is as follows:

A BILL

To provide for the use of net weights in interstate and foreign commerce transactions in cotton, to provide for the standardization of bale covering for cotton, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act shall be known by the short title of "Cotton Net Weight Act."

The word "person", wherever used in this Act, shall be construed to import the plural or singular, as the case demands, and shall include individuals, associations, partnerships, and corporations.

The words "in interstate or foreign commerce", wherever used in this Act, shall be construed to mean from any State, Territory, or District to or through any other State, Territory, or District or to or through any foreign country, or within any Territory or District.

The words "bale covering" shall be construed to mean bagging, ties, and patches.

The word "cotton" shall be construed to mean cotton of any variety produced within the continental United States, including linters.

When considering and enforcing the provisions of this Act, the omission or failure of any official, agent, or other person acting for or employed by any association, partnership, or corporation within the scope of his employment or office shall in every case also be deemed the act, omission, or failure of such association, partnership, or corporation, as well as that of the person.

SEC. 2. That in order to provide for the more adequate covering and protection of the American cotton bale and to facilitate net-weight trading in cotton, the Secretary of Agriculture is hereby authorized to investigate the handling, inspection, and transportation of cotton in interstate and foreign commerce; to study the materials used for bale covering; and from time to time to establish standards for materials to be used for bale covering, which such standards shall include specifications and tolerance as to sizes, weights, constructions, strength, and any other factors of quality that he may find to be necessary; said standards, when established, to be known as the "United States Official Cotton Tare Standards": *Provided*, That the official cotton tare standards first established hereunder shall be promulgated on or before January 15, 1942, and shall become effective on July 15, 1942: *Provided further*, That any change or replacement of such standards shall become effective only on and after a date specified in the order of the Secretary of Agriculture establishing the same, which date shall be not more than one year from the date of such order, but pending such effective date of new or revised standards any bale covering material conforming with such new or revised standards may be used in lieu of any bale covering material embraced in the United States Official Cotton Tare standards theretofore promulgated. The maximum weight of any fabric or material standardized under this section as bagging for the covering of cotton bales shall not exceed fourteen ounces per square yard, and the maximum weight of any fabric or material standardized for patches shall not exceed twenty ounces ounces per patch; and no such fabrics or materials standardized for bagging or patches shall be composed of any material previously used for covering cotton bales unless the same shall have been reprocessed and rewoven.

SEC. 3. That except as provided in section 2 of this Act, it shall be unlawful for any person to ship or deliver for shipment in interstate or foreign commerce any bale of cotton ginned after the effective date of the United States Official Cotton Tare Standards on which the bagging, ties, or patches do not conform with such United States Official Cotton Tare Standards.

No person shall be prosecuted under the provisions of this section when he can establish a guaranty signed by the manufacturer, wholesaler, jobber, or other party residing within the United States by whom such bagging, ties, or patches were sold, to the effect that the same conform with said United States Official Cotton Tare Standards. Said guaranty, to afford protection, shall contain the name and address of the party or parties making the sale of such bale covering materials, and in such case such party or parties making such sale shall be amenable to the prosecutions, fines, and other penalties which would attach in due course to the shipper under the provisions of this Act.

The Secretary of Agriculture is authorized to examine and test bale covering materials and samples thereof for the purpose of determining whether such materials conform with the United States Official Cotton Tare Standards, and to promulgate regulations for submitting samples of bale covering materials for examination and testing.

SEC. 4. That from and after the effective date of the United States Official Cotton Tare Standards it shall be unlawful for any person to buy or sell or to offer to buy or sell any American cotton ginned after such effective date for shipment in interstate or foreign commerce except according to the net weight of the cotton involved, excluding in each instance the weight of bagging, ties, and patches.

SEC. 5. That the Secretary of Agriculture is authorized to cause such investigations and tests to be made as he may find to be necessary in order to determine practical means for the permanent identification of different types of bales of cotton by the use of markers, tags, and other devices which will facilitate the effective administration of this Act, and by public notice to prescribe standard specifications for such markers, tags, and other devices. Such standard specifications or any change or replacement thereof shall become effective on and after a date specified in the order of the Secretary establishing the same, which shall be not less than one year after the date of such order, and thereafter it shall be unlawful for any person to ship or deliver for shipment in interstate or foreign commerce any bale of American cotton ginned after such effective date which does not bear a tag, marker, or other device conforming with such standard specifications.

SEC. 6. That for the purposes of this Act the Secretary of Agriculture shall cause to be promulgated such regulations, may cause such investigations, tests, demonstrations, and publications to be made as he shall find to be necessary; and he is hereby authorized to cooperate with any department or agency of the Government, any State, Territory, District, or possession, or department, agency, or political subdivisions thereof, or any person, in carrying out the provisions of this Act, and he shall have the power to appoint, remove, and fix the compensation of such officers and employees not in conflict with existing law, and to make such expenditures for printing, books of reference, technical newspapers and periodicals, furniture, stationery, office equipment, travel, and other supplies and expenses as shall be necessary to carry out the purposes of this Act in the District of Columbia and elsewhere.

SEC. 7. The duties devolving upon the Secretary of Agriculture under this Act may with equal force and effect be executed by such officers and agents of the Department of Agriculture as he may designate for the purpose.

SEC. 8. Any person who shall knowingly violate any of the provisions of this Act or of any regulation made in pursuance hereof; or any person who shall knowingly represent by misbranding or otherwise that any bale covering material sold or offered for sale or shipped or delivered for shipment in interstate or foreign commerce conforms with the United States Official Cotton Tare Standards when, in fact, such bale covering material does not conform with such standards; or any person who shall forcibly assault, impede, resist, interfere with, or influence improperly, or attempt to influence improperly, any person employed under this Act in the pursuance of his duties, shall be guilty of a misdemeanor and upon conviction thereof shall be fined not more than $500.

SEC. 9. There is hereby authorized to be appropriated, out of any money in the Treasury not otherwise appropriated, such sums as may be necessary for carrying out the provisions of this Act.

SEC. 10. If any provision of this Act or the application thereof to any person or circumstance is held invalid, the validity of the remainder of the Act and the application of such provision to other persons and circumstances shall not be affected thereby.

SEC. 11. This Act shall become effective January 1, 1942.

Comments on H. R. 968.—During a hearing on H. R. 968, conducted by the Committee on Agriculture of the House of Representatives, it was disclosed that the prevailing practice among cotton farmers and American shippers of cotton to European markets is to sell and buy cotton on gross weight without any special tare standards. The tare on the average bale of 500 pounds figures from 21 pounds at the gin to 30 pounds per bale for export. This practice compels the producer, as well as the exporter, to place more wrapping on cotton than is really necessary. This is an economic loss in the way of excessive freight, insurance, waste, and various other charges. In event the unnecessary covering or wrapping is not used, the producer loses the difference in weight between the amount actually used and the customary tare deducted by the trade, which would result in a loss of 8 to 12 pounds per bale.

The proposed legislation would permit bagging made from low-grade cotton to be placed on a competitive basis with jute, burlap, or any other materials which may be developed and which meet the requirements of the United States Tare Standards. The tare on American cotton would be reduced to not to exceed 3 percent, or 15 pounds per bale.

The Committee believes the American cotton producer and cotton shipper are justified in objecting to a continuation of the practice of charging 30 pounds against each bale of cotton.

Recommendations on H. R. 968 and S. 181.—The Committee approves the purpose and intent of H. R. 968 and S. 181, which are bills of similar character and designed to bring about merchandising of cotton on a net-weight basis, the standardization of cotton-bale-covering materials, and development of means of permanent bale identification. The Committee recommends that this Conference go on record as favoring the enactment of this legislation.

The text of the proposed Federal Standard Food Package Bill is as follows:

[SECRETARY'S NOTE.—The text of the bill, as presented below, includes certain changes found necessary by the special committee charged by the Conference with the introduction of the bill into the Congress. (See page 129.)]

A BILL

To prohibit the movement in interstate commerce of packages of food not of the standard units of weight or measure herein prescribed, and for other purposes.

Be it enacted by the Senate and House of Representaives of the United States of America in Congress assembled,

SECTION 1. This act may be cited as the Federal Standard Food Package Act.

SEC. 2. For the purposes of this Act—

(a) The term "Territory" means any Territory or possession of the United States, including the District of Columbia and excluding the Canal Zone.

(b) The term "interstate commerce" means (1) commerce between any State or Territory and any place outside thereof, and (2) commerce within the District of Columbia or within any Territory not organized with a legislative body.

(c) The term "Administrator" means the Administrator of the Federal Security Agency.

(d) The term "person" includes individual, partnership, corporation, and association.

(e) The term "food" means articles used for food or drink for man except maltous, vinous, and spirituous liquors.

(f) The term "dry or solid food" means food commercially marketed in the dry or solid state.

(g) The term "liquid food" means food commercially marketed in the liquid state.

(h) The term "canned food" means food sealed in containers and processed by heat to prevent spoilage.

(i) The term "package" means any closed container of food and the contents thereof which comprise the unit for sale or delivery commonly known as the "retail package."

SEC. 3. The following standard units are hereby established for packages, the specified quantities being the net contents of the packages filled insofar as possible without impairment of quality.

(a) For dry and solid foods: 1 ounce, 2 ounces, 4 ounces, 8 ounces, 12 ounces, 1 pound, 1½ pounds, and multiples of 1 pound, avoirdupois weight.

(b) For liquid foods and for canned foods: 1 ounce, 2 ounces, 4 ounces, 8 ounces, 12 ounces, 1 pint, 1½ pints, 1 quart, 3 pints, 2 quarts, 3 quarts, 1 gallon, and multiples of 1 gallon, United States liquid measure.

(c) For foods except canned foods which are essentially or preponderantly solid at 68 degrees F: Packages as specified in subsection (a) of this section.

(d) For foods except canned foods which are essentially or preponderantly liquid or viscous at 68 degrees F: Packages as specified in subsection (b) of this section.

(e) For foods except canned foods which are semisolid: Packages as specified in either subsection (a) or subsection (b) of this section in accordance with general consumer usage.

SEC. 4. The following acts and the causing thereof are hereby prohibited:

(a) The introduction or delivery for introduction into interstate commerce, the receipt in interstate commerce and the delivery or proffered delivery thereof for pay or otherwise, and the packing, proffering for sale, or selling in any Territory of food in packages which are not of the standard units as defined in Section 3 of this Act, except as follows:

(1) Ice creams and other frozen desserts may be packaged as specified in either Section 3 (a) or Section 3 (b).

(2) Carbonated beverages may be packaged in units of six ounces United States liquid measure.

(3) The provisions of this section shall not apply to packages of dry, solid, semisolid, and viscous food containing amounts of less than 1 ounce avoirdupois weight or to packages of liquid food containing amounts of less than 1 ounce United States liquid measure.

(4) Small packages of particular dry or solid foods containing not more than six pieces or units whenever compliance with the provisions of this section is impracticable may be exempted by regulation.

(5) The provisions of this section shall not apply to packages of food in containers which are in compliance with the provisions of (1) the Act of March 4th, 1915, to fix the standard barrel for fruits, vegetables, and other dry commodities, (2) the Federal Standard Container Act of 1916, or (3) the Federal Standard Container Act of 1928.

(b) The refusal to permit access to or copying of any records as required by Section 9.

(c) The refusal to permit entry or inspection as authorized by Section 10.

(d) The giving of a guaranty or undertaking referred to in Section 12 which guaranty or undertaking is false, except by a person who relied upon a guaranty or undertaking to the same effect signed by, and containing the name and address of, the person residing in the United States from whom he received in good faith the packages of food.

SEC. 5. Nothing in this Act shall be construed as exempting any packages of food from all applicable provisions of the Federal Food, Drug, and Cosmetic Act.

SEC. 6. Whenever the Administrator finds, after investigation, that with respect to particular packages of food it is needful, for the promotion of honest and fair dealing in the interest of the consumers—

(a) To limit the packaging of particular dry or solid foods, when in packages of more than one pound, to certain multiples of the pound, he shall prescribe, by regulation, standard pound multiples for packages of such foods; when standard pound multiples have been so prescribed, packages of the food in question shall be held to comply with this Act only when of the prescribed pound multiples.

(b) To establish exemptions, with respect to particular foods, from the provisions of Section 3 of this Act, he shall, by regulation, prescribe such exemptions.

SEC. 7. The Administrator shall promulgate regulations for the efficient enforcement of this Act.

SEC. 8. The Administrator is authorized to conduct examinations and investigations for the purposes of this Act through officers and employees of the Federal Security Agency or through any weights and measures or food officer or employee of any State, Territory, or political subdivision thereof, duly commissioned by the Administrator as an officer of the Federal Security Agency.

SEC. 9. For the purpose of enforcing the provisions of this Act, carriers engaged in interstate commerce, and persons receiving packages of food in interstate commerce or holding such packages so received, shall, upon the request of an officer or employee duly designated by the Administrator, permit such officer or employee, at reasonable times, to have access to and to copy all records showing the movement in interstate commerce of any package of food, or the holding thereof during or after such movement, and the quantity, shipper, and consignee thereof; and it shall be unlawful for any such carrier or person to fail to permit such access to and copying of any such record so requested when such request is accompanied by

a statement in writing specifying the nature or kind of package of food to which such request relates: Provided, That evidence obtained under this section shall not be used in a criminal prosecution of the person from whom obtained: Provided further, That carriers shall not be subject to the other provisions of this Act by reason of their receipt, carriage, holding, or delivery of packages of food in the usual course of business as carriers.

SEC. 10. For purposes of enforcement of this Act, officers or employees duly designated by the Administrator, after first making request and obtaining permission of the owner, operator, or custodian thereof, are authorized (1) to enter, at reasonable times, any factory, warehouse, or establishment in which packages of food are manufactured, processed, packed, or held, for introduction into interstate commerce or are held after such introduction, or to enter any vehicle being used to transport or hold such articles of food in interstate commerce; and (2) to inspect, at reasonable times, such factory, warehouse, establishment, or vehicle and all pertinent equipment, finished and unfinished materials, containers, and labeling therein.

SEC. 11. (a) The Secretary of the Treasury shall deliver to the Administrator, upon his request, samples of packages of food which are being imported or offered for import into the United States, giving notice thereof to the owner or consignee, who may appear before the Administrator and have the right to introduce testimony. If it appears from the examination of such samples or otherwise that such packages of food are in violation of the provisions of this Act, then such packages of food shall be refused admission.

(b) The Secretary of the Treasury shall refuse delivery to the consignee and shall cause the destruction of any such package of food refused admission, unless such package of food is exported by the consignee within three months from the date of notice of such refusal, under such regulations as the Secretary of the Treasury may prescribe: Provided, That the Secretary of the Treasury may deliver to the consignee any such package of food pending examination and decision in the matter on execution of a bond as liquidated damages for the amount of the full invoice value thereof together with the duty thereon and on refusing for any cause to return such package of food to the custody of the Secretary of the Treasury when demanded for the purpose of excluding it from the country, such consignee shall forfeit the full amount of the bond as liquidated damages.

SEC. 12. (a) Any person who violates any of the provisions of this Act shall be guilty of a misdemeanor and shall on conviction thereof be subject to imprisonment for not more than one year, or a fine of not more than $500, or both such imprisonment and fine; but if the violation is committed after a conviction of such person under this section has become final, such person shall be subject to imprisonment for not more than two years, or a fine of not more than $5,000, or both such imprisonment and fine.

(b) No person shall be subject to the penalties of subsection (a) of this section, (1) for having received in interstate commerce any package of food and delivered it or proffered delivery of it, if such delivery or proffer was made in good faith, unless he refuses to furnish on request of the Administrator the name and address of the person from whom he purchased or received such package of food and copies of all documents pertaining to the delivery of the package of food to him; or (2) for having violated Section 4 (a) if he establishes a guaranty or undertaking signed by, and containing the name and address of, the person residing in the United States from whom he received in good faith the package of food, to the effect that such package of food is not a package of food which may not, under the provisions of this Act, be introduced into interstate commerce.

SEC. 13. (a) Any package of food that is not of a standard unit as defined in Section 3 of this Act, when introduced into or while in interstate commerce, shall be liable to be proceeded against while in interstate commerce, or any time thereafter, on libel of information and condemned in any district court of the United Staes within the jurisdiction of which the package of food is found.

(b) The package of food shall be liable to seizure by process pursuant to the libel, and the procedure in cases under this section shall conform, as nearly as may be, to the procedure in admiralty; except that on demand of either party any issue of fact joined in any such case shall be tried by jury. When libel for condemnation proceedings under this section, involving the same claimant and the same issues, are pending in two or more jurisdictions, such pending proceedings, upon application of the claimant seasonably made to the court of one such jurisdiction, shall be consolidated for trial by order of such

court, and tried in (1) any district selected by the claimant where one of such proceedings is pending; or (2) a district agreed upon by stipulation between the parties. If no order for consolidation is so made within a reasonable time, the claimant may apply to the court of one such jurisdiction and such court (after giving the United States attorney for such district, reasonable notice and opportunity to be heard) shall by order, unless good cause to the contrary is shown, specify a district of reasonable proximity to the claimant's principal place of business, in which all such pending proceedings shall be consolidated for trial and tried. Such order of consolidation shall not apply so as to require the removal of any case the date for trial of which has been fixed. The court granting such order shall give prompt notification thereof to the other courts having jurisdiction of the cases covered thereby.

(c) The court at any time after seizure up to a reasonable time before trial shall by order allow any party to a condemnation proceeding, his attorney or agent, to obtain a representative sample of the package of food seized.

(d) Any package of food condemned under this section shall, after entry of the decree, be disposed of by destruction or sale as the court may, in accordance with the provisions of this section, direct and the proceeds thereof, if sold, less the legal costs and charges, shall be paid into the Treasury of the United States; but such package of food shall not be sold under such decree contrary to the provisions of this Act or the laws of the jurisdiction in which sold: Provided, That after entry of the decree and upon the payment of the costs of such proceedings and the execution of a good and sufficient bond conditioned that such package of food shall not be sold or disposed of contrary to the provisions of this Act or the laws of any State or Territory in which sold, the court may by order direct that such package of food be delivered to the owner thereof to be destroyed or brought into compliance with the provisions of this Act under the supervision of an officer or employee duly designated by the Administrator, and the expenses of such supervision shall be paid by the person obtaining release of the package of food under bond.

(e) When a decree of condemnation is entered against the package of food, court costs and fees, the storage and other proper expenses, shall be awarded against the person, if any, intervening as claimant of the package of food.

(f) In the case of removal for trial of any case as provided by subsection (a) or (b)—

(1) The clerk of the court from which removal is made shall promptly transmit to the court in which the case is to be tried all records in the case necessary in order that such court may exercise jurisdiction.

(2) The court to which such case was removed shall have the powers and be subject to the duties, for purposes of such case, which the court from which removal was made would have had, or to which such court would have been subject, if such case had not been removed.

Sec. 14. Before any violation of this Act is reported by the Administrator to any United States attorney for institution of a criminal proceeding, the person against whom such proceeding is contemplated shall be given appropriate notice and an opportunity to present his views, either orally or in writing, with regard to such contemplated proceedings.

Sec. 15. Nothing in this Act shall be construed as requiring the Administrator to report for prosecution, or for the institution of libel, minor violations of this Act whenever he believes that the public interest will be adequately served by a suitable written notice or warning.

Sec. 16. All such proceedings for the enforcement of this Act shall be by and in the name of the United States. Notwithstanding the provisions of Section 876 of the Revised Statutes, subpoenas for witnesses who are required to attend a court of the United States, in any district, may run into any other district in any such proceedings.

Sec. 17. If any provision of this Act is declared unconstitutional, or the applicability thereof to any person or circumstances is held invalid, the constitutionality of the remainder of the Act and the applicability thereof to other persons and circumstances shall not be affected thereby.

Sec. 18. This Act shall take effect twelve months after the first day of January next succeeding its enactment: Provided, That if, upon investigation, the Administrator finds that with respect to particular packages of food compliance with the provisions of the Act cannot reasonably be accomplished by the time of the effective date of the Act, he shall promulgate a regulation postpon-

ing the effective date with respect to such packages of food for such reasonable period as in his best judgment may be necessary in the circumstances, and may similarly further postpone such effective date, and such regulations may be promulgated and shall take effect upon the dates of promulgation: Provided further, That the provisions of Section 8 shall become effective on the enactment of this Act, and thereafter the Administrator is authorized to promulgate regulations which shall become effective on or after the effective date of this Act as the Administrator shall direct.

Salient Features of the Proposed Bill.—

1. The term "Administrator" is defined as the Administrator of the Federal Security Agency.
2. Nothing in the bill is to be construed as exempting packages of food from the provisions of the Federal Food, Drug, and Cosmetic Act.
3. The Administrator is required to promulgate regulations for the efficient enforcement of the Act.
4. The purpose of the proposed bill is to prohibit the movement in interstate commerce of retail packages of food not of the standard units of weight or measure prescribed therein.
5. The bill embraces all retail packages of food except packages of food in containers packaged in accordance with previously enacted Federal legislation, and maltous, vinous, and spirituous liquors.
6. The standard packages for dry and solid foods are: 1 ounce, 2 ounces, 4 ounces, 8 ounces, 12 ounces, 1 pound, 1½ pounds, and multiples of 1 pound avoirdupois weight.
7. The standard packages for liquid foods and for canned foods are: 1 ounce, 2 ounces, 4 ounces, 8 ounces, 12 ounces, 1 pint, 1½ pints, 1 quart, 3 pints, 2 quarts, 3 quarts, 1 gallon, and multiples of 1 gallon, United States liquid measure.
8. Standardization is based on the amount of food in the container.
9. The Administrator has authority to limit the packaging of particular dry or solid foods, when in packages of more than one pound, to certain multiples of the pound, and to establish exemptions, with respect to particular foods, from the provisions of the Act defining standard food packages.

Recommendation on Proposed Bill.—The Committee approves the purpose and intent of the proposed food-package standardization bill and recommends that this Conference go on record as favoring its enactment by the Congress. It further recommends the appointment by the President of the Conference, prior to adjournment, of a special committee of three members located conveniently close to Washington with directions to promptly seek its introduction to the Congress and assist in every way possible its ultimate enactment.

ROLLIN E. MEEK, *Chairman,*
ALEX PISCIOTTA,
C. L. KLOCKER,
R. M. JOHNSON,
GEO. M. ROBERTS,
Committee on Legislation.

(It was moved and seconded that the report of the Committee be adopted, the question was taken, and the motion was agreed to.)

MR. R. W. DAVIS. Does this bill include fresh fruits and vegetables in containers not standardized by Federal law for fruits and vege-

tables but governed by regulations of the Interstate Commerce Commission and by railroad tariffs?

THE CHAIRMAN. This bill relates only to retail packages.

The next item on our program is the report of the Conference Committee on Methods of Sale of Commodities. I wish to say in this relation that the Committee were not in entire accord on all of the recommendations which will be made in the Committee report, some of the Committee members having reservations relative to certain proposals for standardization of practices and methods. However, it was felt advisable to develop the consensus of the Conference, and therefore the report was signed out by the Committee in order to bring these proposals before the Conference for consideration.

REPORT OF COMMITTEE ON METHODS OF SALE OF COMMODITIES, PRESENTED BY ALEX PISCIOTTA, CHAIRMAN

At the 1940 National Conference on Weights and Measures, a Committee on Methods of Sale of Commodities was created for the purpose of studying and reporting for adoption to the Conference this year the proper methods by which certain commodities should be sold. It is the desire of this Committee to recommend for adoption, where possible, by various States and jurisdictions, uniform methods of sale of certain commodities which are in the best interests of the consumer and manufacturer. It has been found, to the distress and confusion of manufacturers, that one jurisdiction may require the sale of certain commodities by net weight, whereas a compliance with such a ruling would be in violation of the law in another jurisdiction which may require that these same commodities be sold by numerical count.

It is a fundamental rule in weights and measures that the net weight or measure shall be the basis of sale of commodities to the ultimate consumer. Whether or not a commodity should be sold by net weight, measure, or numerical count should depend upon what is most informative to the ultimate consumer. Sale by gross weight or the use of qualifying terms or phrases in connection with the net content marking offers little or no information to the consumer as to the actual contents of a container. Long-established practice and custom have permitted the sale of certain commodities by gross weight. Yet in some States sale of commodities in this manner is prohibited. By the same token, the use of qualifying terms or phrases in connection with net-content marking is prohibited by most jurisdictions and permitted by some. These uncertainties and difficulties in uniform practice have been responsible for the creation of unfair competition amongst manufacturers. It has also been detrimental to the consumer's interest.

It is first recommended that any statement pertaining to the marking of the contents on a label or container shall be prominently placed thereon with such conspicuousness (as compared with other words, statements, designs, or devices) and in such terms as to render it likely to be read and understood by the ordinary individual under customary conditions of purchase and sale.

Tolerances should be reasonable and should allow for possible shrinkages in weight or measure due to atmospheric or other conditions. The most serious question for our consideration was the establishment of uniformity in the proper allowance for shrinkages. It is the consensus of opinion of this committee that for the purpose of determining the

actual net weight or measure of commodities, tolerance shall mean a permitted variation from the marked or indicated net content of a commodity. Such variations shall be as often above as below. Commodities which show a natural shrinkage should be so overpacked as to assure the housewife of the receipt of the exact amount specified on the label at the time of sale to her. A uniform shortage of all packages of one commodity sold by the same packer, though within the tolerance, should not be permitted.

The following recommendations are hereby made for consideration of the Conference. Their purpose is to regulate the proper methods of selling commodities for retail sale to the ultimate consumer and are not intended to interfere with trade customs or practices which are recognized and accepted at the present time between manufacturers, packers, distributors, and dealers of any particular commodity. It is, however, recommended that the manufacturer mark his commodities in such a manner as to aid the retailer to sell such commodities pursuant to the following recommendations:

1. *Meat and meat products.*—These shall be sold by net weight only. Where meat and meat products are packed in containers, the wholesaler or packer shall indicate the net weight on the wrapper or container. In place of the net weight, it shall be permitted to indicate the gross and tare weights with the additional requirement that there shall be indicated on such wrapper or container a statement to the effect that the ultimate retailer must ascertain the correct net weight by reweighing the package at the time of sale to the consumer. Meat products shall include all poultry and prepared meats, and also squabs, broilers, guinea hens, pheasants, etc., when sold for food purposes (not for breeding). Sale by the piece or head shall be prohibited.

2. *Dried fish and fish products.*—These shall be sold by net weight. When packed in containers or wrappers, the net contents shall be clearly and conspicuously marked. It shall be permitted, however, to print the tare weight alone with a conspicuous statement on each wrapper or container to the effect that the retailer must reweigh the package in order to ascertain the actual net weight at the time of sale to the consumer.

3. *Flour.*—This shall be sold or offered for sale by net weight. The net weight shall mean the actual net weight at the time of sale to the retail merchant. Flour in containers in excess of one pound shall be packed in one or more of the following capacities: Two Pounds, Five Pounds, Ten Pounds, Twenty-Five Pounds, and multiples of Twenty-Five Pounds.

4. *Tea.*—This shall be sold by net weight. When sold in the form of tea balls or bags, it may be sold by numerical count, provided that the net weight shall also be conspicuously indicated on the container thereof; and further provided that it shall be sold in the following numerical count and none other: Ten, Fifteen, Twenty, Twenty-Five, Fifty, One Hundred and multiples of One Hundred; and further provided, that such tea balls or bags shall be packed on the basis of no more than two hundred to the pound for the retail trade. Tea balls or bags, however, may be packed in numerical count of less than ten.

5. *Cheese and cheese products.*—These shall be sold by net weight.

6. *Facial and cleansing tissues.*—These shall be sold by numerical count. The number of sheets indicated on the container or wrapper shall be based on the actual number of usable units, and not on the sum total of sheets needed to constitute a usable unit. Sheets of 2 or 3 ply shall, for the purpose of the net content marking, constitute a single unit. The size or dimensions of each sheet must also be indicated on the wrapper. A proper marking shall be, for example, "250 double sheets (500 single sheets)." The marking of the numerical count may be supplemented by an indication of the net weight, but in all cases the actual number of usable units must be clearly and conspicuously indicated. Permissible tolerance on numerical count shall be not in excess of 3%, and on sheet dimensions not in excess of ¼ inch on one dimension, but not on both.

7. *Toilet tissues.*—These shall be sold by numerical count. The size or dimensions of each sheet must also be indicated on the wrapper, and the minimum size for each sheet shall be 4½ inches by 4½ inches. The number of sheets indicated on the wrapper shall be based on the actual number of usable units and not on the

sum total of sheets needed to constitute a usable unit. Sheets of 2 or 3 play shall, for the purpose of the net content marking, constitute a single unit. A proper marking shall be, for example, "250 double sheets (500 single sheets)." The marking of the numerical count may be supplemented by an indication of the net weight, but in all cases the actual number of usable units must be clearly and conspicuously indicated. Permissible tolerance shall be not in excess of 3% on numerical count.

8. *Sheet tissue.*—This shall be sold by numerical count. The container shall be clearly and conspicuously marked with the numerical count and size of sheets contained. A ream shall consist of 480 sheets. When the numerical count is indicated by the use of the word "1 ream", or "½ ream", the actual count should also be stated.

9. *Paper napkins and towels.*—These shall be sold by numerical count. Containers shall be clearly and conspicuously marked with the numerical count and the size of the sheet contained in the package. Rolls or packages of paper towels for industrial use only and not for resale need not be marked individually when the container in which the paper towels are packed is marked to show the number of rolls and the count and size of each roll or package.

10. *Stationery and tablet paper.*—These shall be marked with the number and size of the sheets contained therein.

11. *Writing and book or printing papers.*—In sales by weight outside wrappers will be marked to indicate the size of the sheet, the count of the ream, and the net weight per ream or per 1,000 sheets.

The actual net weight, not including the wrapper, shall not vary more than 5% plus or minus from the stated weight, except that in the case of coated paper, plus or minus variation may be 8%.

In the case of paper sold by sheet count, the outside wrapper shall be marked with the number of sheets and the size of the sheet. The permissible variation in sheet count shall not exceed plus or minus 5%.

12. *Wrapping paper.*—This shall be sold in one of the following ways:

a. By Numerical Count.—When sheets are sold on a numerical count basis, the number of sheets or reams in each bundle and the size of the sheet shall be clearly indicated. A ream shall consist of 480 sheets. The tolerance shall be 5%.

b. By Net Weight.—Wrapping paper in rolls shall be sold or offered for sale on the basis of net weight. The outside wrapper or the core may be marked with the net weight or the gross and tare weight. It will be sufficient for a paper mill or converter to mark only the tare weight on the container and the net weight shall thereafter be determined at the time of sale by the dealer or person making such sale by deducting the tare weight from a determined gross or scale weight.

c. By Ream Weight.—This is the weight of 480 sheets, 24 inches by 36 inches, commercially referred to as the designated basis weight. Such sales by ream weight are to be permitted only in the trade and not in retail sales to ultimate consumers. When other size sheets than the standard 24 by 36 inches are used, the weight for that size shall be computed proportionately from the basis weight.

13. *Matches.*—These shall be sold by numerical count and each box shall be so marked.

14. *Twine and cordage.*—These shall be sold by standard net weight or measure. Each ball, tube, and bale must be marked with the weight or linear measure of the twine or cordage, the weight being the net weight or the gross and tare weights. If a number of balls, tubes, cones, coils, or reels, are sold in a container and are not sold separately, it will be sufficient if the total length or net weight be marked on the container. A tolerance of 4% will be allowed.

15. *Linseed oil and turpentine.*—When sold or put up for the purpose of sale in sealed containers in quantities of less than five gallons, the amounts shall be in terms of the United States standard gallon of 231 cubic inches, its multiples or regular subdivisions, i. e. ½ gallon, quart, or pint, and none other, at marketing temperature.

Note: These regulations are not to be construed to prevent the sale of these commodities in any quantities for immediate delivery from bulk.

16. *Aluminum or bronze paints.*—These shall be sold in one of the following ways:

a. Where aluminum or bronze paint is prepared in containers which separate the aluminum or bronze powder or paste from the liquid, the container in which the powder or paste is enclosed must be marked by avoirdupois net weight and that part of the container containing the liquid must have marked thereon the liquid measure contained therein.

b. The powder or paste may be marked in avoirdupois net weight on the container as described above, and a statement must be made on that part of the container containing the liquid reading, "The contents of this can when mixed with the powder or paste (quoting the weight of the powder or paste) will make one quart" or whatever the liquid measure of the mixture will be.

Respectfully submitted,

ALEX PISCIOTTA, *Chairman*,
JAMES O'KEEFE,
M. A. HUBBARD,
JOSEPH G. ROGERS,
Committee on Methods of Sale of Commodities.

(It was moved and seconded that the report of the Committee be adopted.)

DISCUSSION ON RECOMMENDATIONS FOR WRAPPING PAPER

MR. T. J. BURKE (Sulphite Paper Manufacturers Association). I notice what I believe is an inadvertent error under the heading "wrapping paper." In paragraph *a* a tolerance of 5 percent is stated; in paragraphs *b* and *c* no tolerance is stated. From conferences with Mr. Pisciotta, I believe that it was intended to include a tolerance of 5 percent in paragraphs *b* and c.

MR. PISCIOTTA. The omission of the tolerance in paragraphs *b* and *c* under "wrapping paper" was an oversight, and the statement "the tolerance shall be 5 per cent" should be added to each of these paragraphs.

MR. T. J. BURKE. I have one other suggestion relative to the recommendation for "wrapping paper." For many years it has been a practice in the trade to sell 500 sheets to the ream in the case of certain grades of wrapping paper. My suggestion is, that in paragraphs *a* and *c* the words "not less than" be inserted before the figure "480," so as to define the ream as "not less than 480 sheets."

MR. PISCIOTTA. There is no objection to those changes.

[SECRETARY'S NOTE.—As a result of a conference with representatives of the paper industry, held subsequent to the adjournment of the National Conference, Mr. Pisciotta reported that there are numerous instances in which wrapping paper in sheets is sold on a basis of net weight rather than on a basis of sheet count or ream weight. This appearing to be a proper method of sale, Mr. Pisciotta recommends that paragraph *b* under the heading "wrapping paper" be amended to recognize the net weight basis for wrapping paper in sheets, the amendment to consist of the insertion, after the words "wrapping paper in rolls" in the first line of the paragraph, of the following:

(or sheets when not sold by count or ream weight)

making the first sentence of paragraph *b* read as follows:

Wrapping paper in rolls (or sheets when not sold by count or ream weight) shall be sold or offered for sale on the basis of net weight.

the remainder of the paragraph being unchanged.]

DISCUSSION ON RECOMMENDATION FOR FLOUR

MR. KIRK (Quaker Oats Co.). Under the heading "Flour" we should like to simplify the series by omitting the 75-pound bag of flour.

MR. PISCIOTTA. In other words, you suggest that the series be 25 pounds, 50 pounds, 100 pounds, and multiples of 100 pounds, instead of providing for multiples of 25 pounds?

Mr. Kirk. Yes, Sir!

Mr. Pisciotta. If that is what the industry wants, we have no objection to making that change.

Mr. Ackerman. Are you not introducing new standards for flour packages? Our flour is now put up in sacks of 98 pounds, 49 pounds, and 24½ pounds.

Mr. Pisciotta. It is our thought to propose a change. The industry is requesting standardization on the basis of units of 5 pounds, 10 pounds, 25 pounds, 50 pounds, and so forth, and the elimination of the present odd sizes of 24½ pounds, 49 pounds, 98 pounds, and so forth.

It should be remembered that this entire report is an expression of the Committee's opinion on what this Conference would like to have done relative to methods of sale of commodities. Of course, nothing can be done at once in those State and local jurisdictions having laws the provisions of which are contrary to the recommendations of the Committee report; if such laws are to be changed in the future, this report may be taken as a guide in drafting such changes. Other jurisdictions may be willing to adopt the standards recommended without delay. All of the Committee recommendations are made to promote uniform practice in the methods by which merchandise is sold.

Mr. Schuster. The 196-pound barrel for flour is the present standard in this country; why not recognize this standard and its subdivisions down to the one-eighth barrel? If we ignore national standards, I am sure that we will promote confusion rather than uniformity.

Mr. Pisciotta. I understand from weights and measures officials and also from the industry that although 196 pounds is recognized as the standard for a barrel of flour in many jurisdictions and by many manufacturers, there are other jurisdictions and manufacturers not recognizing that standard. Our attempt is to recommend uniform practice. If the industry has no objections, should weights and measures officials object?

Mr. McBride. Do I understand that the industry was consulted prior to these recommendations, so that this is not just a recommendation of your Committee? In other words, does the report represent your recommendations after conference with the industry?

Mr. Pisciotta. Practically all of these matters, including flour in particular, have been subjects of discussion since as far back as 1937. Conferences have been held from time to time with representatives of industry, and there has been correspondence with other weights and measures officials. The only point of controversy with the industry is the question of shrinkage; as far as other points are concerned we are in agreement.

Mr. Schuster. Have you had any report from the States on their attitude toward changing the standards for the flour barrel?

Mr. Pisciotta. Some have agreed and some have not committed themselves.

Mr. O'Keefe. Is there any member of the industry here today?

Mr. Pisciotta. Mr. Kirk is one of the members of the industry.

Mr. O'Keefe. I should like to have Mr. Kirk express himself on this matter of standards for flour packages.

Mr. Kirk. We feel that it would be much better if we had a 200-pound barrel of flour and a series of uniform simplified package

weights. Flour is now marketed in packages containing 1, 1¼, 2, 2½, 3, 3½, 5, 6, 7, 10, 12, 12¼, 24, 24½, 48, and 49 pounds, and so on. The retailer who usually carries 3 or 4 nationally advertised brands of flour and 2 or 3 local brands of flour in perhaps 7 or 8 sizes, may have in his store 60 or 70 different package sizes. It seems to me it would be a good thing for the industry and for the consumer to effect simplification.

Mr. O'Keefe. I should like to ask Mr. Kirk if he is a representative of the flour industry.

Mr. Kirk. I am representing the Quaker Oats Co.

Mr. O'Keefe. Then it appears that you are not representing the flour industry; I should like to hear from a member of the flour industry.

Mr. Krueger (Millers National Federation). Mr. Chairman, as a representative of the Millers National Federation, I believe that I can speak for the association and for the flour-milling industry. The industry would support standardization of packages, but I do not believe that the industry has ever made any specific recommendation as to what that standardization should be, or that it has recommended any specific sizes.

Mr. J. P. Leonard. I think that we should stand by the standards which have been legally established for a long time, and I recommend that no changes be made.

Mr. O'Keefe. We are trying to make recommendations which will simplify trade practices. We do not want to do anything that is harmful to any industry, and we do not wish the gentleman from New Jersey to think that we are simply trying to tear down existing standards.

Mr. Harrington. I think the purpose of these Conferences is to bring about simplification and improvement in trade conditions and not simply to endorse existing practices. If we can bring about progress in methods of sale and merchandising, we should do so.

Mr. Woodland. As a manufacturer of scales, my company has been associated with flour mills for more than a quarter of a century. There have been two standard barrels for flour in the United States—one is the barrel of 192 pounds, which is recognized in the south, and the other is the barrel of 196 pounds, which is recognized in the north. If the barrel for flour could be standardized, it would simplify our problems as manufacturers.

Mr. Pisciotta. Before the Conference program was made up, Mr. Smith, the Secretary of our Conference, asked me what commodities would be discussed in the report of my Committee, so that he could take steps to inform the industries affected. If industries are represented here and are silent, or if they are not represented, their silence or their absence may be construed as agreement with the recommendations or as indication that they are not interested. Is it not a fact, Mr. Smith, that the industries have been given an opportunity to be represented here?

Mr. R. W. Smith. We have tried to give all possible publicity regarding the subjects which would be discussed on our program. It is for that reason, Mr. Pisciotta, that I asked you to let me know in advance the items that would be covered or considered in your report, and that is why there was included in our advance program and in our printed program a list of those items which you reported to me. We did that

so that the affected industries would have the opportunity of contacting you, as chairman of the Committee, in advance, and of being here at the Conference to listen to the report of the Committee and to participate in the debate following the presentation of the report.

Mr. Ackerman. I am from Minneapolis, where we have the largest milling companies in the world. Just because we did not ride the airplanes a hundred years ago is no reason why we should not ride them today. I see no reason for opposing a change in an existing standard just because it has not been changed for a hundred years. I think the Committee recommendation is a good one.

Mr. Jansey. Speaking not as a representative of the Triner Scale Co. but as a consumer, I think that this Committee has done a notable piece of pioneering work. While all of these recommendations cannot be accepted at once, I think that eventually they will be adopted. Certainly from the standpoint of the weighing operation, it is much easier to weigh commodities at even weights. As a consumer, I think that we should try to adopt these newer standards, even though this might result in some little difficulty at first.

DISCUSSION ON RECOMMENDATION FOR LINSEED OIL

Mr. Moore (Archer Daniels Midland Co.). I represent a linseed-oil manufacturer. The procedure recommended in this report relative to linseed oil involves a very radical change for our industry. For more than a hundred years we have recognized the 7½-pound gallon for linseed oil. However, if it is the consensus of you gentlemen that you want packages of less than 5 gallons based upon a 231-cubic-inch gallon, I can assure you that the linseed-oil industry will gladly go along with you. Right now we are faced with the urgent problem of materials for our cans; moreover, to make any changes in them requires time. We have a stock of some one million cans around the country that have been packed on the old basis. I would appreciate very much the cooperation of all of you gentlemen here if you will bear with us until we can make the necessary changes. We will start immediately to pack on the basis of the standard gallon measure for those States in which such a requirement is now in effect, but we must make some provision for cans already packed. If you will just bear with us for a time until we can get new cans, we will go along with you.

I have just one comment on the Committee's recommendation; this now specifies "marketing temperature." We should prefer to have stated a specific temperature. Under the ASTM specifications, all constants for linseed oil are based on a temperature of 15.5°C; I should like to have that incorporated in the recommendation.

Mr. Pisciotta. It was the intention that "marketing temperature" should mean the standard recognized by the industry. Since you say this is 15.5°C, that temperature can properly be substituted.

Mr. Fuller. When a customer buys at retail he asks for a pint or a quart or a gallon of linseed oil, and I think he should not be confused by a wholesale trade custom which has nothing to do with the consumer. When a creamery company buys milk from the producer it ordinarily buys on a weight basis, but it doesn't sell to the consumer in that manner.

In California we have had, for many years, a regulation requiring sale at retail by liquid measure, and it was a surprise to find packages of linseed oil marked "one quart, basis 7½ pounds", which did not contain 1 quart. When the consumer asks for a quart he will be handed one of these cans. He thinks he is getting a quart, but he is not. After this matter came up, notwithstanding the fact that we notified the responsible parties of our requirement, cans began to come in marked on the label "on the basis of weight only"; that is, on the basis of 7½ pounds to a gallon. The outside of the carton would be marked "24 one-quart cans", and the cans were large enough to hold a quart, but they did not contain a quart of linseed oil.

I realize that there are certain difficulties in marketing, but I do submit that their proposal that, simply because thousands of cans have been put out and are in the hands of retail merchants, we permit their sale to the consumer, who will think in every case that he is getting a pint or a quart by measure, whereas he will be getting less than that amount, is not a sound proposition from the standpoint of good weights and measures administration and the protection of the consumer.

Mr. Ackerman. When we investigated this matter about 6 months ago we told the manufacturers that they could not set up their own standard for a gallon, that weights and measures officials know that a gallon contains 231 cubic inches, and that we intended to see to it that gallons of linseed oil contained 231 cubic inches. The State law in Minnesota does not require that linseed oil shall be sold by the gallon, and it was found that it could be sold by weight; I understand that labels accordingly were changed to conform with our law in Minnesota.

I think what Mr. Moore has asked is, that we be tolerant until this matter can be entirely straightened out. They are willing to do anything which we want them to do, and only ask that we be tolerant until they can get the old packages off the market.

Mr. Fuller. At the same time, you realize that whenever one of those old packages is sold the customer buying it will believe he is getting a pint or a quart, and he will not be receiving that amount.

Mr. Pisciotta. As I understand Mr. Moore, he says that they have already begun to market full-measure packages, that they are not going to market any packages on the old basis, but that he wants an opportunity to dispose of packages already distributed. I think in most jurisdictions the laws are not so strict that the officials would have any objection to this proposal, having in mind conditions with which we are confronted today and with the understanding that within the very near future all packages will be on the approved basis.

Mr. Moore. As far as our customers are concerned, there is no short measure, because payment is made to us on a pound basis for the actual amount of linseed oil in the can. If we put a full United States gallon or a full United States quart into a can, the amount which the customer will pay us will be proportionately greater than it is under the present basis.

Mr. Todd. If the customer was paying for linseed oil by the pound, I wish to ask why the can was labeled in terms of the gallon?

Mr. Moore. A gallon can would be labeled "one gallon—basis 7½ pounds to the gallon." That has been the custom of the trade dating back many years. It was wrong, and we discarded it when it was called to our attention.

DISCUSSION ON RECOMMENDATIONS FOR FACIAL AND CLEANSING TISSUES AND TOILET TISSUES

Mr. Baucom. I think it will be confusing to have packages of facial and toilet tissues marked, first, "250 double sheets" and then, "500 single sheets." Why not say simply "250 two-ply sheets"? I think this change should be made in the recommendations for facial tissues and for toilet tissues.

Mr. Pisciotta. In these things we try to operate on the principle of give and take. The industry has agreed to correct what was most objectionable, that is, marking packages only to show the number of single sheets, and we effected a compromise and recommended that the statement "250 double sheets" should come first, to be followed, in parentheses, by the statement "500 single sheets." If the customary single-sheet declaration is suddenly removed from the package and only the double-sheet count is shown, the consumer will not immediately understand what has happened, and may believe that the package contains only half as much as before. I think it is fair and proper that the explanatory single-sheet marking be permitted for the time being; perhaps that will be dropped within the next 2 or 3 years as no longer needed after customers become acquainted with the new marking.

DISCUSSION ON RECOMMENDATION FOR MATCHES

Mr. Siegler. The recommendation for matches provides that these shall be sold by numerical count. Does that mean all boxes?

Mr. Pisciotta. That recommendation was made because boxes are sometimes marked to show their cubical contents; such a statement does not tell how many matches there are. The recommendation is intended to refer to household matches and not to "match books."

ACTION ON REPORT

The Chairman. The question is on the adoption of the Committee report. Since I happen to be a member of this Committee, I wish to say for the purpose of clarification that you must keep in mind definitely that the Committee report is just presenting recommended, desirable procedure. In some States it may be impossible or inadvisable under present conditions to make any of these changes. The recommendations are offered as representing sound principles which the Committee feels should be adopted whenever it is feasible to do so. We are not recommending any drastic action. Mr. Pisciotta, as chairman of this Committee, has devoted much thought and effort to these matters and has held many conferences. What is now presented represents the best thought at the moment. Let me repeat, that no precipitate action is contemplated, and that the report should be understood as presenting desirable recommendations to be adopted when the time is propitious and when such action can be taken without undue hardship upon anyone concerned.

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

Mr. R. W. Smith. Mr. Chairman, for the purpose of keeping the record accurate, I wish to know whether this action of the Conference in adopting the Committee report means that there have been written into the report the changes in the recommendations for flour, wrapping paper, and linseed oil and turpentine with respect to which the Committee chairman signified his agreement during the course of the debate.

Mr. Pisciotta. That is my understanding. I have a corrected copy of the report embodying those changes, which I shall give you.

(At this point, at 12:50 p. m., the Conference took a recess until 2 p. m.)

SIXTH SESSION—AFTERNOON OF THURSDAY, JUNE 5, 1941

(The Conference reassembled at 2:25 p.m., Lyman J. Briggs, President of the Conference, in the chair.

APPOINTMENT OF SPECIAL COMMITTEE

THE CHAIRMAN. Yesterday morning there were announced appointments to two important Committees of this Conference; I wish to say that the membership of those Committees was arrived at in consultation with the officers of the Conference. I now have to announce the membership of the special committee recommended in the report of the Committee on Legislation, the special committee to be charged with the duty of seeking the introduction into the Congress of the proposed Federal Standard Food Package Bill and of assisting in every practicable way in the ultimate enactment of that bill. I have appointed Alex Pisciotta, of New York City, as chairman, and George M. Roberts, of the District of Columbia, and J. A. Meek, of Virginia, as additional members.

As stated in our program, our session this afternoon is an open forum for the discussion of matters of interest; I think that is a very happy feature of our program.

DIFFERENCES BETWEEN "COMMERCIAL" AND "AREA" MOTOR-TRUCK SCALES

DEFLECTION OF VEHICLE-SCALE WEIGHBRIDGE MEMBERS

Mr. SPINKS. I am not qualified as an engineer to discuss the differences between commercial-type scales and AREA scales, but apparently we have gone on record, as scale experts and weights and measures experts, to the effect that the AREA scale is the better weighing machine. I recently heard that only about 5 percent of the scales sold by one large manufacturer were AREA scales, the remainder being of the "commercial" type. A few moments ago I heard that another manufacturer sells about 20 percent AREA scales. So it appears that AREA scales are being sold, but in my opinion the proportion of such scales is entirely too small.

In the installation by weights and measures officials of "master" scales, I think there is an opportunity to popularize the AREA scale. When anything is a "master", that means to me that it is better than something else; so when you put in a scale and call it a master scale I think you should have a scale better than the ordinary scale and if the AREA scale is the best that we know about in this country, then all master scales in all judisdiction should be AREA scales. Moreover, I believe that such an example will encourage industry to follow your lead.

Mr. Harrison. For purposes of the record, and to bring about a clear understanding, I think that some comments on the differences between AREA specification scales and other types, frequently referred to as "commercial" types, may be in order; I may be pardoned for interjecting these remarks in view of the fact that I am chairman of the committee charged with writing the latest form of the specification which was originally adopted by the American Railway Engineering Association in, I believe, 1923.

The essential consideration which led to the formulation of that specification was a recognition by people in a position to know, that unless some standard were set up it would be more or less impracticable to get bids on comparable merchandise made by different manufacturers. In setting up the specification, so that it might be referred to by those who chose it as a standard, an effort was made to incorporate in the material such requirements as seemed, upon technical analyses, to be warranted. Specifically, some of the faults which had in some instances existed in previously marketed scales were thought to be corrected, and I think that is particularly true with respect to the strength of the parts beneath the platform, including especially the weighbridge structure. It was felt that what was described in the formal language of the specification should, perhaps, give the maximum useful service for the investment made.

I have seen instances in which a community installed what they were pleased to call an official scale which at least superficially was lacking in the strength and other characteristics which would make it a high-class weighing machine to which they could point with pride and which they could regard with confidence as being accurate under all practical conditions of use. I think that Mr. Spinks has put the proposition very nicely in saying that when a scale is installed as a "master" scale, an effort should be made to install the best procurable scale for that purpose. It so happens that the only engineering specifications for vehicle scales that I know of which have ever enjoyed any widespread distribution have been those prepared by the American Railway Engineering Association. The scale manufacturers participated in the preparation of those specifications, and since the job was done there have been no efforts made by anyone else to write anything particularly different; the material has been used by a great many agencies for their own specifications where they desired to use it as a basis and to change certain details, but still that did not in any way affect the fundamental value of the AREA specification.

Mr. Hubbard. I should like an expression on the advisability of installing as a master scale a scale equipped with an automatic-indicating dial mechanism. In many localities the purchasing agent depends upon the advice of the scale manufacturer's representative. I suppose that in some instances the salesman recommends the highest priced scale which he has to offer, whether or not it is best suited for the purpose for which it is to be used, resulting in some jurisdictions installing scales which are not best adapted to service demands.

Mr. Pisciotta. The New York City official scale is a dial scale. One reason for the selection of that style was to provide means

whereby the person whose truck is being weighed may see the scale indication. Another feature of our scale is the registering mechanism, which eliminates the possibility of mistakes by the weighmaster in reading the scale indication and writing the weight record on the ticket. Our scale has been in service for almost a year and has given us entirely satisfactory service; the automatic indication of weight on the dial has eliminated disputes between weighmaster and trucker relative to the weights indicated by the scale.

Mr. Hubbard. New York City has an advantage over many local jurisdictions in that they have available the facilities for checking the accuracy of their scale at any time. I am not disparaging the automatic-indicating scales, but it is a fact that they are much more complicated than the simple beam scale, and I believe that the simpler the scale the better it is for use as a master scale.

Mr. Watson (Soweigh Scale Co.). There appears to be considerable confusion between what is meant by a "master" scale and what is meant by a "city" scale. I do not think the terms should be used interchangeably. There are all kinds of city scales; you have probably seen them with capacities as low as 6 tons, perhaps with timber weighbridges and in varying states of disrepair. A master scale would never be in such condition. Answering Mr. Hubbard's question, a master scale as such certainly should not be equipped with automatic-indicating elements; but if he means a city scale, there are many reasons why such a scale should be equipped with automatic-indicating elements.

Mr. Bennett (Toledo Scale Co.). Why is it improper for a master scale to have automatic indication of weight?

Mr. Vroome (Howe Scale Co.). Perhaps I can clear up some of the misunderstanding of terms which Mr. Watson has mentioned. The scale which Mr. Pisciotta has in use was installed primarily for production weighing and not as a master scale. It is, incidentally, a master scale because it happens to be owned by the city of New York. It has a combination automatic-indicating attachment and recording attachment, and a weighbeam, and it is tested frequently and carefully. It can be used as a master scale, but the predominant use of that scale is as a production scale, and so it needs to be an automatic-indicating scale.

In the State of Connecticut there are a number of official highway scales, all equipped with automatic-indicating attachments. The primary purpose of these scales is to police the highways to avoid overloading of trucks. These may be termed master scales, but I have seen newspaper accounts of a line of trucks a mile long waiting to be weighed on one of those scales. Obviously, such a scale cannot be like the master railway track scale of the National Bureau of Standards in Chicago, equipped with counterpoise weights and a weighbeam, and designed for precise weighing; those highway scales must be production scales.

There are very few places in the industrial east where there are actual master scales. Many towns have vehicle scales which have been installed because there are no other facilities for weighing vehicle loads; because these are owned by the towns, they are considered as official scales, but they are not actually master scales as the term is applied to railway track scales.

Mr. Klocker. I am very much interested in this general subject, but I am not so much interested in whether a scale is equipped with a weighbeam or with automatic-indicating elements, because it has been my experience that whatever the indicating elements may be, they are no beter than what is under the platform. Our particular problem in Connecticut is based on the difference between an AREA motor-truck scale and a commercial motor-truck scale, and this starts with the weighbridge. I should like to give you an example.

At one point in Connecticut, two 40-foot motor-truck scales were installed about 2 years ago in close proximity; one of these is an AREA scale and the other is a "commercial" scale. These scales weigh approximately 250 loads a day. We check these scales periodically, and the AREA scale has never once been found outside the tolerance. About every 3 months the commercial scale gets out of condition, requiring repair and/or adjustment. The weighbridge of this commercial scale has a deflection, under load, of from 1½ to 1¾ inches by actual measurement, and I believe that this deflection has an important bearing on the accuracy of the scale.

Accordingly, on any motor-truck scale installation in Connecticut, if there is very much weighbridge deflection—I will not specify how much—we shall absolutely refuse to seal the scale. I have been waiting for 2 years for the Committee on Specifications and Tolerances to give this matter consideration, and they haven't done it. I do not wish to make any rules or regulations specifying minimum weights for weighbridges which may conflict with the Conference codes, but motor-truck scales are not intended to last only a year or two—they will probably last 20 or 25 years; and if trouble develops the first year there will probably be trouble continually. In the particular example which I have cited we have had trouble with this scale for 2 years, and this has caused expenses for the scale owner and for the State.

I also wish to mention four-section motor-truck scales. Our highway department wished to purchase six of these for our use in checking trucks for overloading. There were no purchase specifications available for such scales, and the comptroller gave me the job of preparing some; not being a scale engineer I had to call on Mr. Harrison to help me out. The specifications were drawn up, the scales were purchased, and two have already been installed and are working satisfactorily. These scales are designed for loads up to 110,000 pounds. Incidentally, the penalties assessed for overloaded vehicles are helping to pay for these scales.

It seems to me that the Conference or the Committee on Specifications and Tolerances should design a four-section motor-truck scale for industrial use. I should like very much to hear from Mr. Richard on that suggestion.

Mr. Richard. Before I undertake a direct reply to Mr. Klocker's question, let me make one suggestion for clarification of the distinction between a master scale and a city scale. Let us define a master scale as a precision scale, designed and installed for use as a comparator—as a laboratory instrument, if you will—to standardize test weights; that is the accepted meaning of the term in the railway track scale field, and within certain limits the term may be so interpreted relative to vehicle scales. Let us think of the other type of

scale—the city scale—not as a master scale, but as a referee scale or as a public weighing scale.

Referring now to Mr. Klocker's question, this seems to involve two considerations, first, AREA scales versus commercial scales, and second, weighbridge deflection. There is no doubt in the minds of those informed on the subject that the AREA specification scale is the quality scale of the vehicle-scale production line. It is perhaps regrettable that a greater number of AREA specification scales have not come into use. Let me cite a comparison which, perhaps, will illustrate the situation. Fully 98 percent of the railway track scales sold today conform to AREA specifications; probably less than 5 percent of the vehicle scales sold today conform to comparable AREA specifications. What does that mean? It means that the rail transportation industry is providing itself with superior weighing equipment, and that the highway-vehicle weighing interests are content with a relatively inferior product.

Turning to the subject of weighbridge deflection and the adequacy of strength and weight of weighbridges, there are two considerations. One is the necessary strength of the weighbridge girders to support loads without excessive deflection, thus transmitting vertical moments of force to the pivots and bearings. The other involves the mass and inertia of the weighbridge. This second consideration is one which is frequently overlooked. It is important that the weighbridge and platform structure of every scale have such mass and inertia that under the tremendous impacts incidental to traffic conditions they will not become displaced, causing displacement of parts or impairing the alinement of connections. Heavy steel weighbridges are therefore most essential, both from the point of view of the necessary strength and rigidity to prevent deflection and from the point of view of the necessary mass to prevent derangement of parts. I should like to see twice as much steel used in every weighbridge as is customary practice today.

Mr. Christie. In New Jersey we have recently had considerable trouble as a result of weighbridge deflection. By taking a convenient position in the scale pit and having someone else operate our testing unit, I have been able to observe some of the conditions which appear to be responsible for discrepancies in weight results. It has been found that there is serious displacement of the lever system, with the resulting introduction of horizontal force components, and there are also binding conditions. Weighing errors at 30,000-pound load have mounted to as high as 1,200 and 1,500 pounds on one end. When these serious weighbridge deflections take place we do as Connecticut does—refuse to seal the scales for commercial use until corrections have been made.

The subject of master scales interests me, because we have only one testing unit in New Jersey, and it takes more than 2 years to make a complete routine survey of the State. We have attempted to locate at strategic points throughout the counties, properly installed and maintained vehicle scales, which are carefully tested for accuracy and are then used by the local officials as "comparing" scales. Such scales might perhaps be loosely designated as "master" scales; in any event their accuracy is well within the prescribed tolerances, and they enable the local officials to keep the scales within their jurisdic-

tions within the applicable tolerances until the State testing unit can make its routine inspection. This is a subject which I hope someone will investigate and report upon to this Conference within the next year or so.

Mr. Hansen. For many years we have tested the scales at the livestock weighing station at South St. Paul, Minn., to the full capacity to which the scales are used in weighing; that is, if a scale is used to weigh loads of as much as 30,000 pounds, 30,000 pounds of test weights are used to test that scale. These are all "State weight" scales, a State weighmaster being employed to do the weighing. The scales are tested every 30 days and the tolerance prescribed is one-fourth pound per thousand pounds of applied test load. I have found scales within that tolerance month after month for as long a period as 2 years without intervening corrections. Of course, the scales are all installed on concrete piers, in concrete pits which are provided with proper means for drainage. There are more than 30 of these scales at South St. Paul, and they should really be known as master scales because of their accuracy.

Mr. Klocker. The statement was made a short time ago that 95 percent of the railway track scales being installed are AREA specification scales. Why is that true for railway track scales and not for vehicle scales? Is it because weights and measures officials are not strict enough in their specifications and regulations?

Mr. Vroome. I think I can answer Mr. Klocker's question. Years ago, when the first AREA vehicle-scale specifications were promulgated, the National Bureau of Standards issued them as National Bureau of Standards Letter Circular LC152. Under that designation, they enjoyed much more prestige throughout the country than they would have enjoyed as an American Railway Engineering Association specification. When the National Bureau of Standards published the four-section railway track scale specification as National Bureau of Standards Circular C83, that enjoyed much more prestige in the minds of industry than it would have enjoyed as an AREA specification alone. I think the problem will largely be solved if the National Bureau of Standards were to publish the AREA vehicle-scale specifications as a Bureau publication.

Mr. Bennett. Reverting to the discussion of master scales and city scales, I believe—and I think I have enough experience to know—that a scale equipped with either an over-and-under attachment, a dial, or a weighbeam could be a master scale, and that the only reason that there is such a term as master scale is because the person or the company or the institution that purchases that scale takes care of it and makes it a master scale.

Mr. Boyle. Referring to Mr. Klocker's inquiry, I might say that as long as I can remember, the railroads have had test cars of from 40,000 to 80,000 pounds which have been used in the testing of railway track scales. It is only within comparatively recent times that weights and measures officials have had available sufficient test weights to test vehicle scales even beyond their tare-weighing range, and modern vehicle-scale testing units with their large test-weight loads are only recently developing the conditions with respect to vehicle scales which are comparable to railway track scale conditions which were known to the railroads years ago and which have gradu-

ally been corrected in the development of present railway track scales.

Mr. KLOCKER. Mr. Chairman, I move that the Committee on Specifications and Tolerances be asked to go into this matter and report back at the next Conference.

Mr. BAUCOM. Do you want a report, or do you want specifications drawn up?

Mr. KLOCKER. The intention is to draw up specifications.

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

NET WEIGHT ON LIMBURGER CHEESE

The CHAIRMAN. Before proceeding with other items scheduled for consideration, I wish to introduce George L. Mooney, Secretary of the National Cheese Institute, who wishes to speak briefly on the net-weight marking of limburger cheese.

Mr. MOONEY. I hope that I am as successful in explaining my problem to you as you have been in explaining scale problems to me; I have learned more about scales this afternoon than I knew before.

The members of the cheese industry in general, and of natural limburger in particular, are grateful to the National Conference on Weights and Measures for the opportunity and privilege of presenting a problem of mutual interest, namely, marking "net weight" on natural limburger cheese. The problem is of interest to you in your enforcement of the law; it is of interest to the industry because of the risks of attempted compliance with law and the consequences of violations due to uncontrollable factors inherent in the product.

It is common knowledge that limburger cheese has always lent itself to humorous treatment, but it is not so generally known that it is less accommodating when subjected to the serious application of law. This characteristic was recognized by the Federal Government over 20 years ago when it exempted limburger from the net-weight provisions of the Food and Drugs Act of 1906. Following the passage of the new Federal Food, Drug, and Cosmetic Act, the 1918 order exempting limburger cheese was rescinded, the United States Department of Agriculture announcing in February 1939 that limburger cheese (and also Roquefort and brick) was no longer entitled to such exemption and must bear on the label a declaration of net weight. Many States have similar statutory provisions, and, having followed the Federal requirements since 1918, will likewise adopt the new Federal interpretation and require a declaration of net weight.

In providing for the net-weight declaration on food in package form, the wording of the new Food, Drug, and Cosmetic Act is the same as that of the Food and Drugs Act of 1906. However, there is a fundamental difference between the two laws. The old law originally restricted mandatory labeling to net weight, while the new law requires not only net-weight marking but also the name and address of the manufacturer, distributor, or packer.

We appreciate the administrative difficulty of attempting to exempt a food from some of the mandatory labeling requirements without extending such exemption to all of them. We submit, how-

ever, that granting a request for exemption in part, for reasons previously recognized, is less difficult than including more than can be justified. Exceptional treatment? Yes! Setting a precedent? No! Limburger has been so treated for years.

In August 1938, Mr. Kanzer, Director of the Bureau of Weights and Measures of New York, issued an order requiring limburger cheese to bear a declaration on the package of net weight or tare weight. For reasons I shall mention later, net weight could not be stated; and because of a wide variation in the weights of the wrappers, tare weight could not be stated with accuracy. Within a comparatively short time we were successful in procuring wrappers of uniform weight and of a type suitable for the curing process, so today tare weight can and is being accurately stated on the package. For developing a limburger wrapper of uniform weight, the industry is indebted to Mr. Kanzer, of New York, and to George Warner, Chief of Inspectors of Weights and Measures of Wisconsin.

A definition of limburger cheese includes the following:

> The curd is ripened for about fourteen days in a cool, damp atmosphere by special fermentation, after which the loaves of curd are enclosed in a practically air-tight wrapper or wrappers to establish the surface conditions necessary for the proper completion of the ripening process.

The wrapper is a part of the cheese. I do not have to emphasize how inconvenient it would be to tamper with the wrapper at the time of sale to consumers; retail clerks are better qualified to furnish the arguments to support that statement. The situation presents to you the problem of informing and protecting the consumer through proper labeling; it presents to the industry the risk of declaring as certain that which is uncertain, because of conditions beyond our control. We are fully cognizant of your problem; we know you appreciate ours.

The consumer is completely informed and fully protected if the package carries a declaration of tare weight, and a further statement that net weight must be determined at the time of sale. With the exception of some retailers, the trade handles limburger cheese on a net-weight basis by deducting the tare weight from the gross weight.

The manufacture and proper curing of a limburger cheese of predetermined weight, within a reasonable tolerance, is impossible because of variations resulting from, or caused by, the condition of the milk, types of pasture and feed, climatic changes, evaporation and shrink, and so forth, any one of which affects the weight and defeats the manufacturer's attempt to produce a uniform weight. A tolerance is recognized if the variation from the declared net weight is above that weight as often as it is below. This reduces the risk of inaccurate marking, but it presents a merchandising problem; distant buyers accept all pieces weighing at or above the declared net weight and reject all those below. Those rejected packages are at the mercy of the law and the trade, because all of them are below the declared net weight and are not entitled to a tolerance.

With the small tonnage it is needless to explain that some handlers have already concluded that it is safer not to handle the product. Has this attitude actually expressed itself? You will find that in 1940 the manufacture of every variety of cheese except limburger increased

substantially over that produced in 1939, and that the production of limburger in 1940 dropped 11½ percent. This can only be explained as evidencing a lack of sales effort because of concern for the consequences of failure to meet labeling requirements as to net weight.

Time does not permit detailing all of the manufacturing problems, the curing, the evaporation, and so on, but the fact remains that the same reasons upon which the exemption was granted in 1918 exist today. The law has changed. Limburger has not. Processors can comply, because when in the pasteurized hot state the product is susceptible of being divided with commercial accuracy.

This statement is made on behalf of the natural limburger industry, and I am supported by the trend of the past 2 years when I say that the survival of that industry depends upon the renewal of the 1918 exemption, except that in addition to permitting the tare-weight marking, it should be required that the label include the name and address of the manufacturer, distributor, or packer. If this is done, the consumer will be fully protected. We are not on opposite sides of a question—you cannot change the law, and we cannot change limburger. But to save an industry, you can extend an exemption with the good grace of a Federal precedent.

The consideration of this problem by your Conference is more than appreciated, and if there is anything which you can do to assist us along the lines suggested, you will be serving an industry that is on its way out if the exceptional situation I have outlined is not recognized.

Mr. Rogers. New Jersey was one of the States which took exception to the exemption of limburger cheese from the net-weight marking requirements. As I understand it, the curd is molded into forms, and these are not of uniform weight. The exemption granted by the Federal Food and Drug Administration years ago was based upon the assumption that these packages would be weighed at the time of retail sale. In actual practice, gentlemen, that does not occur. Customers who ask for a pound of limburger cheese will receive a block of cheese regardless of what it weighs. Why cannot the limburger cheese manufacturers do as the butter manufacturers do, and produce uniform packages? It is lamentable, of course, to hear any industry say that it is on its way out. But I reiterate that I can see no reason for not requiring the marking of limburger cheese in package form with a statement of the net weight of the contents just as is required of the manufacturers of other varieties of cheese.

Mr. Bulson. Several years ago I made an investigation of limburger-cheese practice in our county. At that time the avoirdupois weight of paper and tinfoil wrapping of a brick of limburger cheese was 3 ounces. The weight of the wrappers was included in the weight of the cheese. Now I believe that the weight of the wrapping has been reduced to approximately ½ ounce.

In the manufacture of limburger cheese, molds are utilized, and the cheese maker puts into each mold a scoop full of curd and whey; obviously, it is impossible to get exactly the same amount of curd in each mold; in some there will be more whey than in others. As a result, there may be as many different sized cheeses on the drainboard as there are mold compartments. After the product has

drained for about 12 hours, the cheese is taken off the drainboard, put into an underground cellar, rubbed with salt every 24 hours, and allowed to ripen.

Last summer I made an investigation to determine what became of the cheese that wasn't up to standard weight. I visited several factories where limburger cheese was being wrapped. Over-and-under scales were being used, and if the brick weighed 16½, 17, 17½, and possibly 18 ounces, it would be passed as a standard-weight cheese. Bricks weighing less than 16½ ounces were discarded, and I found that these were taken to another place, ground up, and "processed", after which the product was pressed into standard-weight blocks of any desired weight; this product is what is known as processed limburger cheese.

Mr. Davis. As I understood Mr. Mooney, his proposal is based on the theory that the cheese will be weighed at the time of retail sale. What is to be done in self-serve markets, where the customer makes his own selection and the checker never weighs it?

Mr. Mooney. Many of those cash-and-carry, serve-yourself stores have already thrown it out.

Mr. Davis. I do not think it is safe not to have commodities of that kind marked to show their net weight. It may be supposed that the package is to be weighed at the time of sale, but this is not done in many cases.

Mr. Mooney. You understood me to say that we do want the tare weight accurately stated on the package, did you not?

Mr. Davis. Yes, but even if the tare weight is accurately stated and the gross weight is never determined, where does that leave us?

Mr. Mooney. As I said before, there are some retailers who do not reweigh. They should do this, and I do not know how to compel them to do it. The label states that the package should be weighed and a deduction made for the tare weight—in order to determine the net weight.

I wish to ask the gentleman from New York if his State has not accepted the tare-weight marking on limburger.

Mr. Bulson. I believe they have, and that it is the general practice to weigh the cheese right before the customer, deducting the tare weight and reporting the net weight of the cheese.

Mr. Davis. A package marked to show its tare weight would not comply with the law of Vermont.

Mr. Siegler. If a 2-pound package is cut to make 1-pound pieces, or if a 1-pound package is cut to make ½-pound pieces it would be difficult, would it not, to determine the tare weight? That is the way it is sold in some of the markets.

Mr. Mooney. That may be the practice in some places, but cutting a 2-pound package is not the usual way of handling this product. But even so, just as much protection is afforded by declaration of tare weight as could be afforded by declaration of net weight.

Mr. Bulson. Considering that the total tare weight is only approximately ½ ounce, the difference between the tare weights of the two pieces when a cheese is cut in two would be negligible.

(At this point, Joseph G. Rogers, Vice President of the Conference, assumed the chair.)

ELIGIBILITY TO WEAR CONFERENCE EMBLEM

MR. BUSSEY. We have approved the design of a Conference emblem and have made arrangements for the Conference Treasurer to take orders for the button; but it has not been decided who should be entitled to wear the emblem.

MR. ACKERMAN. In order to get the question before the Conference, I move that all duly registered members and guests who have been in attendance at the National Conference on Weights and Measures be entitled to wear the emblem.

THE CHAIRMAN. You mean that registration at any one session would entitle a person to wear the emblem?

MR. ACKERMAN. Yes, Sir.

(The motion was seconded.)

MR. PISCIOTTA. I think it was intended that this emblem should be something which weights and measures officials would wear to show their affiliation with the National Conference on Weights and Measures. I don't believe that my wife should be entitled to wear this emblem just because she is registered here as a guest, nor that men who are here because of some particular special interest, such as representatives of the tissue industry, for example, should be entitled to wear the emblem just because they happened to have registered at the Conference. I suggest an amendment to the motion to the effect that the only persons entitled to purchase and wear that emblem shall be active weights and measures officials, acting as such at the time the button is purchased.

MR. ACKERMAN. I accept that amendment.

THE CHAIRMAN. Perhaps it was not intended that all guests, particularly the ladies who are here in what may be termed a "social" capacity, be included; but I am wondering if it was not the original intention that representatives of industry be authorized to wear the emblem. There is nothing compulsory about it; they may wear it or not as they see fit.

MR. ACKERMAN. That was my original intention.

MR. PISCIOTTA. There is another problem. Any weights and measures official from any jurisdiction, whether or not he has ever attended a meeting of this organization, is a member of the National Conference by reason of the fact that he is engaged in weights and measures work. For example, all of the approximately one hundred weights and measures officials in my department cannot attend meetings of the National Conference, but the question arises, Should each of them be entitled to wear the Conference emblem? I should like to restrict this privilege to weights and measures officials in active service at the time of procurement of the emblem and who have at any time in the past or who may in the future attend any one of our meetings.

THE CHAIRMAN. It occurs to me that considering the name of this organization, it is the National Conference on Weights and Measures—not the National Conference of Weights and Measures Officials. If it is the disposition of the Conference to extend the privilege of wearing the emblem to any representative of industry who takes sufficient interest in what we are doing to attend our meetings, this would seem entirely appropriate.

Mr. Crawford. I think it would be well if we were to restrict the wearing of the emblem to active weights and measures officials. I do not believe that commercial men would take any exception to such a restriction.

Mr. Baucom. I am inclined to feel that any man who is actively engaged in weights and measures work in the United States, who accepts the rulings of this Conference, and who tries to carry them out in his jurisdiction, should be entitled to wear the Conference emblem if he cares to do so.

Mr. Crawford. I move that the wearing of the Conference emblem be restricted to active members of the National Conference on Weights and Measures, that is, to weights and measures officials of the United States, regardless of whether or not they have been in attendance at a meeting of the National Conference on Weights and Measures.

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

[Secretary's Note.—See page 161 for the reconsideration of this action relative to the National Conference emblem.]

INTERSTATE TRUCKING OF COAL

Mr. Bulson. I have a problem involving coal trucked into northern New York from the Scranton area. It seems that weight tickets are issued at the point of loading, but that at some point after crossing the State border a new set of tickets will be made out, the second set from two to three tons more than the first. We have in Jefferson County but one scale capable of weighing these large loads to determine the gross and tare weights, and this is located at the international bridge between the United States and Canada; we must take the loaded trucks over there, weigh them gross, bring them back to unload, and then return to the international bridge to get the tare weight. One trucker whom I had convicted on a short-weight charge finally sold his outfit; he told me that at the place where he bought his meals and gasoline, they marked up his Scranton weight tickets by 2 tons with the understanding that if he succeeded in "getting away with it," he was to pay them the price of 1 ton on his way back.

I should like to know if some regulation could not be drawn up whereby the issuance of inaccurate weight tickets could be done away with.

Mr. Blickley. A bill is now before the Pennsylvania Senate, having passed the House, making it compulsory to get weight tickets from the State; if this bill is enacted, we hope to eliminate this trouble in our own State and in the bordering States as well. Other States can then get from our bureau copies of what will be known as the "standard weight slip." The bill also makes it unlawful to print any weight tickets without the consent of the bureau. In other words, counterfeiting will be eliminated, and counterfeit tickets are what Mr. Bulson is getting in his territory.

The Chairman. We are controlling this situation in New Jersey through rigid enforcement of our laws. We have a regulation, based on a Supreme Court decision, requiring that when a load of coal comes into New Jersey, the gross and tare weights must be determined on the same scale before the truck leaves the premises; this

means that the load must be dumped in order to get the tare weight before the ticket can be made out, and the coal must then be reloaded. If the weighmaster fails to weigh the empty truck, he risks loss of his job.

Mr. DAVIS. Under the law in Vermont, a trucker bringing coal into Vermont from outside the State must follow the procedure which has just been outlined by Mr. Rogers. The trouble with the law is that the people are not in sympathy with it. I have attempted a number of prosecutions, but juries will seldom convict because they are in sympathy with the fellow who supplies coal at a price $5.00 or $6.00 a ton less than that charged by regular coal dealers in the State.

Mr. BLICKLEY. I wish to ask Mr. Bulson if Pennsylvania weight slips are recognized in New York.

Mr. BULSON. I am not an authority on the legal phases of the matter, but we usually check them to see whether or not they are correct.

Mr. BLICKLEY. In Pennsylvania we do not recognize any weight slip except one issued by a certified Pennsylvania weighmaster. I know that New Jersey and Delaware will not recognize Pennsylvania weight slips, and if New York will refuse to recognize them that may be the remedy for your trouble. I would recommend that you make them weigh as soon as they cross the State line, just as we do.

We have even found truckers with books of weight slips, so that they could make out slips for any amount they chose.

Mr. DEVRIES. I think you will find that much of the trouble is caused by coal being watered at the mine and weighed while wet; after the load has traveled 50 or 100 miles its weight will be considerably less. I think that is one reason for the adoption of our certificate-of-origin law, designed to guarantee that our people will not get bootleg coal.

Mr. BULSON. We require a certificate of origin, but the problem is to determine the genuineness of the Pennsylvania certificate.

Mr. PISCIOTTA. Let me explain that the New York law calls for a certificate of origin, but the State Bureau of Weights and Measures has never issued to the mines any certificates, and as a result the weight slips from the Pennsylvania colliery or mine are accepted both as weight ticket and as what they construe as a certificate of origin. That is not done in New York City, however, for we have our own law separate from the State law.

The CHAIRMAN. Our certificates of origin are official documents, issued only by our department and to sources where we know the origin of the coal is legitimate. There was one instance of counterfeiting, which we broke up through our State police, with the cooperation of the State of Pennsylvania; a printing plant in Pennsylvania was raided, the forms were seized, and the two men responsible were prosecuted for counterfeiting.

Mr. BLICKLEY. Let me make it plain that the weights and measures bureau of Pennsylvania has nothing at all to do with certificates of origin. Weight certificates must be issued by licensed weighmasters, but a Pennsylvania weight certificate is not a certificate of origin.

CALIBRATION OF VOLUMETRIC STANDARDS

Mr. Robert Williams. Recently it came to my attention that the measures used by some of the meter companies in my county for the testing of meters did not agree with mine. In one instance I was told pointedly that my measure was inaccurate, and I was shown certificates from a neighboring city and from a city in another State to substantiate the claim that the company measure was accurate. Incidentally, mine was a measure less than 6 months old, sealed by our State Department, and it was in perfect condition. I think there should be a standard practice for the testing of these volumetric standards, and I do not think there is a local sealer equipped to test 50-gallon or 100-gallon measures the way they should be tested. I contend that a 50-gallon measure cannot properly be tested against another 50-gallon measure. If water is delivered from the sealer's measure to the measure of the meter company, some water is bound to cling to the sealer's measure, causing an error of from 5 to 25 cubic inches.

I do not know that this Conference can do anything about it, but I strongly feel that all of the equipment used by the meter companies should be certified by the State Department of the State in which the equipment is to be used, just as the equipment of the sealers is certified; then we shall all be on an equal basis.

Mr. A. T. Smith. It has been my experience that accurate delivery cannot be made from one of these 50-gallon or 100-gallon measures—there are too many places to trap liquid. Moreover, these measures are made to contain, not to deliver, their nominal capacities. I feel that the proper method is to use an accurately tested 5-gallon or 10-gallon test measure, adjusted to deliver.

Mr. Bulson. I have what I term an "office" 5-gallon measure, certified by the State Department; I leave it in the office all the time. I check my 5-gallon field standards against this office standard once a month. Before testing with water, I use gasoline to provide an oily film on the inside of each measure; then I can do my testing with water, and if I do not spill any I can deliver from one measure to the other with a variation of only 1 cubic inch.

The Chairman. The amount adhering to the walls of the standard can also be corrected for by first wetting the walls of the measure under test.

Mr. Robert Williams. I still maintain that the only proper method is to use a slicker-plate standard which is adjusted to deliver. How many local sealers have such equipment?

TOLERANCES FOR CERTAIN FREIGHT SCALES

Mr. Baucom. I should like to ask Mr. Harrison a question, with his permission. It has been said that 95 percent of the railroad scales are AREA scales, and that these are superior to any other type. If this is true, I should like to know why, representing a railroad, he has come to the Bureau and asked for a double tolerance on his scales.

Mr. Harrison. I do not recall any request having been made for a double tolerance on railway track scales.

Mr. Baucom. It is in the handbook, which recommends double tolerance on all scales used for computing freight charges.

Mr. Harrison. I am afraid that Mr. Baucom is confusing two different things. The remarks made about adherence to AREA specifications were confined to railway track scales. The tolerance to which he refers does not apply to railway track scales at all; it applies to other than railway track scales. The heading of that section is "For Large-Capacity Scales Except Railway Track Scales."

Mr. Baucom. If that is correct it is all right. I do not have the book here. But I still do not understand why a railroad depot scale should not be required to be just as accurate as a similar scale in a motor-truck depot.

[Secretary's Note.—The provision in question, proviso 5 of paragraph J–1a of the National Conference Scale Code, is limited to automatic-indicating scales, and to scales used "exclusively in determining weights for the sole purpose of fixing charges for the transportation of freight," and no distinction is made between scales owned by railroads and scales owned by other transportation agencies.]

GLASSES FOR LIQUOR

Mr. DeVries. From time to time there has been introduced in the New Jersey Legislature a bill for the capacity marking of glasses for liquor. I feel that this is a matter which should be controlled by the weights and measures department and not by the alcohol beverage commission. I should like to know if any of the States represented here have such a law, and if so by whom it is enforced.

Mr. Pisciotta. For several years we have tried to get such a law in New York State and in New York City. There has never been any conflict with the ABC Board, which has felt that this is a weights and measures problem.

The Chairman. The New Jersey department has felt the same way, but in our State the effort is made to put enforcement in the hands of the alcohol beverage commission. Accordingly, we have opposed these efforts to encroach upon the field of weights and measures work.

(At this point, at 5:00 p. m., the Conference adjourned, to meet at 10:00 a. m., Friday, June 6, 1941.)

SEVENTH SESSION—MORNING OF FRIDAY, JUNE 6, 1941

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

REMINISCENCES

By C. F. Horton, *National Bureau of Standards*

It is my pleasure at this time to relate to you some of the highlights of the Nation-wide survey of vehicle scales begun in November 1936, in the city of Baltimore, and concluded last month in the State of Utah. During that time Mr. Crouch and I have traveled with the Bureau's 20-ton Vehicle-Scale Testing Unit in every one of the 48 States, and it has been our privilege and pleasure to have worked with many of you in those States. These experiences have been most interesting to us, and we hope that a description of them will interest you as much.

The itinerary followed by the testing unit has covered a total distance of approximately 49,000 miles, from Washington, D. C., to the extreme southeastern part of our tour at Tampa, Fla., thence to the extreme northeastern point at Bangor, Maine, thence by a zigzag route westward across the country, reaching the extreme northwestern point at Bellingham, Wash., more than 3 years after leaving Maine, thence southward along the Pacific Coast to the extreme southwestern point, San Diego. From that point we followed a route through the mountain States of the far west, finally concluding the survey in May 1941 in the State of Utah, from which State we have brought the unit back to headquarters in Washington, D. C., by the most direct route.

In this survey we have tested approximately 2,960 different motor-truck and wagon scales, in addition to a considerable number of livestock scales, airplane wheel-load scales, axle-load and wheel-load scales used in highway traffic control, and other large-capacity special-purpose scales.

It may be of interest to note that in making all these tests with the Bureau's equipment, it has been necessary to lift manually, by means of the hand-operated, two-wheel, weight-handling cart, more than 60,000 tons of test weights, according to a fairly accurate estimate. This cart has been pushed and pulled a total distance of more than 1,000 miles in making these tests.

In securing data for statistical purposes concerning all these vehicle scales, we have asked scale owners more than 50,000 questions, and they, in turn, undoubtedly have asked us an even greater number of questions. They ask questions about almost every conceivable phase of motor-truck weighing and of operation of vehicle scales. Each test usually attracts a number of spectators, and they also have lots of questions to ask.

In some parts of the country, particularly in those States which have been up to the present time without state-wide weights and measures law enforcement, it is surprising to see how many scale owners have the erroneous impression that simply because the scale will balance perfectly at zero load, the scale must necessarily be accurate throughout its weighing range. The results of some of the tests made with the Bureau's equipment have been revelations to these scale owners. It is rather difficult to imagine just why any scale owner should have such an incorrect idea as to the principle of operation of a scale, but nevertheless the idea is very widespread.

We have had some interesting and sometimes amusing experiences in testing vehicle scales which showed erratic performance, due to "livestock" in the scale pits. We have encountered in scale pits, during pit inspections, rats, mice, cats, snakes, toads, scorpions, black-widow spiders, poultry, and in one case a skunk. Of these, the most frequently found animals that cause erratic scale performance are rats and mice. They frequently run up and down the levers of a scale, and in weigh-beam extension levers of the pipe-lever type they frequently crawl inside the pipes and run from one end to the other, causing very erratic performance of the scale. Difficulty from this source is quite easy to detect during a test, but in ordinary weighing it is probable that rats or mice on the lever system in some location do cause considerable error. In some parts of the country so much trouble is had with rats and mice that it is the practice of the State inspector to plug up the ends of these pipe sections, using tin cans which will fit snugly over the ends of the pipes, to keep rats or mice from crawling inside.

In a number of instances we have found scales which were seriously inaccurate because of mud nests which wasps had built inside the main poises. Cases of this sort are fairly common, as many inspectors know, on weighbeams which are located in outdoor beam boxes or in scale houses which are isolated and are not in constant use.

In some installations of automatic-indicating scales, considerable trouble is experienced due to mice or rats building nests inside the dial cabinet. These rodents enter the cabinet through the opening in the floor around the beam rod, and build their nests frequently around some of the parts of the mechanism, causing enough interference with these parts to affect seriously the accuracy of the scale. Rat guards installed around the beam rod are usually effective in preventing trouble from this source.

One installation of a scale used by the State highway patrol for checking highway loads in a midwestern State has a most unusual feature about it. The scale is provided with a bullet shield, consisting of a steel plate about ¼ inch in thickness and mounted on a trolley in such a manner that the bullet shield may be moved over out of the way when the scale is in use, and may be moved over in front of the dial head when the scale is not in use and no attendant is present, in order to protect the expensive automatic-indicating mechanism from damage from rifle or pistol shots fired from cars passing on the adjacent highway. The highway patrol officers told us that before this bullet shield was installed, the dial head, which was readily visible from the highway through the front windows of the scale house, was a frequent target for rifle or pistol shots fired by persons riding in cars

on the highway at times when there was no operator present at the scale house.

In another mid-Western State, the State highway patrol officers have had even greater trouble from vandalism. One of their scale installations consisted of two wheel-load scales with platforms installed side by side, with separate dial heads installed in one scale house. One night when no operator was present at the scale, some person, probably a disgruntled truck operator, placed a high-explosive charge on the pavement next the scale house and set it off. The explosion completely destroyed the scale house and the two automatic-indicating mechanisms, although it did not damage seriously the lever systems in the pit, since they were protected by heavy concrete platforms.

Although our work in this survey has been principally in all those States which were, at the time of our visit, without adequate equipment for routine testing of large-capacity scales, we have made a number of tests on scales of very large capacities located in jurisdictions which are well equipped with heavy test trucks of their own. In some of these States and counties, including New Jersey, Idaho, and Alameda County, Los Angeles County, and Stanislaus County, California, cooperative tests, using both the local equipments and the National Bureau of Standards equipment, were made.

The heaviest strain-load test we have been able so far to make with the National Bureau of Standards Vehicle-Scale Testing Unit and other available strain loads was made on a four-section motor-truck scale with a 60-foot by 10-foot platform, used for weighing highway loads in California. This scale was equipped with an automatic-indicating dial of 100,000-pounds capacity, no unit weights or auxiliary tare bars being provided, so that the entire capacity of the scale was included in one revolution of the dial indicator. The scale was located on a heavily traveled highway, on which heavy trucks pulling semitrailers and full trailers were passing every few minutes, so that strain loads up to 68,000 pounds gross were easily obtainable. By utilizing a strain load of approximately 60,000 pounds, consisting of a large tank truck and trailer loaded with about 30,000 pounds of wine, and by using our own equipment on the platform of the scale at the same time, it was possible to test the scale nearly to its maximum rated capacity. The actual gross load used on the platform in this test was approximately 99,400 pounds.

In cooperation with the New Jersey State Department of Weights and Measures, tests were made using both the State equipment and the National Bureau of Standards equipment on two very large motor-truck scales owned by the State.

Similar tests were made in cooperation with the Bureau of Weights and Measures of the State of Idaho, using both the State large-capacity-scale test unit and our unit. The Idaho equipment carries 10,000 pounds of test weights and weighs approximately 21,000 pounds gross, so that the total test-weight load used in these cooperative tests was 25,000 pounds; the total gross load used was approximately 60,000 pounds in one test of a 30-ton motor-truck scale with a 40-foot by 10-foot platform.

In Alameda County, California, several tests on four-section motor-truck scales with 60-foot platforms were made in cooperation with

Mr. Strobridge and his deputy inspectors of the county Weights and Measures Department, using the Alamada County 20,000-pound test-weight trailer, our own 15,000 pounds of test weights, and both the Alameda County and National Bureau of Standards test trucks, to make a total test-weight load of 35,000 pounds and a maximum gross weight of approximately 75,000 pounds on the platforms.

In Los Angeles County, California, several tests similar to those made in Alameda County were made in cooperation with Mr. Fuller and his deputy inspectors of the Los Angeles County Weights and Measures Department. In these tests, we used the Los Angeles County 20,000-pound trailer and our own equipment, so that the total test-weight load used was 35,000 pounds, and the total gross load used was approximately 60,000 pounds. The over-all length of the Los Angeles County test truck and trailer and the National Bureau of Standards truck was too great, even for a 60-foot scale platform, so that the Los Angeles County truck was not used in the strain-load tests.

In a number of instances we have tested motor-truck scales which have been built from reconditioned railway track scales, without suitable modifications to the lever systems to eliminate the undesirable side overhangs which result when a weighbridge of 9- or 10-foot width is installed on a standard railway track scale lever system which has a width of 60 inches between main load bearings in any given section. Such construction results in side overhangs of 30 inches under decks of 10-foot width, and in side overhangs of 24 inches under decks of 9-foot width. In the past several months we have been making special tests with the weights concentrated on the side overhangs, to determine, if possible, what adverse effects the side overhangs would have on the performance of the scales. These overhang tests were made in addition to the regular tests with weights evenly distributed across the sections. In several cases the weighbridge of a scale having excessive side overhangs would start to tip with a load of 12,000 pounds stacked entirely on the unprotected overhang on one side of the scale, on one of the end sections. We have found this to occur even on scales with heavy concrete decks, 40 feet or more in length.

In general, we have found that conversions of railway track scales into motor-truck scales are usually unsatisfactory, unless the lever systems have been widened by suitable modifications of the extension levers, or unless the weighbridge is well constructed so as to support adequately the excessive side overhangs.

For example, we may consider one scale recently tested. This scale had been made from two sections of a railway track scale, and the weighbeam had been cut down to restrict the weighbeam capacity to 25 tons. The weighbridge of this scale was very poorly constructed, with cross members consisting of two 2-inch by 10-inch planks. Nine 2-inch by 10-inch wood blocks had been installed on top of each bridge bearing plate, to support the weighbridge at sufficient elevation to clear the lever system. The wood cross members of the weighbridge did not provide sufficient lateral support for the weighbridge structure and were sagging at their center sections. The bridge bearing plates were badly out of level. The deck planking at the near left corner of the deck had broken down because of inadequate support of the side over-

hang. This scale showed a maximum numerical error of minus 157 pounds with a 15,000-pound load of test weights distributed across the left end of the deck.

In a number of instances we have made tests on motor-truck scales and wagon scales having excessive unprotected end overhangs resulting from the extension of the weighbridges beyond the originally designed lengths, without modification of the lever systems. Such installations usually are very unsatisfactory, and show serious errors when loads are placed on the unprotected end overhangs. For example, a 10-ton wagon dump scale tested recently had been designed for a 16-foot by 8-foot platform, but the weighbridge had been lengthened to 22 feet by rebuilding the weighbridge, so that it now has an unprotected end overhang at the right end of 64 inches, to permit weighing and dumping trucks that are too long for the original 16-foot platform. Even this platform extension was not sufficient for some of the trucks, so heavy metal plates had been hinged to the right end of the platform about 1 foot from the end, so that when turned outward, these plates project about 2 feet beyond the right end of the platform. To prevent tipping of the weighbridge when trucks are driven off the scale over this extremely long overhang, safety blocks have been installed under the right end of the weighbridge. However, one of the safety blocks had fallen down, so that it was no longer effective. The other safety block had a clearance of only $\frac{3}{16}$ inch under the weighbridge structure. With a 10,000-pound test-weight load placed on the overhang at the right end, this scale showed a minus error of 117 pounds, although the scale was within the prescribed 0.20 percent tolerance at all other points, including a 10,000-pound load placed over No. 2 section, approximately 64 inches from the right end.

Another outstanding example of the serious errors to be expected in a scale having excessive end overhangs was a 10-ton A-lever wagon scale tested recently with the Bureau's equipment. This scale at present has a platform size of 22 feet by 9 feet, having been extended from the probable original size of 16 feet by 8 feet, with the result that there is now unprotected overhang of 46 inches at each end and an unprotected overhang of 15-inches at each side. The weighbridge is prevented from tipping by means of vertical check links fastened to both ends of the weighbridge, and by means of safety blocks installed under both ends of the weighbridge. Results of the test made on the scale showed it to be within prescribed tolerances for all loads placed on the central area 16 feet by 8 feet in size for which the lever system was designed, but, with the same loads placed on the overhangs, serious errors were found. With 10,000 pounds on the overhang at the right end, the error was minus 210 pounds, and with 10,000 pounds placed on the overhang at the left end, the error was minus 645 pounds. Such large errors probably were due, in part, to binds resulting from deflection of the weighbridge overhangs down onto the safety blocks.

Another vehicle-scale installation which is most unusual is one we tested recently in the western part of the United States. This is a motor-truck scale with four-section lever system formerly used in a railway track scale. The weighbridge is 33 feet 8 inches in length, but the platform is only 21 feet 6 inches long, and 7 feet 8 inches wide. In effect, this is just the opposite of that all-too-common practice of

extending the weighbridge beyond the originally designed length, for in this scale the ends of the platform terminate approximately 6 feet from the ends of the weighbridge; accordingly, the left end of the platform is approximately halfway between No. 1 and No. 2 sections, and the right end of the platform is approximately halfway between No. 3 and No. 4 sections. This scale is being used to weigh coal trucks of relatively short wheel base, and was installed about 20 years ago, when the need for motor-truck scales with long platforms was practically nonexistent. Approaches at both ends of the scale have been provided by building reinforced concrete "roofs" over the unused parts of the pit and over the parts of the weighbridge and lever system not covered by the platform. The reason for installing the scale in this manner is not clear; certainly it would have been cheaper and more practical to install the scale in the conventional manner, making the platform the full length of the weighbridge.

The platform of this scale is also of most unusual construction. The platform was originally built of wood planks, and the owners had later converted it into a concrete-surfaced platform by simply pouring concrete over the wood planks. Edge irons had been installed as is ordinarily done on regulation concrete platforms.

This scale had been poorly maintained and was in bad condition due to dirt, rust, and wear. It showed a maximum numerical error of plus 320 pounds under a 15,000-pound test-weight load at the right end of the platform. The sensibility reciprocal was 100 pounds, or five times the maximum permissible amount. A balance change of plus 50 pounds occurred during the entire test.

In two locations we have seen installations of two short-platform scales installed with their platforms end-to-end, to permit weighing of semitrailers and trucks without resorting to the unsatisfactory practice of two-draft weighing. In one of these dual installations, each lever system was connected to a separate weighbeam; in the other dual installation, consisting of a 15-ton motor-truck scale and a 6-ton wagon scale, both lever systems were connected to one weighbeam. Such dual installations seem to prove unsatisfactory, because of the fact that they usually employ one or more wagon-scale lever systems which are not properly designed to weigh the heavy axle-loads usually encountered.

We have found in use several wagon scales of early design which have one remarkable feature of construction—the main levers do not have fixed pivots at the fulcrum and tip ends, but simply have notches as these points instead. The main-lever fulcrum and tip pivots are fixed in the main fulcrum loops and in the tip connections; the main load pivots are fixed in position in the main levers in the normal manner.

Another unusual installation was that of a wagon scale installed in a driveway through which large freight trucks are frequently driven. To prevent such nonweighing traffic from overloading the scale, a motor-truck equivalent of a "dead-rail" was installed near the longitudinal center line of the deck, consisting of a narrow, heavily built plank "bridge." The wheels on one side of nonweighing vehicles roll on the "bridge and wheels on the other side roll on the

concrete coping at the far side of the deck, with the result that no load is transmitted to the live deck of the scale.

One thing that has impressed us continually in this survey is, that wagon scales are in the great majority of instances seriously overloaded. Very rarely do wagon-scale owners pay any attention to the motor-truck ratings of such scales, even when in the case of 10-ton wagon scales the rating "maximum capacity for motor-trucks, 12,000 pounds" is plainly stamped on the weigh beam. Many scale owners actually believe that such words mean the net, and not the gross, load permissible on the scale, when carried in motor-trucks. We can see no justification for ever building a 20,000-pound wagon scale and equipping it with a weighbeam having a capacity of 20,000 pounds, now, or for the past 10 years or so. A wagon load of 20,000 pounds gross is rare, indeed, in these days. If a 20,000-pound wagon scale has a maximum motor-truck gross-load rating of 12,000 pounds, then certainly such a scale should not be equipped with a weighbeam whose maximum poise readings total more than 12,000 pounds; if, as is usually the case, the scale is equipped with a 20,000-pound weighbeam, it is almost certain that sooner or later the owner will start overloading the scale.

This trip throughout the United States has indeed been an education and a wonderful experience for Mr. Crouch and me, and we were very fortunate to have been given this opportunity. We have received enthusiastic cooperation of the finest sort from State and local officials in all sections of the Nation, and you have extended to us every courtesy and have done everything possible to make our journey pleasant. It is difficult to express adequately how much we appreciate everything you have done; our heartfelt "thank you" may express it best.

In conclusion, we express our sincere appreciation of the interest, friendly counsel and guidance, and encouragement that Dr. Briggs, Mr. Bearce, Mr. Smith, and others of the Bureau have extended to Mr. Crouch and me all the time we have had the privilege of representing the National Bureau of Standards in this work. We have felt most keenly the loss of Mr. Holbrook. His fine ideals, his devotion to his work, his fairness and open-mindedness, have been an inspiration to us in the past and will continue to be so in the future.

ABSTRACTS OF STATE REPORTS[11]

ALABAMA

By R. M. Johnson, *Inspector of Weights and Measures, City of Birmingham*

In the absence of a representative of the State Division of Weights and Measures, Mr. Johnson reported upon the activities of the Birmingham department. He described the methods used by his department in combating the marketing of foods and drugs in slack-filled packages, stated that his department refused to investigate anonymous complaints, and acknowledged the full support of his commissioner in the work of his department.

[11] For convenience of reference, these reports have been arranged in alphabetical order.

CALIFORNIA

By Charles M. Fuller, *Sealer of Weights and Measures, County of Los Angeles*

Mr. Fuller reported for the State, and outlined briefly a number of weights and measures bills being considered by the State Legislature; these included bills relating to slack-filled containers, sales by weight, the positioning of commercial devices, and educational activities of weights and measures officials.

CONNECTICUT

By Carlton L. Klocker, *State Inspector of Weights and Measures*

Mr. Klocker reported that several weights and measures bills had failed of passage in his State. He noted the successful results of a plan for educating the public by means of exhibits along weights and measures lines at "progress expositions" where new developments in household appliances are displayed. He also spoke of the methods used to check sales of "Bunker C" oil which is sold on the basis of gallons at 60° F but actually is weighed at temperatures approximately 140° F.

DISTRICT OF COLUMBIA

By George M. Roberts, *Superintendent of Weights, Measures, and Markets*

Mr. Roberts reported that no outstanding problems had arisen during the year, but that his department had been functioning smoothly, continuing its efforts toward consumer protection.

FLORIDA

By Howard E. Crawford, *Inspector of Weights and Measures, City of Jacksonville*

In the absence of the State representative, Mr. Crawford reported for Florida. He mentioned the splendid work which was being done by the State in the inspection of gasoline pumps and remarked that this left him free in his own jurisdiction to give more attention to other matters of importance in the weights and measures field.

GEORGIA

By W. P. Reed, *Inspector of Weights and Measures, City of Atlanta*

Mr. Reed reported the passage in his State of a weights and measures law to be administered by the Commissioner of Agriculture. No appropriation had been provided, but a plan was being considered, under which the law might be enforced by existing departmental personnel. Mention was made of the possible early operation of a State large-scale testing unit. Reporting for the city of Atlanta, Mr. Reed said that he had recently been furnished with a truck equipped with a police radio, enabling him to receive calls while on inspection trips.

INDIANA

By Rollin E. Meek, *Chief, State Bureau of Weights and Measures*

Mr. Meek reported that a law had been passed bringing into the merit system all employees of the State Board of Health, and as all

weights and measures inspectors were in that organization, they also came under the merit system. He also reported the defeat of a bill designed to take away certain merit protective features of the Indiana law affecting county inspectors.

MASSACHUSETTS

By JOHN P. MCBRIDE, *State Director of Standards and Necessaries of Life*

Mr. McBride mentioned new legislation dealing with the positioning of commercial equipment, additional sizes for paper containers, and weight certificates for loads of road material. He reported that Massachusetts now has in operation a mobile bulk-station-meter testing unit provided with 50, 100, and 1,000-gallon tank measures.

MINNESOTA

By ERLING HANSEN, *Supervisor, State Department of Weights and Measures*

Mr. Hansen discussed what was being done in his State toward making the public weights and measures conscious. He lauded the provisions of the law relating to livestock and grain-weighing scales, but deplored the fact that notwithstanding some recent improvements in the equipment for testing large-capacity scales, livestock and vehicles scales could be tested only once in 4 years because of insufficient funds and equipment. He also mentioned the discouraging leniency of the courts in connection with weights and measures cases.

MISSISSIPPI [12]

By J. M. DEAN, *Chief, Publications and Inspection, State Department of Agriculture and Commerce*

Mr. Dean reported that the weights and measures bill providing for a comprehensive system of State supervision, which had failed on a technicality at the last session of the legislature, would be reintroduced at the next session, and that this bill would almost certainly be enacted into law.

NEW JERSEY

By JOSEPH G. ROGERS, *Assistant State Superintendent of Weights and Measures*

Mr. Rogers discussed the provisions of a number of departmental bills, under consideration by the legislature, which dealt with the licensing of poultry buyers, the sale of meats and poultry by weight, determinations of weight on the buyer's scales, automatic ticket printers for tank trucks and bulk stations, the licensing of fuel-oil dealers, pensions for municipal weights and measures officers, and marking of packages of all commodities with statements of their contents. He said that New Jersey was trying to get a second scale-testing unit and a unit for the testing of large-capacity meters; also that his department now issued warning tickets rather than oral warnings to violators.

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[12] In the absence of Mr. Dean, and at his request, this report was presented to the Conference by the Secretary.

NEW YORK

By JOHN J. LEONARD, *Supervising Inspector, State Bureau of Weights and Measures*

Mr. Leonard expressed his regret that Mr. Kanzer, Director of the State Bureau, could not attend the Conference because of a prolonged illness, and noted this as one of the reasons why no changes had been made in the weights and measures laws of the State or the activities of the bureau during the preceding year.

NORTH CAROLINA

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

Mr. Baucom reported a substantial increase in the appropriation for his department. He also reported amendments to the weighmaster law and the passage of a scale mechanic act requiring "registration" rather than "licensing," and providing, among other things, for reports to the State department upon repairs made to rejected equipment.

NORTH DAKOTA

By A. J. JENSEN, *Chief, State Scale Inspection Department*

Mr. Jensen spoke about the difficulty of procuring adequate appropriations for weights and measures activities in his State, but said that he had finally succeeded in obtaining for his department two new units for the testing of large-capacity scales, each carrying six 1,000-pound weights, and a large-capacity liquid-testing unit.

PENNSYLVANIA

By JOSEPH F. BLICKLEY, *Chief, State Bureau of Standard Weights and Measures*

Mr. Blickley reported that there were six bills before the legislature, the most important being a bill regulating the issuance of weight certificates for loads of coal. He said that during the year enough funds were procured to put the State scale-testing trucks back into service, and reported that through the excellent cooperation of the local inspectors in the State, more progress had been made in Pennsylvania in the field of weights and measures than in any one of the preceding 10 years.

TEXAS

By W. S. BUSSEY, *Chief, State Division of Weights and Measures*

Mr. Bussey reported that his department had been operating under a drastically reduced budget, but that he expected an increase in the next appropriation which would make it the best appropriation his department ever had. He said that several bills of interest to his department were pending in the legislature, which he thought would be enacted into law. It was reported that after the National Bureau of Standards Vehicle-Scale Testing Unit had visited Texas, the test-weight loads on the two State units were increased from 5,000 to 7,500 pounds.

UTAH

By A. C. Todd, *Sealer of Weights and Measures, City of Salt Lake City*

Mr. Todd told of the recent installation, as an official city scale, of a 100,000-pound, four-section, motor-truck scale with a 60-foot platform. Mention was made of an ordinance requiring owners of vehicle scales to secure certificates as private weighers in order to weigh loads for second parties. He also described the method successfully used in his city to combat short-weight packages by stamping such packages "Condemned—Short Weight," and said that this procedure was now being followed by the State officials.

VERMONT

By H. N. Davis, *Supervisor, State Division of Weights and Measures*

Mr. Davis reported an amendment to the mechanic-licensing law requiring the licensing of each individual mechanic servicing weighing or measuring devices, and the provision of an increased appropriation making possible an increase in personnel. A bill making it compulsory to equip vehicle tank meters with ticket printers was defeated, but it was stated that enactment of this requirement by the next legislature seemed assured.

VIRGINIA

By M. A. Hubbard, *State Supervisor of Weights and Measures*

Mr. Hubbard reported the construction by the State of a testing station for calibrating petroleum transport trucks and the correction of fraudulent practices in the weighing of livestock by some well-directed prosecutions. He also outlined a recently adopted plan under which the State officially weighs the wool crop of Virginia in cooperation with the wool-growers' association.

WISCONSIN

By Louis E. Witt, *Sealer of Weights and Measures, City of Milwaukee*

In the absence of a State representative, and having no special report for the State, Mr. Witt discussed the effective control of packages of pickled herring made possible by a State regulation requiring that the "Net Weight of Fish" be marked on the packages; he stated that a mere declaration of the amount of food in the package was not informative, because of the practice of including large amounts of onions in each package.

REPORTS OF REPRESENTATIVES OF STATE ASSOCIATIONS OF WEIGHTS AND MEASURES OFFICIALS

At this point brief reports of State associations were made, as follows:

California Association of Weights and Measures Officials, by James A. Hughes.

Indiana Association of Inspectors of Weights and Measures, by A. Edward Snyder.

Massachusetts Association of Sealers of Weights and Measures, by James M. Cantfill.

Michigan Association of Weights and Measures Officials, by Charles T. Quinn.

New Jersey Weights and Measures Association, by Joseph G. Rogers.

New York State Weights and Measures Association, by Mathias A. Harrington.

Ohio Sealers Association, by Edwin J. Siegler.

Texas Weights and Measures Association, by J. D. Walton.

Virginia Weights and Measures Association, by H. V. Hayman.

CITATIONS BY OFFICIALS OF IMPORTANT COURT DECISIONS IN THEIR JURISDICTIONS

Mr. J. G. Rogers. In New Jersey we had a law to suppress the bootlegging of anthracite coal from the Pennsylvania regions into our State. Our Federal District Court ruled that our act was unconstitutional. We appealed the decision to the United States Supreme Court, and the lower court's decision was reversed. [Read, Superintendent, etc., v. Dickerson, et al., No. 719, October Term, 1940.] We are now again enforcing our certificate-of-origin act.

REPORT OF COMMITTEE ON NOMINATIONS, PRESENTED BY C. L. KLOCKER, CHAIRMAN, AND ELECTION OF OFFICERS

The Committee on Nominations respectfully submits for your consideration the following nominations for officers for the ensuing year:

For President, Lyman J. Briggs.

For Vice Presidents, Joseph F. Blickley, G. K. Heath, M. A. Hubbard, W. P. Reed, Joseph G. Rogers, and J. E. Witt.

For Secretary, Ralph W. Smith.

For Treasurer, George F. Austin, Jr.

For members of the Executive Committee, all officers, ex officio, and, in addition, the following: Chas. G. Crockett, J. M. Dean, Chas. H. Engelhard, W. T. Fossett, M. L. Fowler, Erling Hansen, Carl E. Hawkins, H. E. Howard, James A. Hughes, R. M. Johnson, Alex Pisciotta, Thomas F. Rice, Edwin J. Siegler, A. E. Snyder, H. C. Todd, J. D. Walton, Tom Webb, F. C. Yarbrough.

(Signed) C. L. Klocker, *Chairman*,
R. Bodenwieser,
L. E. Witt,
Rollin E. Meek,
G. M. Roberts,
Geo. F. Austin, Jr.,
W. S. Bussey,
Committee on Nominations.

Mr. Klocker. I move that the Secretary cast one ballot for the officers and members of the Executive Committee as named.

(The motion was seconded, the question was taken, and the motion was agreed to. Accordingly, the Secretary having cast the ballot as directed, the nominees of the Committee on Nominations were duly elected.)

REPORT OF COMMITTEE ON RESOLUTIONS, PRESENTED BY JOSEPH F. BLICKLEY, CHAIRMAN, AND ADOPTION OF RESOLUTIONS

APPRECIATION TO DIRECTOR AND STAFF OF THE NATIONAL BUREAU OF STANDARDS

Whereas Dr. Lyman J. Briggs, R. W. Smith, and their able and efficient staff have extended valuable assistance and guidance to this Conference, of which the Conference is highly appreciative: Therefore be it

Resolved, That this, the Thirty-first National Conference on Weights and Measures, does hereby record its grateful appreciation to the above-named gentlemen.

APPRECIATION TO THOSE PARTICIPATING IN PROGRAM

Whereas numerous committees, speakers, and individuals, have given their valuable time and effort to make this, the Thirty-first National Conference on Weights and Measures, a success: Therefore be it

Resolved, That the Thirty-first National Conference on Weights and Measures does hereby record its grateful appreciation to all who have contributed to the success of this Conference.

APPRECIATION TO OFFICIALS COOPERATING

Whereas the governing officials of the various States, counties, and cities, through their manifest interest in weights and measures work, have made it possible for their respective jurisdictions to be represented at this, the Thirty-first National Conference on Weights and Measures; and

Whereas such cooperation and attendance have in a most practical way furthered uniformity in regulations for the various jurisdictions and have otherwise assisted the general good of the work: Therefore be it

Resolved, That this, the Thirty-first National Conference on Weights and Measures, does appreciate such practical cooperation and does make this resolution a part of the record of its meeting.

APPRECIATION TO MANAGEMENT OF HEADQUARTERS HOTEL

Whereas the management of the Mayflower Hotel has done everything within its power to make our present meeting the success which it has been: Therefore be it

Resolved, That this, the Thirty-first National Conference on Weights and Measures, assembled at the Mayflower Hotel this sixth day of June 1941, does express its warmest appreciation and thanks to the management of the said hotel for the careful provisions made for our meeting; and be it further

Resolved, That the Secretary of the Conference be instructed to transmit a copy of this resolution to the management of the Mayflower Hotel.

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APPRECIATION TO COMMITTEE ON WEIGHTS AND MEASURES EDUCATION

Whereas the Committee on Weights and Measures Education have by their very efficient work added a new chapter to the accomplishments of the Conference for which the Conference should be grateful: Therefore be it

Resolved, That this, the Thirty-first National Conference on Weights and Measures, does hereby record its appreciation to this Committee and recommend its continuance.

APPRECIATION TO NATIONAL ASSOCIATION OF BROADCASTERS

Whereas the National Association of Broadcasters have been generous in their time and talent in appearing before this Conference: Therefore be it

Resolved, That this, the Thirty-first National Conference on Weights and Measures, does hereby record its appreciation of the service rendered by the National Association of Broadcasters.

TRADING BY WEIGHT

Whereas this Conference has repeatedly stressed sale by weight instead of by dry measure: Therefore be it

Resolved, That we, of the Thirty-first National Conference on Weights and Measures, do hereby recommend that every reasonable effort be made to change from trading by dry measure to trading by weight and recommend that a committee be appointed to study this matter further and report to the Thirty-second National Conference on Weights and Measures.

CONTAINERS FOR ALCOHOLIC BEVERAGES

Whereas a chaotic condition exists in containers for alcoholic beverages; and

Whereas there is a great deviation from the adopted standard of liquid measurements in the United States for alcoholic beverages: Therefore be it

Resolved, That the Thirty-first National Conference on Weights and Measures go on record as recommending to the Federal Revenue Department, or other proper agency of the Government, the adoption of standards of liquid measurement for containers used in the sale of alcoholic beverages and that such standards be based on the United States gallon of 231 cubic inches and its binary submultiples such as one-half gallon, 1 quart, 1 pint, one-half pint, and 1 gill, and that we further go on record as condemning the use of odd-size bottles or containers in existence such as four-fifths gallon, one-fifth gallon, three-fourths quart, and such other containers as are outside the recommended standards.

ASSISTANCE TO THE STATES BY THE NATIONAL BUREAU OF STANDARDS

Whereas this Conference has felt the need for more assistance to the States from the National Bureau of Standards: Therefore be it

Resolved, That the Budget Bureau and Congress be urged to approve at least an $11,000 increase in the appropriation for weights and measures services in cooperation with State and local officials

and that the Conference recommends that the Committee on Proposed Federal Legislation to Provide Assistance for the States in Administration of Weights and Measures Laws be continued.

REGRETTING THE ABSENCE OF BARNETT KANZER

Whereas Mr. Barnett Kanzer, Director of the Bureau of Weights and Measures of the State of New York, has, through serious illness, been unable to attend the Thirty-first National Conference on Weights and Measures; and

Whereas because of his sincere efforts for the promotion of the interests of the Conference his presence has been greatly missed: Therefore be it

Resolved, That we, of the Thirty-first National Conference on Weights and Measures, do hereby express our sincere regret that he was unable to attend, and further express our best wishes for a speedy recovery and return to active duty.

IN MEMORY OF DECEASED MEMBERS

Whereas during the past year we have lost through the plan of Divine Providence Samuel T. Griffith, Louis J. Hoffman, Erwin J. Rogers, and other members of this Conference; and

Whereas our association with these departed members has been an inspiration to us to continue with greater determination toward the ideals set by them: Therefore be it

Resolved, That we of the Thirty-first National Conference on Weights and Measures, do hereby record this expression of sincere sorrow at the loss of these members.

[At this point, upon the suggestion of the chairman of the Resolutions Committee, the Conference rose and stood in silence for some moments in memory of the departed members.]

[SECRETARY'S NOTE.—The text of the foregoing resolution has been modified from the form originally proposed by the Committee on Resolutions, in accordance with the instructions of the Conference. See the debate immediately following the Committee's report.]

APPRECIATION TO THE PRESS AND TO THE SCALE JOURNAL

Whereas the press of the city of Washington has been generous in reporting the activities of our present meeting; and

Whereas the Scale Journal has likewise been generous in giving advance notices of our present meeting: Therefore be it

Resolved, That this, the Thirty-first National Conference on Weights and Measures, does hereby record its appreciation to the press of Washington and to the Scale Journal.

(Signed) J. F. BLICKLEY, *Chairman*,
ERLING HANSEN,
W. T. FOSSETT,
W. P. REED,
C. T. QUINN,
R. M. JOHNSON,
C. P. SMITH,
Committee on Resolutions.

Mr. PISCIOTTA. May I suggest that, if available, the names of those departed be incorporated as a part of the report of the Committee on Resolutions and that they be put in the record.

Mr. R. W. Smith. If those of you who know of members of our Conference who have died during the past year will advise me, I shall be glad to include the names as suggested. A possible unfortunate result would be that if we include some and inadvertently omit others, it may appear as though we were slighting the memory of some who should be recognized.

Mr. Pisciotta. My thought is that when we have such a prominent member as Captain Griffith, who was one of the most active members of this Conference, I would not want the resolution to omit definite reference to him. If names are not available, no one is to be blamed, but I believe that such names as we know of should be incorporated in the resolution.

(It was moved and seconded that the report of the Resolutions Committee be adopted, the question was taken, and the motion was agreed to.)

The Chairman. The Chair notes that one of these resolutions provides for the appointment of a special committee to report to the Conference next year. With your permission, I shall defer the appointment of that committee for the present, in order that the matter may be thoroughly studied, and the membership of the committee will be announced through the Weights and Measures News Letter.

REPORT OF THE TREASURER, GEORGE F. AUSTIN, JR.

		June 1, 1941
Balance on hand June 1, 1940		$496.94
Receipts:		
June 3. Dues—1940 Conference	$214.00	
Interest accrued	5.23	
		219.23
		716.17
Disbursements:		
May 1. Receipt book	$2.00	
June 5. Social evening:		
Hotel Mayflower—refreshments	188.50	
Music and entertainment	96.00	
Playing cards	6.00	
Rental—Public address system	7.50	
Telephone service, cartage, and miscellaneous	4.65	
Stenographic, mimeographing, and messenger services	30.00	
Bronze memorial tablet—Fay Stanley Holbrook	44.00	
		378.65
Balance on hand June 1, 1941		337.52

(Signed) George F. Austin, Jr., *Treasurer.*

(It was moved and seconded that the report of the Treasurer be accepted as read, the question was taken, and the motion was agreed to.)

UNFINISHED AND NEW BUSINESS

CONFERENCE EXPENSES

Mr. J. G. Rogers. I move that the Secretary of the Conference be authorized to pay the customary and necessary expenses of this Conference.

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

RECONSIDERATION OF MOTION RELATIVE TO NATIONAL CONFERENCE EMBLEM

Mr. Crawford. Mr. Chairman, the Associate Members of this Conference have contributed much to the success of our organization. I believe that we have made a rather serious mistake in limiting to "active weights and measures officials who are now in office or who may become weights and measures officials in the future" authority to wear the newly adopted emblem of the National Conference. Therefore, I request a reconsideration of the action taken by the Conference on June 5, and move the adoption of the following:

This emblem shall be available to members of the National Conference on Weights and Measures, past, present, or future, to officials of the National Bureau of Standards contributing to weights and measures work, and to associate members who are now or have been actively participating in weights and measures work at the National Conference on Weights and Measures, eligibility of associate members in regard to the emblem to be determined by officers of the Conference.

(The motion was seconded.)

Mr. Pisciotta. Does "officers of the Conference" include the Executive Committee?

Mr. Crawford. I would assume "officers of the Conference" to mean the President and the Vice Presidents.

The Chairman. The officers of the Conference are the President, the Vice Presidents, the Secretary, and the Treasurer.

Mr. Pisciotta. Is there any objection to including the members of the Executive Committee? If not, I move that the language be amended to read "officers of the Conference, including members of the Executive Committee."

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

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

MEMBERSHIP DUES

Mr. R. W. Smith. There is an important question which this Conference much decide in order to determine the policy to be followed at future meetings with respect to the character of entertainment to be provided as a part of the program.

As you know, for the past several years we have had an "evening party," the expenses of which have been borne by the National Conference, and all members of the Conference, both active and associate, and their ladies have been invited to participate in these affairs. Through the reports of the Treasurer you are familiar with what these functions have cost. For many years our dues have been one dollar per registrant. The amounts of money which are being taken into the Conference treasury through dues are insufficient to enable us to continue holding parties such as we have had for several years past.

In making arrangements for this year's meeting, your Secretary took this matter up with the Executive Committee, suggesting that we could do one of four things: We could have a party similar to the one held last year, drawing upon this year's income to meet the expenses; we could change the character of the party so that the expenses would be reduced, thus "keeping within our income"; we could eliminate the party entirely; or we could increase the dues of the Conference suffi-

ciently so that we might continue to have parties of the character of those recently held. The Executive Committee was of the opinion that our party this year should be of the same genéral character as the one held last year, and accordingly this plan was followed. The Executive Committee did not wish to assume the responsibility of increasing the dues this year, and wished to refer to the Conference as a whole the decision with respect to entertainment at future Conferences.

Judging from the preponderant sentiment in the Executive Committee that the parties should be continued, it appears that the Conference will wish to choose between two options: Shall the dues be increased so that the general character of the parties may remain unchanged, or shall the dues remain at one dollar, necessitating reduction in the cost of parties by the elimination of the refreshments, the music, or in some other manner?

Mr. Crawford. Personally, I should be in favor of increasing the dues. Even though it may be inconvenient for some of us to pay an increased amount as dues, it seems to me that it is worth some sacrifice to keep the character of the parties unchanged, because these have contributed very much toward the entertainment of the wives of the members attending the Conference.

Mr. Saybolt. Mr. Smith did not indicate even approximately the amount of the deficiency. I presume that this year's attendance is representative, and approximately 50 percent of those present are associate members, that is, those representing business, industry, and so forth. Although the Conference is primarily a weights and measures conference, I think that representatives of industry would be very happy to pay double the present dues if that increased amount would satisfy the requirements of the situation. The entertainment has been of a high order on every occasion when I have had an opportunity to attend, and I think it would be a mistake to reduce its caliber.

Mr. Turner. Perhaps Mr. Smith will tell us about how much the dues would have to be increased to meet this deficiency.

Mr. R. W. Smith. I can only make an estimate, because we can never tell definitely how many people are going to attend our meetings. The suggestion has been made that the dues be increased to two dollars, which would, of course, be ample. I believe that if the dues were increased to one dollar and fifty cents and our attendance remained at its present level, we should be able to remain solvent.

May I say, referring to Mr. Saybolt's suggestion, that up to this time, as all of you realize, no distinction has ever been made between associate and active members in the matter of dues, except that originally the payment of dues was restricted to weights and measures officials; for a long time we accepted no contribution whatever from the associate members. Later, at their urgent suggestion, they were permitted to pay the same registration fee that was collected from weights and measures officials.

Mr. Harrington. We have been around here for nearly a week and have had a lot of fun, but our most enjoyable time was at the evening party of the Conference. I move that the dues be increased to two dollars.

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

WEIGHTS AND MEASURES NEWS LETTER

Mr. R. W. Smith. The comments which have been offered during this meeting relative to the Weights and Measures News Letter have been very gratifying, and we are happy to know that you are finding the News Letter interesting and helpful. I wish, however, to reiterate and emphasize what Dr. Briggs said in this relation in his opening address. We could make the News Letter very much more valuable to you if more of you would help by sending in appropriate items for publication. I am not gifted with second sight, and you must send the information to me before I can publish it. Dr. Briggs has not imposed any restrictions on the size of the individual issues or on the size of the mailing list. If you like the News Letter and want it to be improved and enlarged, you must keep us supplied with items suitable for publication. Moreover, if anyone desires to be placed on the mailing list for the News Letter, whether or not he is a weights and measures official, all that is necessary is to write us making that request. There is, as you know, no charge for the News Letter.

The Chairman. Is there any other matter to come before the Conference?

Gentlemen, this brings to a close, again, a Conference of the weights and measures officials of the country. I wish to thank you for coming and to tell you how glad I am to see so many of you here. It has been a pleasure for me to meet so many of my old friends. I shall look forward to seeing you again at the Thirty-second Conference.

The Thirty-first National Conference on Weights and Measures stands adjourned.

(Thereupon, at 1:05 p. m., the Thirty-first National Conference on Weights and Measures adjourned sine die.)

APPENDIX

[In connection with the program item "You're On The Air", presented at the Third Session of the Conference, there were made available to those in attendance, copies of a booklet prepared by the National Association of Broadcasters, this being "a handbook of helpful hints which has for its object the clearer presentation of public questions in the American home by radio." Because of the very practical value to weights and measures officials of these suggestions for the preparation and delivery of radio talks, the following extracts from the booklet in question are here presented, with the permission of the National Association of Broadcasters.]

HELPFUL HINTS FOR RADIO SPEAKERS

You have things to say; people to meet *by radio!* The shouting, the platform stalking, the scowling, the arm waving—the silver-tongued orator whose softest word could reach clear back to the balcony—these ornaments of a colorful American past, radio has outmoded. These, radio has replaced with a quieter, and we believe, more intelligent method of communication. Radio speaks to those listening in the comfort of their firesides. One "talks things over" logically and conversationally, as one seated in the room would speak.

The sole purpose of this booklet is to help men in public life to present their views by radio *convincingly.* It is simply a handbook of helpful hints which has as its object the clearer presentation of public questions in the American home *by radio.* In it, we have drawn liberally from the everyday, practical experiences of professional radio people, commentators, and well-known announcers.

THE RADIO TALK

The essential of radio is speaking to people in their homes—*not* in the convention hall.

You *speak*—you don't shout!

Perhaps 99 percent of the people you address by radio are seated in their front parlors. There, quiet reigns. There, citizens are able to measure your sincerity through *your voice.*

No law in this country compels them to listen to you. You must interest them. For if you don't, a swing band, a news broadcast, *another speaker will!*

Radio, as public discussion goes, is both the newest and the oldest means of communication—*oldest,* because the intimacy, the directness, the *personalty* of the human voice have swayed millions down through history; *newest,* because no such means of projecting the human voice has ever been enjoyed until radio gave it a spin through the air of 186,000 miles per second to all *who were interested!*

Radio serves as direct contact between listener and speaker. The listener *can not talk back.*

A radio talk may be heard by thousands, perhaps millions. But, these listeners are *never part of a great convention hall audience*—they are *but several people* seated in the living room, listening—multiplied by thousands, or by millions!

That's Radio!

Ever to forget it, means a loss of listeners, a failure to "get over" your message convincingly.

When you use radio, visit informally. Make friends, through friendly, persuasive conversation.

A THOUGHT BEFORE WRITING YOUR RADIO TALK

The audience you have depends upon what you say in the first two minutes of your talk.

Specialists, teachers, zealots, tend to assume, or to overestimate, the interest of their subject to the listener. Even the most important subjects are not readily significant to many.

Tie up your introduction with something timely, well-known, or unusually pertinent.

Get *interest* at the start!

Then—Pick a purpose. Your audience wants to know what you're "driving at" and "where you're going."

But select a purpose that can be fully explained and expounded *in the time allotted!*

Few speakers can hold radio attention for more than fifteen minutes. Some can for half an hour. A few *may* sustain radio interest for a full hour.

Always remember your listeners are *several people seated before a radio in their home* (multiplied by thousands, or by millions).

Your remarks should be addressed *to a home group. After* you've spoken, they may easily turn to one another to discuss what you have declared or challenged.

Your talk should *sustain interest, create confidence, prove your conviction.*

But what you say in the *first two minutes gains* or *loses* audience for you.

How you sustain interest throughout fifteen, thirty, or sixty minutes depends upon the unfoldment of your ideas—how you carry the listener along, point by point.

HOW TO WRITE THE RADIO TALK

Above we said, "Pick a Purpose." We reiterate it here.

What one main idea do you wish to "get over"? How best, in the radio talk, may you project it?

You believe in your conviction—your subject. Have you tried out your ideas on others—some friends—some folks at the cross-roads store—some neighbors?

What is your vocabulary? Do you prefer *big* multisyllabled words? Forget them!

If you say "domicile" for "home"; "seat of learning" for "school"; "place of worship" for "church," stick to the simpler terms.

Write your radio talk as *you* speak.

Words in radio should form pictures, provoke thought, give dimension and color, produce thinking and action.

Remember: *Radio reaches only the ear.* Help listeners understand your story by using words of description. Help them *see, smell, taste, feel*—help them *understand two times two makes four.* If you must use statistics, use them sparingly and try presenting them in word-picture form.

Don't get lost in literary confusion. This is *not* an oration.

What you illustrate, what you say, must be stated plainly so as to reach the human ear convincingly, and clearly.

Write your radio talk this way: Write sentences shortly. Pick your purpose. Use "picture" words. Develop it interestingly. Try it on a friend. Remember, you have radio competition. There are other speakers on the air—other programs, too! Write only what you feel—write as you speak—be sincere.

HOW TO TIME YOUR TALK

What period of radio have you chosen? Fifteen minutes? Thirty minutes? (In this country all radio periods are *exactly* timed.)

Should you be on a "fifteen minute program" you actually have *fourteen minutes* and *thirty seconds*—in a thirty minute program you actually have *twenty-nine minutes* and *thirty seconds.* It takes thirty seconds for the studio (on average) to clear ordinary station technical operation.

Someone should introduce you. Generally, an announcer will. He can refer to your record—personal or otherwise. That is better in the radio talk than if you are forced to refer to your own achievements.

The introduction usually takes a minute or so. Calculate your time accordingly.

The time occupied by your own talk should be no longer, nor any shorter, than the period you have contracted to fill. If "you're short," some studio music must "fill in." By lack of accurate, well-timed preparation you leave your audience forgetting what you've said. Schooled to split-second program delineation, they "worry about the fill-in." You lose caste as a radio speaker. You are compared with better speakers on the air.

Time it "on the nose." An announcer will "sign you off." Be introduced properly and fully.

HOW FAST DO YOU TALK?

"I dunno" doesn't help you. Get someone to *stop-watch* you.

Some speakers deliver as many as 250 words a minute; others 150 or 125.

You must clock your normal rate of delivery.

If you speak too quickly, few can understand what you are saying. If you speak too slowly, you risk a restive audience.

You must *accommodate* your voice to radio.

Before you come to the studio, speak aloud at home. Get a stop-watch or borrow one from the station manager. As you read each page, mark down the time it takes, *page* by *page*, at the bottom of each page. For example, should it take you two minutes to read a full-sized, double spaced, typewritten page, mark "2" at the bottom of that page. By looking at the studio clock and the *bottom* of each page as you go along, you can check up to determine if you are reading at your normal rate, or not. You can, before the period ends, make adjustments to fit the time exactly.

Double or triple space your talk.

Use paper that will not rattle.

Send a copy of your timed talk to the studio, well in advance.

Underline important words; mark pauses (———) for breath stops or emphasis as you will.

Be sure you can read it sincerely. People, remember, are at home.

AT THE MICROPHONE

Properly prepared, properly timed, properly introduced at the microphone, *you* are on your own. What you say must be said convincingly. In radio, this depends entirely on the human voice—*yours!*

When you are before the microphone, relax.

If you are one who needs a few interested people around to register reactions, ask friends to come in.

Keep your lips moist. (This avoids speaker's "dry dust.")

Have your voice checked (well in advance of your radio period) by the engineer.

Speak into the microphone. Take a distance (at the start) of not less than two feet. Be guided by what the control room engineer tells you; he is there to help you. When you hold up your written speech, don't let it come between your lips and the microphone. (Your voice will be muffled and indistinct; no one can hear you.) Check your script-reading habits with the engineer again.

As you finish "speaking" each page, drop it to the floor so it will cause no sound.

DO NOT COUGH OR SNEEZE INTO THE MICROPHONE. Avoid clearing your throat.

Use your voice to reflect your sincerity—intimacy—knowledge of the problem.

You are speaking to people at home—not in a convention hall.

Be friendly. That is radio at its best.

Be sincere. Nothing is more convincing.

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