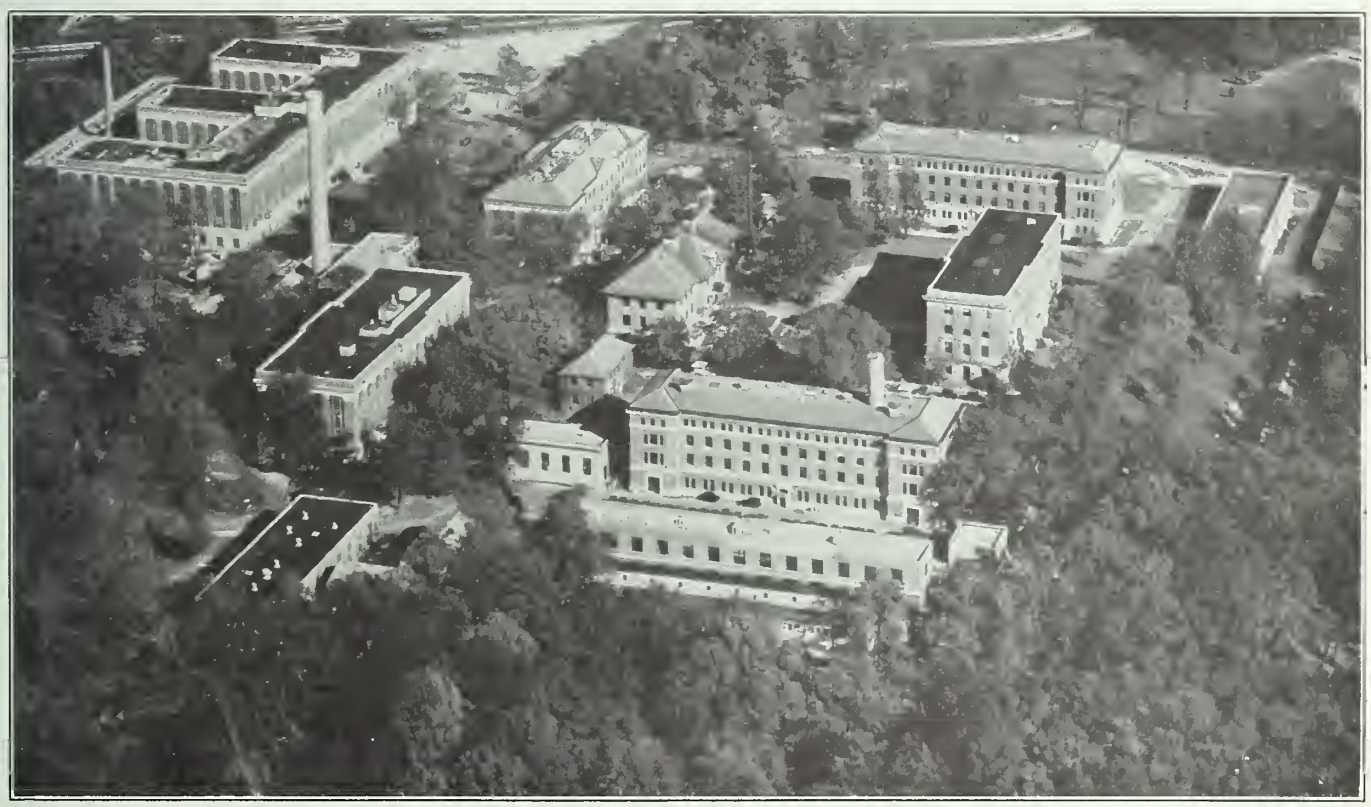
COMMERCIAL STANDARDS MONTHLY

A Review of Progress in Commercial Standardization and Simplification



AIRPLANE VIEW OF NATIONAL BUREAU OF STANDARDS

ISSUED BY THE NATIONAL BUREAU OF STANDARDS OF THE UNITED STATES DEPARTMENT OF COMMERCE, WASHINGTON, D.C., U.S.A.

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U. S. DEPARTMENT OF COMMERCE
R. P. LAMONT, Secretary

NATIONAL BUREAU OF STANDARDS
GEORGE K. BURGESS, Director

COMMERCIAL STANDARDS MONTHLY, S. F. Tillman, Editor

The Commercial Standardization Group

DIVISION OF SIMPLIFIED PRACTICE

Edwin W. Ely

The division of simplified practice cooperates with industrial and commercial groups to reduce waste, usually through eliminating unnecessary variety of product, method, or practice. Its function is to bring together all parties interested in a project of this character, and to coordinate their work in developing a simplified practice recommendation. Such work includes surveys of current practice, formulation of a simplified practice program, and presentation of that program for action by a general conference representing all interests. The division then transmits to all concerned a full report of the general conference, with a request for written acceptance of the action taken. When the volume of acceptances is sufficient to indicate initial success, the Department of Commerce indorses the program and publishes the recommendation. The division thereafter cooperates with a standing committee appointed by the industry concerned, in conducting periodic surveys to determine the degree of adherence, to maintain and extend support of the recommendation, and to secure data for reaffirmation or revision. Simplified practice may be applied to any commodity or activity in which it will reduce waste. The division stands ready to render service in developing and making effective any application of simplified practice which will reduce waste, stabilize business, or extend commerce.

BUILDING AND HOUSING DIVISION

J. S. Taylor

The division of building and housing, formed in 1921, cooperates with business, technical, and professional groups in furthering construction activities. It works to modernize building codes and to encourage improved standards for the quality of building construction, and the practical application of the latest development in design and use of building materials.

It encourages home ownership through the development of an enlarged, steadier, more intelligent, and more discriminating demand for dwellings—the largest single class of buildings which the construction industries provide.

The division also cooperates with other governmental agencies and with many private business and professional groups in efforts to distribute building activity more evenly throughout the year and to secure less fluctuation from year to year.

The work on city planning and zoning has the broad objective of making buildings more useful through proper location with respect to other structures, stabilizing of land values and property uses, well coordinated thoroughfare systems, and well laid out public works.

STANDARDIZATION
..IS..
A CONTINUING PROCESS
ITS AIM IS NOT FIXITY OR STAGNATION
..BUT..
TO ADD SERVICEABILITY AS OFTEN AS THE POTENTIAL GAIN MAKES IT WORTH WHILE

DIVISION OF SPECIFICATIONS

A. S. McAllister

The duties of the division of specifications are to promote and facilitate the use and unification of specifications. In doing so it carries on activities involving cooperation with technical societies; trade associations; Federal, State, and municipal Government specifications making and using agencies; producers, distributors, and consumers; and testing and research laboratories. It ascertains the Standardization and specifications promoting activities of the associations and societies, and brings to their attention the work being done by the commercial standardization group. It brings the Federal specifications and commercial standards to the attention of the maximum number of producers and users of commodities complying with these standards and specifications. It compiles and distributes lists of sources of supply of materials guaranteed to comply with the standards and specifications. It shows both buyers and sellers the benefits from handling nationally specified, certified, and labeled commodities. The division prepares directories of governmental and nongovernmental testing laboratories and the Directory of Specifications, and is working on an encyclopedia of specifications, the first two volumes of which have been issued, namely, "Standards and Specifications in the Wood-Using Industries" and "Standards and Specifications for Nonmetallic Minerals and their Products." It also aids in preparing the Standards Yearbook.

DIVISION OF TRADE STANDARDS

I. J. Fairchild

The division of trade standards, on request, assists industrial and commercial groups in the voluntary establishment of standards covering grades, quality, dimensional interchangeability, or other acceptance criteria as a national basis for marketing manufactured commodities.

The detail criteria are selected or determined voluntarily by interested buyers or sellers, without any Government dictation or domination, and adjusted at a general conference of producers, distributors, and users so as to represent the composite views of all branches. The division functions chiefly as a neutral agency to see that all interested elements are given full opportunity to be heard and satisfied; to solicit and record acceptances; and to publish and promulgate the standard when a satisfactory majority of acceptances is obtained and provided there is no active opposition.

Industries are encouraged to apply self-certifying labels to products meeting the commercial standard requirements, as a means of protecting the consumer and the scrupulous seller from misrepresentation or unfair methods of marketing.

Provision is made for regular revision of the standard through the appointment of a standing committee to consider periodically any necessity for revision of the standard, in order that it may be kept constantly compatible with progress in the industry.

Address NATIONAL BUREAU OF STANDARDS, Washington, D. C., *for further information*

COMMERCIAL STANDARDS MONTHLY

A Review of Progress in Commercial Standardization and Simplification

VOLUME 7 | WASHINGTON, D. C., APRIL, 1931 | NUMBER 10

SUBJECT ANALYSES

AN INVITATION TO VISIT THE NATIONAL BUREAU OF STANDARDS

A cordial invitation is extended to all interested in scientific progress to visit the laboratories of the National Bureau of Standards when in Washington. A personally conducted trip is organized at 2.15 p. m. daily except on holidays. Special trips for groups may be arranged at other times by writing to the bureau in advance. The bureau's illustrated Visitor's Manual may be had for the asking. This lists the work in progress and gives an airplane view of the ensemble and a brief statement of typical discoveries and inventions which have been notable, basic contributions to radio, aviation, and other modern arts and industries.

An interesting fact in the growth of the bureau is the steady increase in the number of visitors. From all over the world experts come to see the work in progress in many specialties. Not alone the experts but in growing numbers many of our people visit the bureau from a public-spirited desire to acquaint themselves with its research work. All visitors—from the newspaper men, who have called the bureau a " house of wonders," to the specialists, who use its services—are welcome, for it is their bureau in a very real sense. They are the owners of the business and its beneficiaries. The annual per capita cost of 2 cents which the average citizen pays toward the operation of the bureau yields return sometimes a hundredfold or a thousandfold. How science turns wastes into profits, increases the useful life of materials, adds new efficiencies to industry, advances new arts, such as aviation and radio, by research and discovery—these are to be seen first-hand in the scientific and technical laboratories of the bureau.

GEORGE K. BURGESS, *Director.*

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International Commerce Congress
May 4 to 9, 1931

Sixth Congress of International Chamber of Commerce
Will Investigate Remedies for Trade Depression

THE Sixth Congress of the International Chamber of Commerce, to be held May 4 to 9, in Washington, will endeavor to investigate carefully the distinction between cause and effect in the present international trade depression and the possible remedies that can be applied to hasten full recovery.

In an advance release on the forthcoming congress, officials of the Chamber of Commerce of the United States pointed out that "the existing depression has served to emphasize more than ever before the economic interdependence of all nations, and that it is incumbent upon business leaders in all countries to get together in a united effort to work out a solution of the present difficulties, without recourse to Government action."

Another important feature of the conference will be the consideration of the results of an inquiry under way by a special committee into the economic relations between the United States and Europe, both directly between the two continents and in other markets. This committee is now surveying the important shifts that have taken place in trade currents between the two areas and will report on the changes that have taken place in their relative positions. It will undertake to show for the first time authoritatively and impartially what direct and indirect economic activities of the two continents have been mutually complementary and helpful, and what activities may be defined as directly or indirectly competitive.

The principal contrasting aspects of general economic practice in Europe and in the United States are being thoroughly examined, comparative production costs and the elements that enter into their determination, mass production as against small scale production, high versus low wages, the regularization of employment; modern distribution methods—these and other contrasting features of European and American practice are being subjected to a critical study by the committee, the results of which will be presented at the May congress.

QUALITY CONTROL OF CONSUMER COMMODITIES

A Brief Comparison of Several Systems of Quality Assurance

By I. J. Fairchild, *National Bureau of Standards*

In our modern civilization legislation is, perhaps, at once the oldest and most natural remedy for correcting trade evils. Where a manufacturer loses an order to a competitor as a result of unfair methods, or when a buyer finds himself cheated by an unscrupulous seller, the cry frequently arises, "There ought to be a law."

As a result of an official investigation in New York City in 1920, the board of health issued regulations on clinical thermometers in an attempt to prevent the sale of inaccurate and unsatisfactory clinicals. This action was followed by laws or regulations having the effect of laws, in the States of Massachusetts, Connecticut, Michigan, and California, although these laws or regulations were not coordinated and presented a puzzle to the manufacturer who desired to sell thermometers in any two or more of these States.

Each year, for a considerable period, there has been introduced in the National Congress one or more bills designed to regulate the sale of clinical thermometers, but the opposing factions have not been able to agree on the details of any bill and as a result no national legislation has been forthcoming.

In recent years a few periodicals have pioneered in an attempt to correct certain trade evils by means of a special indorsement of products are deemed to be satisfactory. Another method, which has been used to attack this problem, is by trade agreement. For example, the Viscose Co. has a quality control plan by which fabrics or garments of satisfactory standard made from their yarns may bear the crown label. This arrangement is controlled by a contract between the Viscose Co. and the textile mills or garment manufacturers, and a system of symbols is used which permits the company to identify the manufacturer by the label.

A rather unusual example of a trade agreement for the purpose of controlling quality has recently come to our attention. Steel bone plates, used by surgeons in the reduction of bone fractures, have been the source of considerable trouble due to faulty design, unsuitable steels, and improper heat treatment. In 1914, Dr. William O. Sherman took out a patent on the form of steel bone plates and screws and arranged contracts with the manufacturers by which, in return for the use of the patent without royalty, the producers agreed to maintain a satisfactory quality of bone plates. In spite of this magnanimous action on the part of Doctor Sherman, manufacturers have not kept the agreement, and since the patent is about to expire the American College of Surgeons has requested the cooperation of the National Bureau of Standards in the establishment of a commercial standard as a basis for controlling quality of steel bone plates.

Still another method designed to prevent misrepresentation of quality or grading is the use of labels or insignia sponsored by trade associations. A fairly satisfactory solution of the problem is possible by this method. The National Lumber Manufacturer's Association licenses the use of its "Tree mark" on each piece of lumber in conjunction with the grade mark, trade-mark, or species mark of licensed mills, the lumber being guaranteed by the association to conform to American lumber standard sizes under such quality specifications as may be branded thereon.

Another example of this method is the "Lavelle" label, sponsored by the Silk Association of America, which permits this name to be used only on wash silk meeting the minimum specification of the spun silk research committee. The producer of these goods is permitted to use a blue identification tag and the manufacturer of the garment uses a green tag, both of which are attached to the merchandise.

It is not practicable to cover in an article of this type, the many reasons as to why legislation is generally an ineffective means of correcting trade evils, but it may be possible to list a few in order to stimulate more thought in that direction. First, it is a difficult matter to obtain an agreement as to the form and substance for national legislation on any given commodity, since producers have various methods of manufacture and marketing even for similar items, and frequently are unwilling to modify production or marketing arrangements in order to provide a uniform basis for the application of national regulations. Second, for most ordinary commodities the enactment of national legislation would constitute an abrogation of State rights. Third, legislation by individual States is generally uncoordinated and confusing for those who are doing an interstate business. Fourth, a variety of regulations by separate States makes centralized production or interstate service difficult. Fifth, legal regulations attempting to control quality, grading or measurements usually involve cumbersome and expensive means of enforcement. Sixth, as a correction of trade evils, legislation entails an extension of governmental function and increased taxation which, if carried out to cover all commodities, would stagger the imagination.

Generally those who propose legislation as a corrective have in mind only the single commodity in question, and honestly believe that the necessary testing laboratories or other "policing" methods are entirely justified. Yet it seems obvious that the extension of such a system of quality control to cover the entire gamut of commodities from acetone to zinc or apricots to yeast, would entail an astounding expansion of governmental function and a corresponding increase in taxation not comparable with American ideals.

The question as to why many other methods fall short of the goal may likewise be treated in its general, rather than specific, aspects. In the first place, most manufacturers are reluctant to subject themselves voluntarily to direct complaint, or to place anything in the hands of the user which would justify direct complaint or legal action; they are quite generally fearful of unfavorable publicity or court action. This reluctance and fear on the part of the

manufacturers is one of the basic underlying reasons why many quality control systems fall short of the ultimate goal, and why many have degenerated into glorified advertising campaigns.

A close inspection of many systems will reveal an attempt to control the situation internally, without consumer participation. In many cases, the arrangement is more or less secret either within the association or between the producers and the testing laboratories. Again, most of these systems depend upon some contractural relation, such as advertising contracts, sale of labels, or other basis of payment between the producer and the checking agency. In other words, the central agency which purports to control quality is frequently nothing more nor less than an employee of the producer.

Perhaps the most important reason why most systems of quality control fail to reach maximum effectiveness is the fact that they give the ultimate consumer no direct opportunity for redress against either the distributor or producer. It is believed that any system which does not give the ultimate buyer a ready means of action against the seller of misrepresented goods is destined to fail.

The contacts of the National Bureau of Standards with consumer organizations would tend to support the thought that many consumer groups feel that they frequently do not get their money's worth on purchases, but are generally not in a position to offer any specific suggestions or remedies. Although the consumers are gradually awaking to the seriousness of the situation, it is probably safe to say that there is more pressure for quality control from producers to-day than from consumers. One reason for this is the fact that the buyers are interested in a wide variety of commodities, the quality control of which appears to be, and really is, a monumental task, whereas the producers are interested in individual or specific commodities and quality control is more or less within their grasp.

It may be well to enumerate here, from the consumers' viewpoint, some of the chief purposes in the establishment of commercial standards. These are: First, to assure adequate consumer participation in the actual formulation or adjustment of the standard; second, to provide a list of sources of the standard material through published lists of official acceptors and willing-to-certify manufacturers; third, to publish the standard in a form and at a price available to all; fourth, to focus user attention on the real elements of quality; fifth, to sharpen the "knife" of competition and raise the value-over-price ratio; sixth, to increase consumer satisfaction in purchasing; and seventh, to provide the consumer with a weapon which will justify complaints or legal action against the seller of misrepresented goods.

We have no idea that the household buyer will become familiar with all of the details of any commercial standard, but we do look forward to the day when a large proportion of such buyers will be on the alert for labels by means of which the manufacturer certifies conformity to a nationally recognized specification or a commercial standard. Such a label becomes a part of the sales contract and a ready basis for legal action or complaint against the distributor or producer in the event the goods are found, on careful examination, not to conform to the specified requirements.

It seems only reasonable to assume that the purchaser of an article bearing a self-certifying label will be more inclined to inquire into the cause of any dissatisfaction resulting therefrom than would be the case with the same article not bearing such a label. (See Label for wall paper.)

Label used for wall paper

We have been assured by the Federal Trade Commission that complaints against a manufacturer marketing misrepresented goods under labels which guarantee compliance with a commercial standard will be investigated and suitable legal action initiated without the necessity of a trade practice conference. In other words, the established commercial standard or any nationally recognized specification will serve as a satisfactory basis for complaint to and action by the Federal Trade Commission where misrepresentation through labels is involved.

In industries where such guaranty labeling has been tried it has been found that the competitors of a given manufacturer are usually the first to learn of any misrepresentations and also are the first to offer complaints, since unfair methods tend to make inroads on the business of the manufacturer who is trying to play square. Such protests frequently are referred first to the trade association office where, if he is a member of the association, pressure is brought to bear on the offending manufacturer. If not a member, then the trade association office turns the report over to the Better Business Bureau or to the Federal Trade Commission for action.

For goods sold through retails stores, there are additional means of correction. Retailers have terms for various kinds of complaints. One such term is "justified complaint," thus indicating that the buyer is entitled to a replacement or an adjustment. Such

"justified complaints" are naturally referred to the offending manufacturers as they accumulate, or in flagrant cases, the retailer may demand reimbursement altogether or discontinue dealing with that particular producer.

When the label carries a straightforward statement of guarantee by the manufacturer to the buyer that the goods comply with a nationally recognized specification or a commercial standard, such a statement is a part of the sales contract and is enforceable at law.

It may be said that, in general, existing agencies for policing or enforcing the integrity of such guarantee labels are considered to be adequate. After a critical examination of commercial standards and the procedure by which they are established, one can scarcely escape the conclusion that they serve the consumer by: (1) Establishing standard terminology and definitions, (2) improving the understanding between buyer and seller, (3) focusing attention on the real elements of quality, (4) providing an acceptance basis for daily trade, (5) raising value-over-price ratio, (6) providing minimum standards of quality or measurements, (7) providing a basis for justifying complaints or legal action, and (8) increasing consumer satisfaction.

EXTENSION OF RADIO-RESEARCH FACILITIES

National Bureau of Standards to Construct Laboratory to Expand Research Facilities

Under the terms of an act recently passed by Congress, an extension will be made in the National Bureau of Standards' facilities for radio research. The act authorized the Secretary of Commerce to acquire for the bureau a parcel of land not in excess of 200 acres, in the vicinity of the District of Columbia, and to construct thereon buildings and facilities for experimental researches in the propagation and reception of radio signals. The act further authorizes the Secretary of Commerce to construct upon land now owned by the Government in the vicinity of the District of Columbia, buildings and equipment for an experimental radio transmitting station.

This act contemplates the establishment of two field stations, one for radio reception experiments and one for radio transmission. These facilities are required because of the inherently large-scale nature of radio experimentation. The bureau's radio work has been greatly hampered by the lack of a transmitting station at a distance from the bureau, since any transmissions carried on produce destructive interference to the bureau's radio measurement and standardization work.

For a different reason a remote and large area is necessary for reception experiments. In order to study the behavior of radio waves as received, and in the medium through which they are transmitted, it is necessary that delicate measuring instruments be used and that the waves be received in a location free from obstacles which would disturb the incoming waves.

The bureau's radio service to the public, along two principal lines, will be considerably expanded by the new facilities. The first of these is the transmission of standard radio frequencies. Radio is unique in that the primary radio standard can be made simultaneously available to everyone in the country. By sending out signals of standard frequency controlled by the primary standard maintained by the National Bureau of Standards, it is possible, for all who wish, to tune in and make direct use of the standard. An improved transmitter will be located at the new transmitting location, and it is hoped to send out signals of standard frequency continuously. This will be of the utmost value to radio stations of all kinds which can thus readily determine whether they are on the correct frequency. Interference will be minimized by this procedure. In addition, it is possible that broadcast stations may be directly controlled by means of the incoming standard signals. This offers a possibility of synchronizing broadcasting stations so that a number may operate on the same frequency.

The other principal service which can be expanded by means of the new facilities is the study of radio-wave transmission. Low power and temporary equipment which have been used in the past will be replaced by a suitable transmitter and proper receiving and recording apparatus. The suitability of radio waves of various frequencies for transmission over desired distances, the accuracy of radio direction finders, and knowledge of such limitations of radio as fading and "static," depend upon large-scale investigations of radio-wave transmission.

One of the most valuable of the means of studying the behavior of radio waves is the direct measurement of the height of the Kennelly-Heaviside layer by means of radio waves reflected from it. This layer is a region of ionized air from 50 to 100 miles above the earth which determines the carrying power and behavior of all high-frequency radio waves. The determination, as nearly continuous as possible, of the height of the Kennelly-Heaviside layer is expected to furnish the best possible index of the conditions determining radio-wave propagation.

ADMIRAL CRAVEN BECOMES CHIEF COORDINATOR

Rear Admiral Thomas Tingey Craven, U. S. Navy, for several years in command of the United States Yangtze patrol, has been selected for duty as Chief Coordinator to fill the vacancy caused by the death of Rear Admiral Harry H. Rousseau last summer. He will assume his new duties on June 1, 1931.

Admiral Craven who was awarded the distinguished-service medal, for meritorious service performed while acting as aid for aviation with the naval forces in France during the World War, will handle all questions of coordination arising through the application of the policies of the President and the Congress to the routine business activities of the executive branch of the Government.

TESTING DOMESTIC GAS APPLIANCES

Laboratory Test Insures Appliances Operating Under Highest Degree of Safety

By F. R. Wright, *A. G. A. Testing Laboratory*

The establishment of the American Gas Association testing laboratory in 1925 marked the gas industry as one of the first great industries to establish a national testing and research organization dedicated to the improvement of public service. In addition to the altruistic motives back of movements of this kind, enterprises have become confident that material rewards are invariably an accompaniment of work well done for the welfare of mankind. Through the testing and certification of gas appliances under nationally recognized standards of construction and performance, a great benefit has not only been conferred upon the public but these activities have stimulated the use of gas and contributed materially to the rapid growth and development of the gas industry during the past few years.

The laboratory was established to fulfill a recognized need within the industry for basic standards of construction and performance of domestic gas appliances, and the certification of compliance with these standards of all appliances offered for sale to the public. This program of self-discipline was not only felt essential from the standpoint of safety to the public, but for the purpose of maintaining good will, insuring satisfaction of customers in the use of gas, increasing ways and means of utilizing gas safely and economically, and in decreasing the waste in manufacturing processes by stimulating the production of appliances based upon recognized standards embodying the fundamental elements of good design and construction.

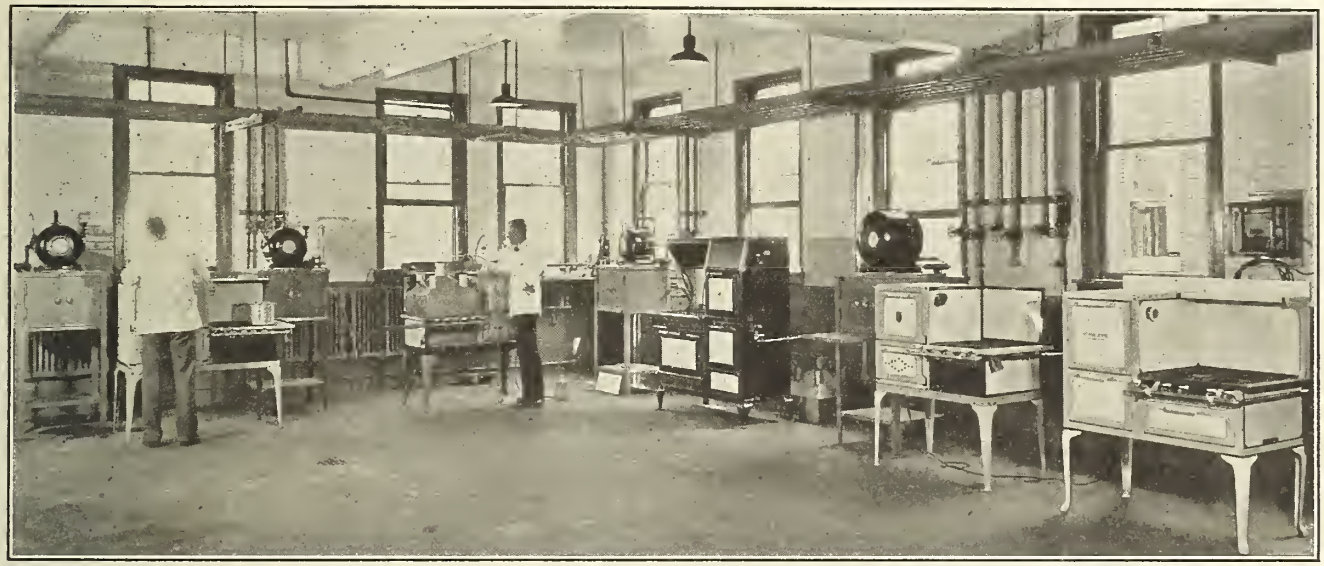
The development and formation of these standards is carried on under the direction and supervision of the A. G. A. approval requirements committee, which is composed of experts in gas utilization representing producers, consumers, and independent agencies, including every interested element in the United States and Canada. Included in the group are representatives of the American Gas Association (which are equally divided between gas company and manufacturer representatives), the Canadian Gas Association, National Bureau of Standards, U. S. Bureau of Mines, U. S. Public Health Service, U. S. Bureau of Home Economics, American Home Economics Association, Master Plumbers' Association, Heating and Piping Contractors' National Association, and the Underwriters' Laboratories. Operating under this committee are 14 approval requirements subcommittees, one for each type of domestic appliance, and composed equally of gas company and manufacturer representatives. All A. G. A. requirements are not only approved by both the subcommittee and the A. G. A. approval requirements committee, but are also submitted to the entire membership of the American Gas Association for criticisms and suggestions before final adoption. The A. G. A. requirements in their completed form, therefore, represent not only the opinions of leading gas engineers but also the recommendations of the entire gas industry.

The A. G. A. approval requirements committee is a sectional committee of the American Standards Association, and the A. G. A. approval requirements have been adopted as American standards for domestic gas-burning appliances. One of the functions of the A. G. A. testing laboratory is to test all appliances submitted for approval under the standards thus adopted.

All manufacturers of gas appliances may submit their appliances to the laboratory for tests whether they are members of the association or not. Compliance with the A. G. A. standards is impartially determined, and if an appliance submitted is found to comply with the requirements in every detail a certificate of approval is issued to the manufacturer, which is good for the balance of the calendar year. The approval of the appliance may be renewed for the next succeeding year by the manufacturer submitting to a factory inspection of his products when in production. The laboratory maintains an inspection system for the purpose of conducting periodical inspections of all appliances produced bearing the laboratory approval seal. At least once each year an inspector visits every manufacturer of approved appliances and makes a thorough inspection of all products listed by the American Gas Association as approved. If an appliance is being manufactured exactly in accordance with the specifications of the one approved by tests, approval of it may be renewed and the manufacturer allowed to affix the approval seal to all such models produced for the next year. The laboratory inspectors go into the factory and inspect actual stock models. Every part of the appliances is thoroughly checked against the laboratory's records of the one tested. If a production model is found to be at variance in any material respect which might affect the safety, durability, or performance of the appliance, the manufacturer is so notified, the appliance is no longer listed in the A. G. A. list of approved appliances, and the manufacturer is not permitted to display the approval seal on it. Such appliances will be relisted when the necessary changes have been made and the corrected models have been inspected at the factory. In selecting approved appliances, the public is therefore assured of obtaining only those models which comply with American standards for safety, durability, and performance in every detail.

The American Gas Association's testing laboratory at Cleveland, is the largest and most completely equipped institution of its kind in the world. Approximately $300,000 was invested by the gas industry in the building, gas holders, and equipment. The most up-to-date and accurate instruments and equipment attainable are used in the testing of applicances. As the A.G.A. approval requirements specify that an appliance shall produce no carbon monoxide when operating at its proper rating, it is necessary to have instruments for analyzing the products of combus-

tion which are not only very sensitive, but which operate with extreme accuracy. On account of the large volume of testing work done, it is also essential that the amount of carbon monoxide in a sample can be determined in a comparatively short period of time. The instrument which combines all of these features and which is yet comparatively simple to operate, is the iodine pentoxide machine. This apparatus was originally developed for the laboratory by the National Bureau of Standards, and with certain modifications incorporated, has been found to work out most satisfactorily. It is accurate to 2 parts in 100,000 and the carbon monoxide content of a sample of flue gas can be determined by it in approximately 20 minutes. Six of these machines are kept in continuous operation at the laboratory in the analysis of combustion products from appliances. Another instrument which is equally accurate, is the carbon monoxide recorder. This machine is used for determining the amount of carbon monoxide produced in a 1,000 cubic foot airtight room, during the operation of a space heater confined therein. Samples of the room atmosphere are continuously drawn through the machine and the amount of carbon monoxide, if any, is automatically recorded on a chart. Dozens of other instruments equally accurate are used in conducting various tests.



Gas Range section of American Gas Association testing laboratory, showing ranges undergoing test

The thorough manner in which appliances are tested may be shown by the fact that 159 separate tests are conducted on a gas range alone. During the construction tests an appliance is completely disassembled and every part checked for compliance with the requirements. Not only is the weight, strength, and construction of the various parts checked, but the assembly of the appliance is carefully noted. The location and method of fastening parts must comply with certain specifications and where such parts may need to be removed for cleaning, or if they may require adjustment they must be capable of easy removal or adjustment. Where any parts show signs of becoming so warped, bent, or broken during the course of the tests as might affect the durability, safe or satisfactory operation of the appliance in service, such supplementary life tests are made as are necessary to determine the facts, and if not satisfactory the appliance is not approved.

Performance tests are conducted on three types of gases, namely, natural gas, of approximately 1,135 B. t. u. per cubic foot and 0.65 specific gravity, coke oven gas, and carburated water gas having heating values of approximately 535 and 400 B. t. u. per cubic foot and specific gravities of 0.38 and 0.70, respecively. These gases represent the extremes in gas service used in the majority of cities in the United States and Canada. The normal test pressures for each of these gases were established at 7.0 inches water column for natural gas and 3.5 inches water column for coke oven and water gases after a survey had been made of gas pressure conditions in various parts of the country. Tests are conducted on each kind of gas at normal pressure with the appliance adjusted at the proper input rating as specified in the requirements or by the manufacturer, as the case may be. Without any change in either the adjustment of gas rate or air shutters, tests are made with the gas pressure increased to 50 per cent above normal and with it reduced to 50 per cent below normal. Compliance with the A. G. A. requirements on all three types of gases and over the comparatively wide range of pressures specified insures a degree of flexibility of performance which makes it possible for the appliance to be used in any section of the United States or Canada.

Included among the numerous performance tests made are tests for completeness of combustion; fire hazard; efficiency; leakage; explosion; burner operating characteristics (which include ignition, flame travel, flash back, noise of operation and extinction); pilot operation; tests of draft hoods, flue loss, performance tests on all accessories, such as thermostats, gas cocks, relief valves, etc., as well as many additional tests applying to the individual types of appliances. During all of the performance tests appliances are not connected to a flue or chimney, but must depend for their satisfactory performance solely on the principles of design incorporated in them. This

makes for a more difficult condition of performance than is normally encountered in service, since appliances are usually flue connected, which tends to improve their operation. However, it is essential that appliances operate safely under their own draft, since chimneys and flues may become blocked or otherwise rendered inoperative. It is assumed, of course, that a draft hood will be provided, with adequate provisions for the escape of the flue gases.

Since the A. G. A. laboratory began its operation in 1925, it has approved approximately 12,700 models of gas ranges, 1,950 space heaters (including radiant heaters, gas-fired steam and hot-water radiators, warm-air radiators, circulators, gas logs, and coal baskets), 975 water heaters, 1,200 gas boilers and furnaces, 5 clothes dryers, 14 incinerators, 11 hot plates and laundry stoves, as well as many types and sizes of flexible gas tubing. It has been estimated that more than 80 per cent of all domestic gas appliances sold in the United States in 1930 bore the laboratory seal of approval. Other types of appliances tested for approval are gas unit heaters and gas-heated ironers. A. G. A. approval requirements are now being prepared for garage heaters, hotel and restaurant ranges, and high pressure gas boilers.

Another important step in the American Gas Association's standardization program is the drafting of requirements for the installation of conversion burners. The requirements are practically completed, and will be released for the use and benefit of the gas industry within the next few months. In view of the large number of conversion burners now being installed, requirements and standards governing their proper installation should be particularly valuable to the industry and should serve in bringing about even greater satisfaction on the part of the customer in the use of gas. These requirements will supplement the A. G. A. requirements for house piping and appliance installation, which have been in effect since 1928, and which have been followed extensively by gas companies, contractors, and plumbers during the past two years. Standards of this nature not only simplify installations, but eliminate a large portion of the difficulties encountered or resulting from haphazard methods of installing piping and appliances.

In addition to its testing activities a large amount of research is carried on at the A. G. A. laboratory. This includes research to improve or strengthen the standards for domestic appliances and research affecting the general problems of utilization and distribution of gas. In order to develop basic information concerning possible variations in mixing gases, an investigation was conducted over a period of two and one-half years during which time over 125,000 separate tests were made using different gas mixtures. Among the major problems now under investigation are the repair and construction of pipe joints, propane-butane research, a study of the characteristics of burning gas with preheated air, and research in the elimination of noise in industrial gas burners.

The success of the A. G. A. laboratory and its value to the gas industry and the public is reflected in (1) the approval of more than 16,000 models of domestic gas appliances, (2) the elimination of the necessity for each manufacturer to maintain a large research laboratory, (3) the decrease of waste in manufacturing due to standard specifications, (4) the elimination of a large portion of the inferior appliances from the market, and (5) the creation of good will for the industry as well as greater safety and satisfaction for the consumer in the use of gas for cooking and heating.

A statement which is typical of the opinion of leading men throughout the industry, was expressed by George B. Cortelyou, president of the Consolidated Gas Co., of New York, in a recent address when he said, "The highest form of service to the public is shown in the operations of the appliance testing laboratory which the association owns and operates in the city of Cleveland. Through its tests, based on nationally recognized requirements, and the certification of compliance therewith, the laboratory has immeasurably improved the safety of domestic gas-burning appliances, and as a result has brought about definite and demonstrable improvements in the service rendered to the public."

INDUSTRIAL RESEARCH LABORATORIES

In the fourth edition of its Directory of Industrial Research Laboratories of the United States, the National Research Council, Washington, D. C., lists more than 1,620 laboratories, which number represents a 60 per cent increase over the 999 listed in the third edition issued in 1927. This directory, which is for sale by the National Research Council, is designated as Bulletin No. 81.

Included in the bulletin are the names and addresses of the organizations maintaining the laboratories, the names of the directors of research, alphabetically arranged, subject classification of laboratory activities, and a geographical index to the locations of the laboratories.

Information is given concerning the research activities in laboratories maintained not only by manufacturing companies, consulting chemists and engineers, but also by trade associations, including the following:

American Gas Association.
American Institute of Baking.
Asphalt Institute.
Associated Factory Mutual Fire Insurance Companies.
California Fruit Growers Exchange.
Dairymen's League Cooperative Association (Inc.).
Glass Container Association of America.
Institute of American Meat Packers.
Institute of Food and Drug Research.
Institute of Paint and Varnish Research.
Laundryowners National Association.
National Association of Dyers and Cleaners.
National Board of Fire Underwriters.
National Canners Association.
National Crushed Stone Association.
National Sand and Gravel Association.
Paperboard Industries Association.
Portland Cement Association.
Utah Coal Producers Association.

The above-noted directory of industrial research laboratories supplements effectively the Directory of Commercial Testing and College Research Laboratories issued as Miscellaneous Publication No. 90 of the National Bureau of Standards.

CONSUMERS' DESIRE FOR INFORMATIVE LABELING

Plan Promotes Intelligent Buying by Aiding Selection

By Alice L. Edwards, *American Home Economics Association*

The thoughtful consumer is interested in standardization because he or she realizes that it promises a solution for some of the difficulties encountered when trying to select commodities for personal use or for use in the household. He or she recognizes the convenience which may be afforded through standardization, which offers such advantages as interchangeability of parts, easier replacement of utensils, and standardizing of electric current.

Where the right kind of standardization is developed, durability is often increased through the improved quality of material used and through the adoption of better methods of construction. Furthermore, consideration is often given to improvements which make the article better adapted to the use to which it is to be put; this is especially noticeable when consumers are represented on standardizing committees. Although the first cost may be higher, economy may be effected through the greater durability of an article which meets a given standard. In addition, there may be a saving to the user in time and labor required in the operation of a piece of equipment.

Too often the consumer has great difficulty in securing pertinent information about the goods for sale on the retail counter. There are various fundamental causes for this, and, perhaps, one of the most important is that for many articles no one, not even the manufacturer of the commodity, has determined significant facts about performance, the cost of operation under standard conditions, cost of upkeep, and durability. Facts of this nature are frequently determined in the process of developing desirable standardization of a given commodity.

If such facts are to be most useful, they should be made available to the would-be purchaser. Under present retail merchandising practices, very little of the information possessed by the manufacturer, buyer, and retailer about a given commodity is passed on to the consumer because no dependable means is provided by which he or she can readily secure it. As we all know, few clerks in a retail store can answer more than the most superficial questions about the goods they sell. Hence, some plan should be devised by which reliable, significant facts about a commodity may be readily secured by the over-the-counter buyer. We believe that in most cases informative labels will be a necessary part of any workable program which seeks to provide the consumer with the facts he needs.

As an example of the type of informative labeling for which home economists are asking, let me cite the project for the development of standards and specifications for household refrigerators now in progress under the procedure of the American Standards Association. Representatives of the American Home Economics Association and certain other groups serving on this refrigerator committee are trying to work out a plan for the placing of name plates on refrigerators, which will carry the name of the manufacturer and also supply pertinent facts, such as the following: (1) The number of cubic feet of usable storage space, (2) the number of square feet of shelf area, (3) the temperature maintained under standard test conditions in the milk compartment and the food compartment, and (4) the amount of ice, electricity, or gas required to maintain this temperature over a 24-hour period.

To some it seems quite astonishing that manufacturers should be asked to supply this sort of information, but the truth of the matter is that in this instance representatives of the American Home Economics Association are only asking for two pieces of information which the purchaser can not, with a little effort, secure personally. The most significant of these is information as to the temperature maintained under standard test conditions. And is it not justifiable and reasonable that the consumer should ask for and be given the facts relative to such a vital matter?

The object in buying a refrigerator is to secure refrigeration for the preservation of food. We do not as a rule buy refrigerators for shelf space. As for the other information requested, which the consumer can not secure personally, is it any more unreasonable that one should wish to know the cost of the operation of the refrigerator? Can we credit the consumer with reasonable intelligence if he or she does not ask for and expect this type of information? And can anyone honestly justify, as a sound and ethical merchandising procedure, the denying of such information to a would-be purchaser?

The sort of information which is being requested on the name plates of refrigerators illustrates points which the writer believes should be given more consideration in many standardization programs. It is not asked that the label state that the refrigerator belongs to a special class or grade A, B, or C, but that it give a very few significant facts about the particular refrigerator on which it is placed. It is requested that the name plate on each refrigerator state the temperature maintained and ice, electricity, or gas consumed by the particular size and style to which it is attached. Hence, the customer, knowing the price of the refrigerator and his or her own needs, can choose from those available the one best suited to his particular situation.

It should be noted that with the facts relative to performance thus provided, the manufacturer would not be discouraged in producing a refrigerator superior in quality to a required minimum standard, for he would be permitted to reap the benefits accruing from improving his product, because the facts as to its performance would be given on the name plate.

It sometimes seems quite inaccurate to speak of consumer buying habits, when we consider the fickle, erratic way in which many women make their purchases. We believe one of the most significant factors contributing to this situation is the customer's inability to secure accurate information about the

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things she buys and her consequent inability to replace satisfactory articles or to choose something more suitable to take the place of a commodity which has proven unsatisfactory. We often find that a woman's dissatisfaction expresses itself in that she does not become a " repeater " as regards either the commodity she buys, or the store at which she makes her purchase.

Members of the American Home Economics Association, who have given most attention and thought to the problems of the household purchaser and the effects of the household purchaser's buying procedure, are convinced that more information is needed, not alone by consumers but also by manufacturers and retailers. They believe that a satisfactory adjustment of many of the present vexing merchandising problems can not be made until representatives of these three groups work together on standardization and similar projects in the development of suitable standards, specifications, and tests for consumers' goods, and in devising ways by which significant information in intelligible form may be made available, probably by the manufacturers, to those concerned. Otherwise, unnecessary economic loss, commodities less well adapted to consumer needs, and dissatisfaction on the part of each group in this manufacturer-retailer-consumer triangle are inevitable.

MANUFACTURE OF TUNGSTEN LAMPS IMPROVED

New Standards of America and England More in Line with Industry's Progress in Manufacture of Bulbs

The past several years have seen great progress in the art of manufacture of tungsten-filament electric lamps. Present manufacturing processes make for an improved product without reducing the minimum average life of the bulb.

To keep our Federal specifications for this item in step with modern progress, the electrical supplies committee of the Federal Specifications Board has just completed, with the cooperation of the manufacturers of incandescent lamps, the 1932 supplements to the specifications for large tungsten-filament lamps and miniature tungsten-filament lamps. New supplements to the lamps specifications are issued each year, and made effective July 1, when Government contracts go into effect for the succeeding fiscal year.

These annual supplements give tables of initial rating tolerances as to total watts above and below the standard rating, and as to initial lumens per watt above and below the standard. The large lamp supplement gives schedules of lamps for regular lighting service ranging from 10 to 1,000 watts inclusive, showing rated initial lumens, mean lumens in per cent of average initial lumens, rated initial lumens per watt, over all and light center lengths, bulb sizes and hours life.

It is interesting to compare some of the tolerances in the Federal specifications for lamps with the tolerances given in the British standard specification for tungsten-filament electric lamps recently announced by the British Engineering Standards Association. The Federal specification sets a 5 per cent tolerance, plus or minus in total watts for lamp of 25 watts to 1,000 watts. The British standard allows 15 per cent plus or minus for the 25-watt lamps, 12.5 per cent for 40 and 60 watt lamps, and 10 per cent for 75 to 1,000 watt lamps. The Federal specification gives a tolerance of 7 per cent plus or minus in lumens per watt, the British standard 10 per cent plus or minus, for all ratings from 15 to 1,000 watts.

British gas-filled lamps, up to and including the 100-watt rating are now standard only with internally frosted bulbs, the light absorption being so small that the figures for the light output remain nearly the same, whether the bulbs are internally frosted or clear. It is anticipated that the standardization of the inside-frosted lamp will minimize the use of clear-bulb lamps in positions in which the glare of the naked filament is harmful. Inside-frosted lamps in all ratings from 15 to 100 watts have been standard in the United States for several years.

The schedules in the English standard have been simplified and improved. The normal lighting lamps, whether vacuum or gas-filled, appear in one schedule. In addition, the standard provides that the maintenance of light throughout the life of the bulb shall be better than formerly. For example, the revised English standard provides that the average light output, throughout the life of the 40-watt lamp, shall be at least 90 per cent, as against 85 per cent in the old standard. The conditions of testing have likewise been simplified and alternative methods of life testing are recommended.

English lamp standards are in almost universal use in Great Britain, and have been adopted as standard in many other countries.

MOPSTICKS

The program of the industry designed to maintain a high standard of quality for mopsticks, having been well received by the distributors and organized users, as well as the manufacturers, is released by the National Bureau of Standards in printed form entitled "Mopsticks, Commercial Standard CS2–30."

The standard covers two well-known types, namely, the spring lever and the janitor's screw type. In the former type two sizes are described, known as the domestic size and janitor's size. The various items considered in the commercial standard include the dimensions for handles, head, spring, lever, bale, etc., and the various acceptable materials from which these parts can be made, together with the nature of the plating to be used.

Copies of this commercial standard are procurable from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 5 cents per copy.

WHAT IS A 50-POUND WEIGHT?

Brief History of Fundamental Standard of Mass

By Ralph W. Smith, *National Bureau of Standards*

What is a 50-pound weight?

If this question were to be propounded to the average citizen, his reply would probably be, "Why, naturally, a 50-pound weight is a weight which weighs 50 pounds." But such an answer gives no information as to what a "weight" is, as to just what is meant when one says that something "weighs" so much or as to what a "pound" really is. The material which follows is presented with the thought of supplying a satisfying answer to the original query.

It is first necessary to consider "mass." The "mass" of a given body is the quantity of matter comprising it, and so long as no portion of this body is removed and nothing is added to it, its mass remains constant. Now in the case of two masses, these attract one another with a force which is directly proportional to the product of their masses, and inversely proportional to the square of the distance between their centers of mass. The whole earth may be considered as one mass which will attract a body, or mass, at or above its surface; and the force of this attraction varies, in accordance with the general law just stated, directly as the mass of the small body and inversely as the square of the distance of its center of mass from the center of the earth. Due, however, to the rotation of the earth, a body moving with the earth is also acted upon by a centrifugal force which, in general, is greatest at the earth's equator and diminishes toward the poles. The resultant of these two forces—the attraction between the body and the earth, and the centrifugal force due to the earth's rotation—is known as the force of gravity.

Determination of the intensity of the force of gravity, made at different points on the earth's surface, shows that at some points there are unexplained variations from the anticipated values; it is also found that the conformation of the surrounding terrane has an observable effect. In general, however, considering elevation alone, and positions on or above the surface of the earth, the force of gravity exerted upon a body is found to be very nearly inversely proportional to the square of the body's distance from the center of the earth; considering latitude alone, the force of gravity is found, in general, to be uniform for a given latitude, and to increase slightly and with approximate uniformity as the poles are approached.

From the foregoing it follows that if we can measure this force of gravity upon a given body, and if we can eliminate or correct for the effects of comparative elevation and of the other factors noted, we have at once a basis for comparing the mass of the body in question with the mass of any other body upon which we can similarly measure the force exerted by gravity. If we now express this measured force in terms of some acceptable unit, we are enabled clearly to define the mass of the body, or the amount of material of which it is composed.

The expression "weight" is used to mean a measure of the force of gravity exerted upon any body. This force or weight is measured by counterbalancing it with a similar force acting upon a body, or bodies, of known mass or with some counterforce of known value; when equilibrium is established, the two forces are equal, and the value of the previously unknown mass is thus directly or indirectly ascertained. The bodies of known mass are called "weights." The "counterforce of known value" may be supplied by a spring, a hydrostatic assembly, a "pendulum" scale assembly, or otherwise, usually acting through a system of levers; in this case, the known value of the counterforce has been determined by resorting to weights. In other words, what we commonly call a "standard weight" is really a standard mass of metal or other material by comparison with which the masses of other bodies may be determined through measurement of their respective weights.

In commercial transactions involving quantity determinations, the important consideration is to determine the mass or the amount of commodity; since these determination are made, however, in terms of weight, as just defined, the expression "weight" is loosely used to represent the amount of commodity. Thus "100 pounds of steel" really means a mass of steel such that the force of gravity exerted upon it is 100 times greater than the force of gravity which is or would be exerted, under the same condition, upon a standard mass known as the "pound."

However, since the units of mass and weight are identically named, and since no practical purpose would be served in commercial transactions if the two were to be distinguished, the distinction between them may be considered of scientific interest and importance only, and the commercial usage in which the expression "weight" is used in the sense of "mass" need not be condemned.

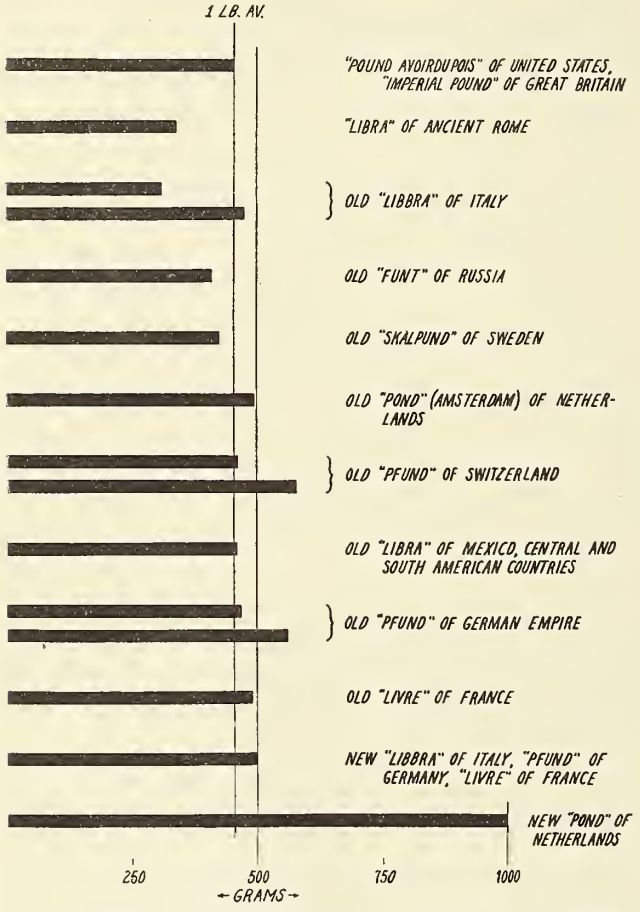
In reference to the gravitational force acting on a body, it has been said that this is a function of the distance of the center of mass of the body from the center of the earth. The magnitude of the effect of a change of elevation upon the gravitational force exerted upon a given body is of the order of 1 part in 2,000 for a change of elevation of 6,000 feet, the "weight" being less the greater the elevation.

But if we have weights which are standard according to some accepted basis, and use these on an "equal-arm" balance to determine the "weight" of an unknown amount of commodity, the accuracy of the result, upon the accepted basis, will be independent of the elevation at which the determination is made, and check determinations made at different elevations should agree because the change in the intensity of the gravitational force affects equally the standard weights and the commodity being weighed. The same would be true in the case of a weighing mechanism employing a compound-lever system.

In any case, however, where a spring is utilized as the ultimate counterforce, disregarding other effects, different results would be obtained at different elevations, provided that the weighing mechanism were susceptible of indicating the differences actually ex-

isting. In the case of such a device, if the assembly is sufficiently sensitive to respond to weight differences resulting from a change of elevation, and if such differences of indication may be read upon the device in question, it should be calibrated against standard weights at the elevation at which it is to be used, thus making its indications standard for that elevation. In the case of ordinary commercial devices, however, it is probable that these differences can never be observed, and in any event they are of such small magnitude relative to the graduations on the commercial device, that they may be entirely disregarded.

Let us now proceed to a consideration of " what is a pound "? If we refer to the dictionary we find



A comparison of various ancient and modern " pounds "

" pound " defined as " a unit of weight varying in value from about 300 to about 1,070 grams, and commonly divided into 12 or 16 ounces." From this definition it would appear that the pound is not a very definite unit of weight. The dictionary further tells us, however, that the avoirdupois pound of 7,000 grains is used in this country in the weighing of most commodities, but that the troy pound of 5,760 grains is used in certain restricted fields of weighing. If we pursue our researches further afield and endeavor to trace the history and determine the origin of the units which we know as pounds, we can go back, step by step, until we finally reach a point where recorded history ceases and beyond which we can not proceed for lack of authentic data. (See graph.)

As to the pounds of the United States we know, of course, that these came to us from England. As to the history of the English standards, I quote the following from " Men and Measures," by Edward Nicholson, an English author:

> Our pound [the Imperial Pound of Great Britain settled at its present Imperial standard in the time of Queen Elizabeth, was then found to have risen slightly since the time of Edward III. It was found to have increased by about 8 grains. The ounce, now=437½ grains, had been 437 grains, the same weight as the ounce of the Egypto-Roman pound, the Roman libra. There is every reason to believe that this Roman standard passed to Britain, and that the libra, raised to 16 ounces, became the commercial pound, afterwards known as averdepois, and now the Imperial pound.
>
> When the Romans took the Alexandrian talent as the standard of their new libra system, they divided it into 125 librae, which were 1,500 ounces or double-shekels, each ounce=437 grains. * * * It is not improbable that the survival of the Roman commercial pound in Saxon England was strengthened by commercial and scientific relations with the Moors of Spain. * * * However this may have been, there seems no doubt that the Roman pound, raised to 16 ounces, was the standard of England before as after the Norman conquest, and there is no evidence of it having ever been in abeyance. * * *

The same author gives a table of Roman weights reading in part as follows: Libra, 5,244 grains; uncia, 437 grains; drachma, 1/8 uncia or 54.6 grains; scrupulus, 1/3 drachma or 18.2 grains.

Here will be recognized certain terms and relations familiar to use in our present apothecaries' table. According to Mr. Nicholson, the Roman ounce of 437 grains was in England taken 16 times to make the commercial pound of 6,992 grains, and to this pound 8 grains were subsequently added to give an even figure of 7,000 grains for the pound.

Considering the origin of the Roman pound we find that this, in common with other ancient standards of weight, was derived from a standard of linear measure. The principal ancient linear unit was the cubit. There were a number of these, the most important being the Egyptian common cubit of 18.24 inches, its foot being two-thirds of this or 12.16 inches; Egyptian Royal cubit of 20.64 inches, its foot being two-thirds of this or 13.76 inches; Great Assyrian cubit of 25.26 inches, its foot being one-half of this or 12.63 inches; Beladi cubit of 21.888 inches, its foot being one-half of this or 10.944 inches; Black cubit of 21.28 inches, its foot being two-thirds of this or 14.186 inches.

Speaking of these cubits, Mr. Nicholson says:

> The history of the five cubits, ancient and medieval, has shown that they were all derived, directly or indirectly, from the Meridian measurement of the earth, some of them being probably instituted with the desire to make them representative of the relation of latitude and longitude. I venture to say that every measure and weight used throughout the world has been developed from one of these cubits * * *.

The principal ancient unit of weight appears to have been the talent which in any given locality represented the weight of the local cubic foot of water. The talents were of varying values, depending upon the cubit from which they were derived; also the subdivisions of the talent differed in different countries. Many of the terms which we associate with ancient monetary units were in reality primarily subdivisions of the talent as a weight unit.

We might pursue this line of investigation almost indefinitely, tracing the relationships between the various weight units of ancient times and their connections with units of the present day, but I think enough has been said to demonstrate that there is a direct

connection between our present-day standards and those of very ancient times, both as to values and names.

This mention of similarity of names for corresponding weight units suggests a brief excursion into the field of modern nomenclature. Mention has already been made of the Roman libra, a word which seems to be responsible for our present abbreviation of "lb." for pound. The Roman uncia, the Greek drachma, and the Roman scrupulus have already been mentioned as the derivations of the modern ounce, dram, and scruple. We find that in modern times the funt of Russia, the libbra of Italy, the libra of Spain, Portugal, and various South and Central American countries, the livre of France and Greece, the pfund of Germany, the pond of Java and the Netherlands, and the pund of Denmark and Sweden, correspond to the avoirdupois pound, as we know it, although the exact equivalents in terms of our pound vary from about three-fourths to more than 2 pounds.

The development of the word "Avoirdupois" is also interesting. We find this word variously spelled in old English documents as "Haberty poie," "Haberdepase," "Avoirdepois," etc., "Aver" is said to be an old established English word meaning "goods" and the combination in question is said to mean "goods of weight" or "heavy goods." Some of the old statutes refer to this pound as the one to be used for the weighing of corn, heavy goods, meat, and fish, a distinction apparently being drawn between such commodities and more expensive commodities, such as spices, precious metals, precious stones, etc., which were weighed in small amounts. By the avoirdupois pound, then, is meant the pound for heavy goods as distinguished from the troy pound used by the gold and silver smiths and in connection with the coinage. "Avoir" in modern French also has the meaning of wares or merchandise, so we can arrive at the same meaning for "avoirdupois" by considering the word as of French origin.

And now let us consider some facts about our own United States pound. For a complete discussion of our standards reference should be made to the paper of Louis A. Fischer on the History of the Standard Weights and Measures of the United States, published as Bureau of Standards Miscellaneous Publication No. 64. For our present purposes it will be sufficient only to sketch briefly the points which Mr. Fischer discussed in detail.

Colonial weights were of English origin, and corresponded to those in use in England prior to the formation of the colonies. There was considerable divergency, however, among the weights of the several colonies, and this persisted after the formation of the Union. Repeated efforts were made to have Congress correct this condition, but without success. Finally, in 1828, Congress decreed that a certain troy pound which had been procured in England, and which was supposed to be an exact copy of the Imperial troy pound of Great Britain, should thereafter be the standard for the coinage of the United States.

Two years later Congress ordered that a comparison be made by the Treasury Department of the weights at the principal customhouses. Large individual discrepancies were found, but the average values for the different denominations were found in fairly good agreement with the weights used in England at the time of the revolution. In order to construct uniform weights to be furnished the customhouses, the Treasury Department found it necessary to adopt a definite standard; it was decided that the relation between the avoirdupois pound and the troy pound of the mint should be as 7,000 is to 5,760, this being the relation previously accepted in the United States and in England.

Uniform standards having been furnished to the customhouses, Congress in 1836 directed that copies of these be furnished the several States, and as additional States were admitted to the Union they were also supplied with standards; North Dakota, in 1893, was the last State to receive one of these sets.

In the year 1870 there was held in Paris a conference to which various nations had been invited by the French Government to send their representatives, to consider the advisability of constructing new standards of the metric system. This and subsequent conferences were attended by representatives of the United States, and these meetings resulted in the decision to construct new metric standards, and in the signing of a treaty providing for the formation and maintenance of an International Bureau of Weights and Measures. This international institution is supported by the various countries signatory to the treaty, and is controlled by an elected committee upon which the United States has always been represented. Dr. S. W. Stratton, former Director of the National Bureau of Standards, and later president of Massachusetts Institute of Technology, is the present representative of the United States on this committee.

New metric standards having been constructed by a special committee appointed for that purpose, these were compared with the old metric standards by the international bureau, and at a general conference held in 1889 the new kilogram which agreed most closely with the kilogram of the archives was declared to be the international kilogram; the other kilograms were distributed by lot to the various governments supporting the international bureau, the United States receiving kilograms Nos. 4 and 20.

These were brought to this country in 1890, kilogram No. 20 arriving in January and kilogram No. 4 arriving in July. Kilogram No. 20 was accepted by President Harrison upon its arrival as the national standard, and both standards were deposited in the Office of Weights and Measures, of the Coast and Geodetic Survey. On April 5, 1893, the Superintendent of Weights and Measures, with the approval of the Secretary of the Treasury, decided that the international kilogram would in the future be regarded as the fundamental standard of mass in the United States, both for metric and customary weights.

The Office of Weights and Measures used as the relation between the avoirdupois pound and the kilogram the equivalent, 1 pound avoirdupois equals 0.4535924277 kilogram, a value determined by the joint work of the International Bureau of Weights and Measures and the British Standards Office. When the National Bureau of Standards was established in July, 1901, the decision of the Office of Weights and Measures to recognize the international kilogram as our fundamental standard of mass, and the equivalent just given as the relation between the avoirdupois

pound and the kilogram, were fully accepted by the bureau and are so accepted to-day.

Earlier in this article it was indicated that when we speak of a "standard" weight we mean a weight which is standard according to some accepted basis. The following statement represents the practice accepted in the United States as that upon which weights of classes A, B, and C are to be considered standard: The calibration is based upon the apparent mass as determined at 20° C. in air having a density of 1.2 milligram per milliliter, against standards having a density of 8.4 grams per cubic centimeter at 0° C., whose coefficient of cubic expansion is 0.000054 per ° C., and whose values are based on their true mass or weight in vacuo.

The scope of this article is not broad enough to permit of a discussion of each of the factors just mentioned. Those desiring to go somewhat into detail on these matters will find them discussed in Circular No. 3 of the National Bureau of Standards, Design and Test of Standards of Mass.

To sum up, then, the situation in relation to the United States avoirdupois pound is this: The pound is defined in terms of the kilogram, the relation being, 1 pound avoirdupois equals 0.4535924277 kilogram. The international kilogram, preserved at the International Bureau of Weights and Measures, Sevres, France, is our fundamental standard of mass; our national primary standard is the kilogram preserved at the National Bureau of Standards, the value of this in terms of the international standard being known with the highest accuracy attainable by the modern metrologist.

The United States primary kilogram is used upon rare occasions to verify the accuracy of the reference standards of the mass laboratory of the National Bureau of Standards, which, in turn, are utilized to check the accuracy of the laboratory's working standards. These latter standards are of various denominations, suitable for the comparison of weights submitted to the bureau for test.

The examinations are made at the bureau of the primary standards of weight of a State, the errors of those standards are determined and reported to the State in a certificate returned with the weights, so that the State may have in its possession authentic standards of known values with which to control its own testing activities. The State primary standards are then used by the State to prove its secondary or office working standards, the latter are used in testing the field or inspectors' working standards, and the field standards are carried to the commercial establishments using weights or weighing equipment, there to be used in the final step of the long series of comparisons beginning with the international kilogram and ending at the merchant's counter.

So now for a fairly concise answer to the original question of, "What is a 50-pound weight?", something along the following lines is suggested: A 50-pound weight is an object, usually of metal, having such a mass that, when compared in air under specified conditions, the gravitational force acting upon it is just 50 times as great—within appropriate tolerances, of course—as the gravitational force acting upon a standard mass of specified characteristics known as the "pound," which is equal to 0.4535924277 kilogram.

LABELING SUBSTANDARD CANNED GOODS

Use of Labels to Become Mandatory May 17, 1931

Beginning May 17, 1931, all canned peaches, pears, and peas falling below the standards of quality prescribed by the U. S. Department of Agriculture, will be required to bear a designated label reading "Below U. S. Standard Low Quality, But Not Illegal," according to the Department of Agriculture. The label will be displayed prominently on the container in immediate conjunction with the name of the article, and will inform the buyer that the canned food, while substandard, is nevertheless, wholesome and edible even though not so palatable or attractive as a standard product.

Congress decreed July 8, 1930, that the Secretary of Agriculture should establish definite standards for canned food products, excluding only meat and meat products subject to the meat inspection act, and canned milk, and to promulgate a form of label designation for substandard canned foods falling within the jurisdiction of the act.

From the standpoint of the household buyer, the new system of labeling substandard qualities of canned foods, should be advantageous in that she will be able to buy with a much more definite knowledge of the quality of the item in question, than has heretofore been possible. If desired, she can select goods of substandard quality at a reduced price, with a full knowledge of their character, but with assurance that they are pure and wholesome and have satisfactory food value. If, on the other hand, she wishes a more expensive article, she is assured, through the label, against the unwitting purchase of a substandard article.

AMERICAN MANAGEMENT ASSOCIATION MEMBERS VISIT THE NATIONAL BUREAU OF STANDARDS

A delegation composed of 50 members of the Industrial Marketing Group of the American Management Association, attended a conference at the National Bureau of Standards on Thursday, March 19, 1931. The meeting was addressed by the director of the bureau and by representatives of four divisions of the bureau.

The work of each division was outlined in a 5-minute talk, and the delegates were invited to hold individual conferences with the chiefs of those divisions in the work of which the sales executive was particularly interested. Before adjournment a few of the research and testing laboratories were visited.

The following day the delegates were given a similar résumé of the major economic functions of the Department of Commerce's Bureau of Foreign and Domestic Commerce.

These condensed presentations of the more important phases of the work of the two bureaus aroused considerable interest, and led to a number of meetings by smaller groups to discuss various points in greater detail.

NEW HOUSING STANDARDS PROMOTE CHILD WELFARE

Carefully Equipped Houses Will Insure Better Health and Welfare of Children

By A. E. Robinson, *National Bureau of Standards*

The health and welfare of children are essential factors to be considered in house planning, according to the report of the subcommittee on housing to the White House Conference on Child Health and Protection. Child health is promoted by privacy and quiet for undisturbed sleep, relative cleanliness of premises, proper removal of household wastes, an abundant supply of clean water, protection from excessive heat and cold, protection from escaping coal gas and leaking gas fixtures, adequate provision for the refrigeration of food and the preparation of meals, and for lighting arrangements that will not cause eye strain—in short, thoroughgoing provision for sanitation, safety, and cleanliness.

Housing conditions involve the design, planning, construction, and maintenance of homes, premises, and neighborhood. Housing standards, as recommended by the subcommittee, were planned with especial regard for such provisions as maximum fire safety, durable and damp proof construction, convenience of arrangement, avoidance of traffic dangers, and protected play ground space for children.

The standards recommended appeared to the committee to represent desirable and reasonable objectives, which may wisely be considered by all groups interested in housing and child welfare and toward which they may direct their efforts. They may also serve as a check list of the housing needs of children, which parents may wisely take into consideration with reference to their applicability to their own domestic needs in buying or building a home. Although the committee realized, in submitting recommendations, that the cost of plans designed to carry out desired changes would severely tax the resources of the majority of people at the present time, it considered that approved standards might well be a goal toward which to work.

Housing Standards.

The housing standards recommended involved numerous features for neighborhood, lot, house exterior, and interior, and fundamental equipment. Among the principal points considered were the following:

The neighborhood should be primarily residential; it should preferably be within relatively easy access of churches, schools, civic, cultural, and shopping centers; protected by zoning laws and free from smoke, dust, odors, fumes, noise, and heavy traffic. Charm and distinctiveness may be provided by landscaping, by trees, grass strips, hedges, and small parks. The children find pleasure in a yard or neighborhood playground. Safety and health are more nearly assured if residences are not unduly near railroads, aviation landing fields, public garages, stables, dumps, marshes, or obnoxious industries. Land that is frequently flooded or so low that it is damp or subject to difficulties in sewage disposal is unfit for residential buildings.

The house lot is more satisfactory if it is wide enough so that each room may have sufficient light from open spaces on its own lot without depending on its neighbors; if it has suitable space for play, the drying of clothes and disposal of refuse; and it is more attractive if it is provided wth shrubbery, trees, and vines. Private garages or outbuildings should be easy of access, fire safe, well lighted, and so placed as not to interfere with the lighting or outlook of neighboring residences.

Exterior Requirements.

The house that is most healthful is so designed and placed upon the lot as to provide for adequate sunning and natural lighting of all rooms. Each room ought to have direct sunshine at some time of day throughout the year. Covered porches should not be so placed as to reduce unduly the natural lighting of rooms. It is well to avoid ugliness, excessive ornamentation, and unpleasant color combinations in the exterior of the house. The finest effects are ordinarily secured through simplicity in the architecture.

The best building practice in house construction demands sound and durable materials and equipment. Some of the more important building requirements are the following: Fire resistive roof coverings; proper fire stopping in walls and partitions; adequate protection around sills and pipe coverings, chimneys, and lighting or heating equipment; and dry interior foundation walls and basement floors. The house construction should utilize the best methods of framing, bracing, and anchorage to assure rigidity and avoid undue settling. The use of insulating materials and weather stripping assists in the maintenance of even temperatures and house comfort regardless of outside weather conditions. It is well to keep the appearance of dwellings always attractive and to keep all parts of the house equipment in good repair.

Interior Requirements.

The room arrangement in the house plan should be such as to make it possible to avoid lost motion, to save unnecessary steps, and facilitate housework. Relatively easy access from room to room is necessary, but it should also be possible to close each room off from the others when desired. Every room requires adequate natural ventilation. It is desirable in some climates to condition the air for proper temperature and humidity.

Each room should have a window area of at least 15 square feet. Windows should be so constructed that they will be weathertight and easily opened in order to afford good ventilation and facilitate cleaning. Large rooms should have greater corresponding widow area in proportion to their size. Cross ventilation is also desirable.

Rooms that are best designed allow ample space for the principal and appropriate pieces of furniture to be so placed that they will not be in the way of doors, windows, or closets, radiators, and a fireplace, if it is included in the plan. Comfortable rooms are generous in dimensions; sufficiently large

to accommodate the furniture, allow good ventilation, and give one a sense of space. The down stairs common rooms might be advantageously designed to open into one another, but it should also be possible to close off each room for privacy.

It is well to separate the sleeping quarters from the living quarters in order to insure privacy. Generally a sleeping room for each member of the family is worth consideration. At least one bathroom should be reached from a private hall.

A cheerful, light kitchen is most desirable, it ought to be easily entered from the dining room, and so located that odors and noise will not penetrate to the rest of the house. It should preferably be compact and rectangular in shape. In cold climates a direct entrance from out of doors to a living room or kitchen causes unnecessary drafts. The entrance should be protected.

A nursery, if it is provided, must be light and cheerful; situated near a lavatory and near the mother's work center; and it might well be so arranged as to be eventually convertible to other uses. It is well to provide some space as a play room for children, and other space as a work shop for older members of the family.

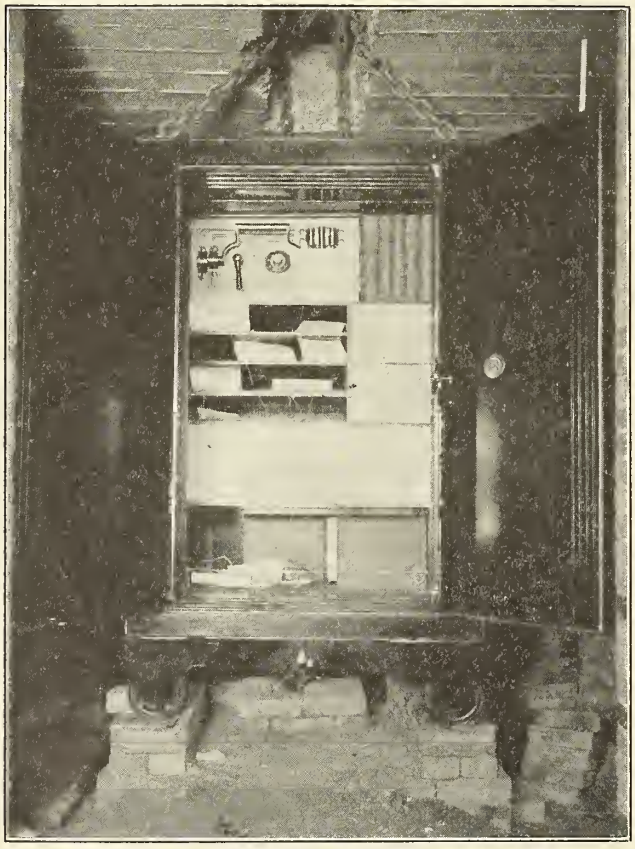
Stairs that have a steep incline are dangerous, and triangular turns are unsafe. Landings should be broad. Handrails or balustrades are necessary safety provisions on all stairs, and where there are children, gates are desirable. Light is essential for all stairways.

Ample closet space is a comfort and convenience to each member of the family, and other storage space, reasonably accessible, free from dampness, and properly lighted, should be provided for household possessions.

Fundamental Equipment.

Water supply should be adequate in amount, clean, and free from pollution. It is advisable to have water piped into the house, and, if necessary, provision should be made for adequate protected storage. Modern sanitary plumbing fixtures, noiseless, vented, easily flushed and cleaned, chould be provided. Ample electric lighting equipment is conducive to safety and convenience in the home. Heating equipment that holds an even temperature and proper humidity is an essential provision for the maintenance of child health.

TRIAL BY FIRE AND HEAVY IMPACT FOR STEEL SAFES



To determine their fire-resisting qualities, steel safes have been severely tested in laboratory examinations by the National Bureau of Standards. The locked safe and contents are subjected to heat at a temperature of 1,700° F. within a brick furnace for one hour. The safe is then taken out and given the impact test, consisting of a sheer drop of 30 feet. Replaced upside down in the furnace, the safe undergoes the trial by fire. The photographs show a safe, opened to exhibit the contents, in place in the furnace, preparatory to the heat test, and the same safe after undergoing the complete ordeal.

ARTIFICIAL COLORING OF FOOD

Constant Supervision Exercised by Government to Avoid Impure Food Dyes

By Horace Terhune Herrick[1]

Do you know that when you reject an article at the grocery or butcher shop "because it doesn't look right," you are obeying one of the oldest instincts of the human race? You are influenced by the color of your food. True, an apple may be wormy or a piece of meat may have faults other than that of color, but almost invariably the housewife will reject an edible, be it canned goods, meat, or garden truck, if the color of the material is not what her experience or instinct—call it what you will—has led her to expect.

A deep-seated psychological impulse lies behind all this. When man sought his own food in field and forest, he was guided to his choice by the effect of color on the sense of sight and confirmed the results of his search by touch, smell, and taste. Later on, when crude cooking facilities intervened between hand and mouth, the consumer was still able to account for every step in the process and was not hampered in his enjoyment of his meal by thoughts of "damage or inferiority," whatever the change in appearance might be.

We live in a more complicated age. Our food must pass through many hands and be subjected to many changes before it reaches our table, and it is no longer possible in every case to touch or taste the article which later appears in the home. Ever since the food industry has existed, manufacturers have recognized the importance of appearance, and from the beginning have sought to replace the color lost in the processing of those materials which were to be presented to the consumer in other than their original form. At first manufacturers were not hampered by considerations of toxicity, and used sulphide of mercury or chromate of lead interchangeably with harmless colors, the only criterion being a brilliancy of hue in the final product. Vegetable dyes were in many cases too dull in shade or, in common with the natural tints of the food, did not withstand the rigors of an industrial preparation.

And then, about the middle of the last century, came the coal-tar dyes. Possessing a range of shade and brilliancy of color far beyond anything found in either the vegetable or mineral kingdom, they leaped into instant popularity with the manufacturers of foods, and were used neither wisely nor well. It should be distinctly understood that coal-tar colors, as a class, possess all the characteristics of the individuals making up that class. Some dyes are exceedingly poisonous, while others are as harmless as table salt, so that it is impossible to deal with them as a group when considering their use in foods. Each color should be thoroughly tested and its toxicity determinated; then, and then only, should it be approved for use in foods.

In spite of the foregoing, a prejudice against coal-tar colors still exists, a prejudice which is as widespread and unreasonable as the belief that all vegetable colors are suitable for use in foods. All dyes, vegetable or coal-tar, vary as individuals and not as classes, and also according to their purity; so that it is a delusion to think that vegetable colors are to be preferred to those from coal-tar merely because of the plant origin of the former.

There is nothing essentially harmful in adding artificial coloring to food, provided that no deception follows. Recognizing this fact, the U. S. Department of Agriculture promulgated standards of purity for coal-tar food colors more than 20 years ago, shortly after the passage of the Federal food and drugs act. It made provision for the use of seven harmless coal-tar dyes in the coloring of food, and devised machinery by which these colors could reach the public in a pure form. These seven dyes were chosen after a search of the literature had disclosed the fact that numerous tests had proved the harmlessness of these particular substances. Since that time eight new colors have been thoroughly examined, both chemically and pharmacologically, and have been added to the list as the need for them was proved. The list of 15 includes 4 reds; an orange; 5 yellows, including 2 butter colors; 3 greens; and 2 blues. This provides a very generous assortment, which can be combined to furnish all the colors of the rainbow.

Of course, the placing of a dye on the permitted list means nothing unless care is taken to provide that the dye bought on the market is the same as that on which the tests were made. The toxic properties of a coal-tar color may arise from three sources: The dye itself, small amounts of other dyes formed as subsidiary products during manufacture, or impurities coming from the chemicals used in the manufacturing process. Obviously, if a dye is on the permitted list, no apprehension need be felt about the first alternative, but vigorous standards and constant supervision are required to avoid impurities of the latter types. It was necessary, therefore, to establish due precautions by which the public might be assured that the permitted dyes were up to the standards set for them. These standards are based on specifications setting the maximum amounts of all types of impurities which will be allowed in food colors. Every manufacturer's batch is examined to see that it meets all requirements, and those batches which are up to the standard are accepted as certified food colors. Anyone interested in a more detailed description of the certification regulations and methods of analysis of food colors, may obtain them by applying to the Food and Drug Administration of the Department of Agriculture, for Service and Regulatory Announcements, Food and Drug No. 3, and Department of Agriculture Bulletin, 1390.

Since this procedure was established in 1907, the certification of food colors has grown enormously. During the last year 318,849 pounds of straight dyes, 36,646 pounds of repacked straight dyes, and 331,023 of mixtures were certified. As before stated, there is

[1] Principal chemist in charge, Color Certification Laboratory, Food and Drug Administration, U. S. Department of Agriculture.

no objection to added color in foods, provided that there is no deception and that it does not conceal damage or inferiority. Under these circumstances and when the presence of added color is declared on the label, the use of artificial color is not objectionable. This fact has been recognized in assuring the public a source of harmless colors, and the word "certified" on the label of a package of food colors has come to be known as the Government's guarantee of purity and harmlessness to the consumer.

GRADING RAW WOOL

Accurate Measuring Device Urged for Classification of Wool

In the grading of raw wool for manufacturing purposes the average diameter of the fibers is a dominant dimensional characteristic of the material which serves as the present basis for the classification. Sets of wool standards have been established for the industry based entirely on the average diameter of the fibers.

In present trade practice the grading is done by men of long experience in the industry who, by merely observing and handling the material, assign it intuitively to its proper grade. There is no suitable instrument available for the rapid, convenient, and accurate evaluation of wool on the established basis.

A simple rapid optical method for measuring the average diameter of a group of fibers was devised by Thomas Young in 1824, but no thorough investigation has ever been made of the practical possibilities of this method in the grading of wool. The method is based on the phenomenon of diffraction, which is manifested when a line source of light is viewed through a bundle of fibers which are arranged approximately parallel to one another and to the source. Under these conditions a banded light distribution is seen extending laterally and symmetrically on both sides of the source, and the separation of the bands is—to a close approximation—inversely proportional to the average diameter of the fibers.

The National Bureau of Standards has prepared a paper, in which a new construction of Young's instrument (the eriometer) is described. A stationary artificial light source is used and more convenient and accurate means supplied for determining the separation of the diffraction bands. Comparative diameter measurements were made with this instrument and with a microscope on wool and other textile fibers. The samples studied cover a range of average diameters from 13 to 50 microns.

From the miscroscope measurements on 12 wool samples diameter-frequency distribution curves were obtained for each sample. These data are used to illustrate the wide dispersion of diameters which are collected into a single averaged result. On the average, this range of variation extends to ± 40 per cent from the mean with an average deviation of roughly 10 per cent. The diffraction method is not suitable for the averaging of all possible diameter distributions. The diameter distribution should not cover a wide range of variation combined with a frequency curve which is very flat or irregular. For best results there should be a pronounced concentration of diameters about a single class.

It is shown that the precision and accuracy of this instrument are quite sufficient for the intended purpose. The averages for 12 wool samples, all fall within 2 microns of the corresponding values obtained by averaging many individual determinations with the microscope.

An investigation is made of sources of error arising from irregularities in form and orientation of the fibers, such that the theoretical condition of parallelism between the fibers is not fulfilled closely. This possibility of error may be reduced to negligible proportions by reasonable care in the mounting of the fibers and is not regarded as of serious practical importance.

Further devolpments in the construction of the instrument are outlined in the paper, by which a larger area of the sample may be observed and some quantitative information on the dispersion of diameters obtained.

BUREAU RECEIVES PORTRAIT OF ITS FIRST DIRECTOR

Dr. Samuel Wesley Stratton Served 21 Years as Director of National Bureau of Standards

At the dawn of the new century, by act of Congress, March 3, 1901, the National Bureau of Standards was established, with Dr. Samuel Wesley Stratton its director. On March 7, 1931, 30 years later, at a celebration commemorating the establishment of the bureau, a portrait of Doctor Stratton, painted by Margaret Fitzhugh Browne, was presented to the bureau by Henry Alexander Wise Wood, "as a tribute of the profound gratitude of American industry; to an institution and a man."

Much of the success of the bureau has been attributed to the foresight of Doctor Stratton, who served as director of the institution from 1901 to December 31, 1922. He was succeeded by Dr. George K. Burgess, the present director. During its 30 years of existence the bureau has advanced materially in buildings, staff, equipment, and achievements. From one of the smallest of the Government bureaus, housed in temporary quarters and with a staff of about 14, the National Bureau of Standards has grown to be one of the most important of the Government's establishments, with a staff of more than 1,000 and equipment said to be the finest in the world for research work.

LOW-VOLTAGE ELECTRICAL SHOCK

Alternating Current May Be More Severe Than Direct Current, Both Having Same Effective Voltage; Schaeffer Method of Artificial Respiration Standard Procedure

By A. Halsted. *National Bureau of Standards*

Accidents and deaths from electrical shock involving ordinary electric lighting or appliance circuits continue to happen. When compared to the toll of casualties from many other causes, such as automobiles, fires, falls, etc., fatalities from low-voltage electrical shock are relatively few. This cause of accident, however, is always present and results in a number of fatalities each year. A study of the conditions that make such accidents possible will be of use in avoiding them.

The seriousness of shock depends on the current and the part of the body through which it passes rather than directly upon the voltage of the circuit. A current as small as 0.1 ampere, if it passes through a vital part of the body, especially the chest, generally causes a serious nervous disorganization or death. Involuntary muscular contraction of the parts of the body affected may be expected from currents of from 0.005 to 0.020 ampere, and currents above these values are generally considered unsafe.

The resistance of the body from hand to hand or hand to foot with wet contacts may be as low as 500 ohms. In the case of accidental connections with the skin dry or partially dry, this resistance is usually from 5,000 to 50,000 ohms.

Ohm's law states that the current in a circuit is equal to the voltage of the circuit divided by the resistance (or impedance). Consequently, severe shock may result from potentials as low as 25 volts when connections are the best, involving large areas of wet skin in contact with the circuit so that the resistance is low. The effect of alternating current of commercial frequency may be more severe than direct current when both have the same effective voltage. This may result from a higher instantaneous value of current in the case of alternating current, the ratio of effective value to maximum instantaneous value being approximately 1 to 1.4.

Effects of shock.

In addition to moist skin, due to natural perspiration or to surrounding dampness, a second condition is usually present in the case of fatal low-voltage shock. An involuntary muscular contraction follows instantly when a person makes contact with a circuit. If this muscular contraction results in freeing the person from the circuit, the brief interval of contact will be more apt to result in nervous shock rather than death. However, if this involuntary muscular contraction results in closing the hand more tightly on the "live" wire or object, or throws the person on a wet floor or against a grounded metallic object in such a position as to remain in contact with the live wire, he will be unable to save himself.

Death from contact with low-voltage circuits usually results from asphyxia caused by paralysis of the breathing muscles rather than from extensive damage to body tissue. Artificial respiration, if applied within the first few minutes after shock, is likely to result in resuscitation. Paralysis from electric shock has a tendency to be quite profound, sometimes involving the heart as well as the breathing. Artificial respiration should be started at the earliest possible moment and continued until natural respiration is established or signs of rigor mortis appear. If natural respiration is not reestablished promptly the patient should be kept warm.

The prone-pressure, or Schaeffer, method, of artificial respiration is now a standard procedure. This method is taught to boy scouts, and has been adopted by police and fire department rescue squads. In some cases, two to four hours, or even more have been required to reestablish natural respiration, and this method has the advantage that it may be applied with the least fatigue to those administering it.

SIMPLIFICATION OF HOTEL EQUIPMENT AND SUPPLIES

The simplified practice committee of the Texas Hotel Association is undertaking a simplification program covering a number of hotel supplies and items of equipment. A preliminary conference of the committee was held at Houston, Tex., on February 20, 1931, and was attended by the chief of the division of simplified practice of the National Bureau of Standards. At this meeting the supplies selected for simplification were napkins, guest towels, dining-room tables, banquet tables, and standards and holders for water glasses.

This simplified practice committee has been functioning in accordance with a resolution passed by the annual convention of the Texas Hotel Association, in El Paso, Tex., in November, 1929. Any projects that grow out of these proposals will be developed by the affected industries themselves, with the cooperation of the National Bureau of Standards.

GRADES OF HARDWOOD DIMENSION-STOCK LUMBER

In an effort to provide standard grades for hardwood dimension stock, the Hardwood Dimension Manufacturers Association requested the cooperation of the National Bureau of Standards in establishing nationally recognized grading rules as a basis for daily trade.

These specifications cover sizes and tolerances, grading rules, nomenclature, and labeling of this product in rough, semifinished, and finished form.

The committee appointed for this work plans to have the grade rules adjusted in order that they may be considered by a general conference of the industry in the near future.

STANDARDIZING THE TEST METHODS FOR CEREALS

American Association of Cereal Chemists Develops Standard Methods for the Testing and Analysis of Cereals and Cereal Products

By C. H. Bailey and R. C. Sherwood, *American Association of Cereal Chemists*

The American Association of Cereal Chemists was formed primarily for the purpose of standardizing methods for the testing and analysis of cereals and cereal products. Since its inception it has maintained committees that have been actively engaged in this kind of work and at intervals have brought recommendations before the association for approval.

The result has been the gradual development of a series of approved methods for the guidance of its membership. Not only have the conventional methods of chemical analysis been included, but also certain empirical testing procedures, including the baking test.

During the first few years reports of the committees and the results of actions taken by the association in conventions were published in the Journal of the American Association of Cereal Chemists, which appeared in eight volumes (1915–1923, inclusive), and later in the journal, Cereal Chemistry, which succeeded the old journal in 1924.

A pamphlet was published in 1922 which contained the description of the approved methods adopted by the association. Several years later the methods committees undertook the publication of a more pretentious volume, which was printed in 1928 and reprinted in 1929, under the title, "Methods for the Analysis of Cereals and Cereal Products."

The general policy in recent years has been to avoid the use of the expression "official methods" in connection with the methods studied and approved by the association; it being recognized that it is doubtless preferable to reserve the use of the term "official" for designating the methods which have been approved in the usual course by the Association of Official Agricultural Chemists. The official and tentative methods of the latter association are used very largely by the cereal chemists and very close relation is maintained between these two associations; in fact, the referees and associate referees on cereal foods of the latter association are also members of the American Association of Cereal Chemists.

There has been a tendency toward narrowing the limitations permitted in the Association of Official Agricultural Chemists method. Frequently the cereal chemists will approve or favor only one of the several alternative methods which are permitted by the Association of Official Agricultural Chemists. Thus, they commonly work in the direction of greater specificity of detail, and thereby effecting, in all probability, a somewhat greater uniformity of testing practice.

Study of new methods.

New methods are often subjected to a critical study by appropriate committees and collaborators of the American Association of Cereal Chemists, with a view toward determining the suitability of the methods in replacing older procedures. Again, these collaborative and other studies are sometimes tied up with the activities of the Association of Official Agricultural Chemists, so that the data become available to both organizations and may thus be used in modifying old Association of Official Agricultural Chemists methods or formulating new methods for consideration by that association.

The American Association of Cereal Chemists has maintained a special committee through a period of years to develop a standard baking test procedure. Considerable progress has already been made in adopting, in 1928, a tentative method of standard baking test. The method provides for a basic procedure of testing, together with four types of modifications: (*a*) Absorption or proportion of water used, (*b*) fermentation time, (*c*) addition of a special oxidizing reagent, potassium bromate, (*d*) mechanical modification or variations in the operation of mixing the dough.

Recognizing that an empirical procedure can not be set up without ample justification of the various details as they may be subsequently added, an arrangement has recently been completed whereby the American Association of Cereal Chemists will maintain for a year or more at the Nebraska Agricultural Experiment Station a research fellowship for the study of this procedure. It is anticipated that useful data respecting the effect of several variables on the result of the baking test may be accumulated for the benefit of the entire industry.

In addition to the standardization of laboratory baking, which involves primarily the testing of flour for its adaptability to yeast-bread production, a committee has been experimenting for several years on methods for testing cake and biscuit flours. This committee has thus far concerned itself chiefly with the effort to develop a standard cake-baking test, to be used in the study of soft wheat and cake flours. This committee has likewise registered substantial progress and has contributed largely to our knowledge of the effect of several variables upon the properties of cake produced from different types of flour. The work of this committee is conducted largely through the services of its members, who give individual attention to a particular detail of committee activity.

Activities of the American Association of Cereal Chemists are not confined by any means to the development of methods. The association publishes a bimonthly journal, Cereal Chemistry, which contains the results of much of the research conducted in the field. It confers the Thomas Burr Osborne medal, periodically, upon chemists who have made notable contributions to this field of science.

It maintains seven sections in various parts of the United States which hold periodic meetings for the members residing in the several localities. These sections conduct periodic collaborative studies of the standard laboratory analytical methods, thus enabling the members to ascertain how their findings compare with those of numerous other analysts.

The association holds an annual meeting each year, usually lasting five days, when numerous scientific papers are presented, the majority of which are ultimately published in the association's journal.

STANDARDIZATION FAVORED IN THE NETHERLANDS

Forty-three Standardizing Committees, Representing Six Hundred Active Members, Keep Pace with Current Activities

By J. A. Teyinck, *General Committee for Standardization in the Netherlands*

In 1916 the Society for Industry and the Council of Administration of the Royal Institute of Engineers formed an institution called Hoofdcommissie voor de Normalisatie in Nederland. The Netherlands was the second country where organized standardization work was undertaken, England being the first. Shortly after the World War many others followed and now national standardization committees or institutions exist in 21 countries. The need for the establishment of national standards led to the creation of the International Standards Association in 1928.

After the establishment of the HCNN, the standardization of rivets and bolts was proposed. Standard sheet No. 1 for rivets, and No. 2 for bolts were adopted in 1917 and 1918, respectively. At present 350 standard projects are completed, 135 of which have been published. These include the testing requirements and the standardization of dimensions and are the result of the work of standardizing committees composed of manufacturers, business men, and consumers.

The Central Standardization Bureau, with a personnel of about 20, functions as secretariat to the technical committees, and is responsible for the research and publication of specific projects subject to the approval of the Hoofdcommissie, which criticises the projects for the general principles of standardization, while the standardization committees are responsible for the technical content. After approval, the projects are published for a period of six months in the technical press to invite comment and criticism. The criticisms are collected and classified by the Central Standardization Bureau. The definite establishment of the standard follows, subject to the approval of the editorial committee and the Hoofdcommissie. Approved projects are published by the Central Standardization Bureau in standard sheets or in book form. In an effort to stimulate wide distribution, the price is kept low, that of a sheet being only 0.15 florin ($0.06).

The Hoofdcommissie consists of about 20 members, including the most prominent people in science, industry, and representatives of large groups interested in standardization.

The great number of projects undertaken has led to the establishment of many new standardizing committees; there being 43 committees at the present time. Because of the extensiveness of subjects in this field of work, 47 subcommittees have been organized. More than 600 active members participate in the activities of the standardizing committees.

Résumé of status of work.

In the field of mechanical engineering sheets were published on work in progress, on rivets, bolts, screws, various kinds of machine-tool work, pipe lines and fittings, containers for compressed gases, steel wire, chains and hooks, calibers and tolerances, fire-fighting equipment, and sieves for testing purposes.

In the electrotechnical line, standards have been published for wire, cable and cable fittings, insulation and installation material, and standard voltages. Work is under way on safety codes for electrical systems and installations, and various types of incandescent lamps.

The standardization of parts for shipbuilding includes anchor chains, cables and rope, scuttle ports parts of rigging, loading equipment, and bollards.

Architecture covers mostly the standardization of tests for building materials, such as wood, natural stone, brick, art stone; bonding materials, such as cement, tile, bituminous materials, iron, steel, dry paints, prepared paints, and oils for paints. Various standard sheets on such materials have been published and others are in preparation. Consideration is being given to standards for drains such as traps and accessories, street and pavement manholes, and sewer covers. Also under way are designs for service pipes, household water mains, and technical elements of building regulations.

Standardization also affects the field of locomotion. Standards for ties and ballast material, and for railways and tramways have been published. Standardization of narrow-gage railways and traffic signs for the right of way are under consideration.

A special group is preparing standards for the arrangements of technical drawings and for the symbolic indication of parts.

In the graphical field, standardization is advancing on sizes and weights of paper, maps, card systems, and proofreaders' marks. For some time, a committee has been working on the standardization of glass bottles for milk, beer, carbonated beverages, and wine. Another committee is active on the standardization of hospital textiles and furniture.

A number of other undertakings was brought to the attention of the Hoofdcommissie. Some are standardization of housebuilding parts, such as hardware, window frames, doors, windows, and window glass; the standardization of colors; projects for the application of central heating; and switches for local railways and tramways. These subjects have not yet been taken up.

The widespread interest in standardization is an indication of the advantages which are expected from it. A few striking examples are the use of simplified forms in the General Printing Office, saving 3,500 florins ($1,407) yearly, by decreasing the number of stock sizes. The standardization of curbstones reduced the number of cross sections from 42 to 3. The standardization of lead pipe diminished the series from 647 to 69.

Standard projects always entail much time in their preparation and consideration; their accomplishment with the cooperation of interested parties who have at first opposite views forms the best security for their practical usefulness and application. A standard project forms a recommendation which, through voluntary acceptance, opens a way for itself. It is, of course, essential that the standards be revised to keep pace with improvements in technical and scientific knowledge.

ACTIVITIES OF THE AMERICAN STANDARDS ASSOCIATION

A. S. A. Announces Progress Status on Its Work for Month of March

The following current information relating to developments in certain standardization projects under the auspices and procedures of the American Standards Association has been furnished by that association:

Wrought-Iron Plates and Bars.

American tentative standard specifications for refined wrought-iron bars and American tentative standard specifications for wrought-iron plates, have been aproved by the American Standards Association following their submittal by the American Society for Testing Materials as proprietary sponsor. Approval as American tentative standard was originally given to both these specifications under the existing standards method of 1923. The present approval follows slight revision.

The definition of wrought iron has been changed to read: "Wrought iron is a ferrous material, aggregated from a solidifying mass of pasty particles of highly refined metallic iron with which, without subsequent fusion, is incorporated a minutely and uniformly distributed quantity of slag."

Another revision is the elimination of the reference to pjudding. The original specifications stipulated that the bars and the piles manufactured in accordance with the specifications should be made of puddled iron. The revised specifications specify only that the bars and piles should be made of wrought iron.

Grand Stand Safety Code.

Organization of a sectional committee which will develop a national safety code for grand stands, under the procedure of the American Standards Association, has just been announced. The project was initiated in an effort to reduce the number of casualties resulting from the collapse of grand stands. In developing the code the committee will consider the design and construction, stability, and strength of permanent and temporary outdoor stands and of temporary and portable indoor stands for the seating of audiences; the volume and ease of approach of exits from the standpoint of flow of traffic and prevention of panic jams; fire hazards, and the provision of fire-fighting equipment for wooden or other combustible stands; sanitary arrangements; and the methods of erection of temporary and portable stands.

The organizations represented on the committee are: American Institute of Architects, American Institute of Steel Construction, American Society of Civil Engineers, American Society for Municipal Improvements, Association of Governmental Officials in Industry of the United States and Canada, Belmont Iron Works, Circle A Products Corporation, City Managers' Association, Dixie Portable Bleacher Co., International Association of Amusement Parks, National Association of Mutual Casualty Companies, National Bureau of Casualty and Surety Underwriters, National Collegiate Athletic Association, National Fire Protection Association, National Lumber Manufacturers Association, New Jersey department of labor, Ohio department of labor, Pennsylvania department of labor and industry, Portland Cement Association, Ringling Bros., Barnum & Bailey, U. S. Polo Association, Virginia Bridge & Iron Co., U. S. Department of Labor, and the Wayne Iron Works.

Symbols for Heat and Thermodynamics.

The American Standards Association has just approved a new American tentative standard for symbols for heat and thermodynamics. The approval follows extensive work by the subcommittee of the A. S. A. sectional committee on scientific and engineering symbols and abbreviations. In the preparation of the standard the committee cooperated with the International Electrotechnical Commission and with the National Research Council.

A tentative list of the symbols was submitted to a subcommittee of the advisory committee on steam turbines of the International Electrotechnical Commission for discussion at a meeting held in 1928. A large proportion of the symbols in the list were tentatively adopted at that time by the advisory committee. The symbols for heat transmission included in the present standard were adopted jointly by the subcommittee on symbols for heat and thermodynamics and by the committee on heat transmission of the National Research Council, following extensive correspondence between the two bodies.

The new standard will be of interest to power plant designers, turbine engine designers, boiler designers, and all others working with the problems involved in the transfer and transmission of heat. The standard is one of several projects already developed or being developed by the sectional committee on scientific and engineering symbols and abbreviations. The following approved standards have thus far resulted from the work of this committee: Symbols for hydraulics, symbols for photometry and illumination, aeronautical symbols, mathematical symbols, letter symbols for electrical quantities, symbols for telephone and telegraph use, and navigational and topographical symbols. The sponsors for the sectional committee on scientific and engineering symbols and abbreviations are: American Association for the Advancement of Science, American Institute of Electrical Engineers, American Society of Civil Engineers, Society for the Promotion of Engineering Education, and the American Society of Mechanical Engineers.

Woodruff Keys.

The American standard for Woodruff keys, key slots, and cutters, approval of which by the American Standards Association was announced in a recent issue of the COMMERCIAL STANDARDS MONTHLY, has been published and copies may be purchased from the association direct.

Cylinders and Adapters.

A tentative draft of the proposed American standard for rotating air cylinders and adapters has been

prepared by the subcommittee on chucks and chuck jaws of the A. S. A. sectional committee on small tools and machine tool elements. A draft is now being circulated for criticism and comment, and copies may be obtained for review from the A. S. A. information service. The purpose of the standard is to obtain interchangeability of different makes of air cylinders on the spindles of machine tools without changing the adapter or draw rod. Sponsors for the project are the Society of Automotive Engineers, the National Machine Tool Builders' Association, and the American Society of Mechanical Engineers.

SIMPLIFICATION BRIEFS

No. 1 Kraft sealing tape.—Simplified Practice Recommendation R. 114–30 covering No. 1 Kraft sealing tape has been reaffirmed by the standing committee of the industry without change, for the period of another year.

Mayonnaise containers.—A survey to ascertain views regarding the simplification of sizes (capacities) of mayonnaise jars is being conducted by the National Bureau of Standards, at the request of the Mayonnaise Manufacturers' Association.

Trunks and ladies' suit cases.—A general conference of representatives of the industry will be held sometime in May for the purpose of discussing the simplification of trunks and ladies' suit cases.

Forged tools.—Simplified Practice Recommendation No. 17 on forged tools was amplified to include certain additional industrial forged tools at a meeting of the standing committee of the industry, held in Pittsburgh, Pa., February 17, 1931. The revised recommendation is now before the industry for written acceptance.

Packaging of flashlight batteries.—Simplified Practice Recommendation (R104–30) for Packaging of Flashlight Batteries, is now available in printed form. Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., price 5 cents each.

Dental brush wheels.—The simplified schedule for stock varieties of dental brush wheels, recently developed by industry, is now available in printed form. The pamphlet (Simplified Practice Recommendation R116–30, Dental Brush Wheels) may be obtained, at 10 cents each, from the Superintendent of Documents, Government Printing Office, Washington, D. C.

Bedsteads, springs, and mattresses.—The printed pamphlet on the revised Simplified Practice Recommendation R2–30, Bedsteads, Springs and Mattresses, can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., for 5 cents each. This program recommends the reduction of 78 varieties to 4.

Fiber-board shipping containers.—The results of a survey recently conducted to ascertain the variety in sizes of fiber-board shipping containers have been tabulated and are now before the simplified practice committee of the Paperboard Industries Association for their consideration. May 22, 1931, has tentatively been selected as the date for a general conference on this project.

Bell-bottom screw jacks.—Copies of Simplified Practice Recommendation R97–30, Bell-Bottom Screw Jacks, is now available. This recommendation, which has been instrumental in reducing the number of sizes of jacks manufactured and catalogued for general use from 78 to 38 can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., for 5 cents each.

Shovels, spades, and scoops.—Simplified Practice Recommendation R48, Shovels, Spades, and Scoops, has been reaffirmed, without change, for another year by the standing committee of the industry. Reports from 15 manufacturers, according to a survey of the 1929 production conducted prior to the revision meeting, indicated that the average degree of adherence to the recommendation by these manufacturers was approximately 96 per cent.

Restaurant guest checks.—The recently approved simplified schedule for Restaurant Guest Checks (SPR 113–30) has just been announced. This program reduces grades of cardboard checks from 4 to 3; widths, from 12 to 5; and lengths, from 16 to 14; grades of paper checks from 7 to 4; widths from 10 to 8; with no change in lengths. Copies can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C. for 5 cents each.

Hospital and institutional cotton textiles.—Manufacturers, distributors, and users of hospital and institutional cotton textiles have accepted and approved a revised list of simplified recommendations promulgated by the Department of Commerce, through the National Bureau of Standards. A pamphlet containing these recommendations, entitled SPR 74–30, "Hospital and Institutional Cotton Textiles," may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C. Price 5 cents.

Fish containers.—As a result of a preliminary conference held in Boston, Mass., March 6, 1931, a simplification committee composed of members of the Massachusetts Fisheries Association and the United States Fisheries Association (Inc.) is being formed. This committee will study the possibilities of applying simplified practice to all kinds of fish containers, such as cans, cartons, boxes, and barrels, with a view to establishing recommendations for these various items. The National Canners' Association recently suggested that work be started on the simplification of fish containers, and it is expected that they will cooperate with those now actively engaged in the development of these projects.

WIRE AND CABLE STANDARDS

New York Edison System Saves $725,000 Annually by Reducing Sizes and Types of Cables

When the present New York Edison System was consolidated in 1928 one of the benefits promised the public was reduction in cost of service through unification of practices among the five companies which were merged. The success of this program of standardization with regard to one very important item, wires and cables, is reported in a recent number of Metropolitan Electric Topics, a monthly publication issued by employees of the system.

In less than two years the number of sizes and types of cable used by the system was reduced from 500 to 134. Of the 134 types remaining in use, 32 are listed as special for particular purposes, so that only 102 types and sizes are bought for general use.

As an immediate result of this simplification in materials it is estimated that the first cost of cable purchased annually by the system has been reduced by $725,000. This saving in original cost of cable is, however, only one of many advantages gained. Some of these advantages could hardly have been foreseen, for the studies undertaken with regard to the use of the various cables led to the solution of several technical problems in addition to the standardization of the physical dimensions and electrical characteristics of the cables themselves.

The same type of cable is now generally used for a given purpose in all of the companies in the system, and cable is purchased by all of the companies under the same standard specifications. Purchase under these specifications has insured high and uniform quality of cable throughout the system, storeroom stocks have been simplified, and smaller stocks suffice to meet all needs because cables can be readily transferred among the companies to meet any emergency. As secondary results a standard method of bonding cable sheaths in manholes has been adopted, thus assuring a greater degree of safety for workmen, and methods for testing and selecting portable cords for use on the system have been developed.

The magnitude of the work accomplished will be apparent when it is considered that the materials standardized range from small wire for lighting installations up to 45,000-volt feeder cables, covering various sizes and types used for transmission feeder and low-tension mains in the streets, the many cables used in stations, wires for the overhead distribution system, buried cable, and the portable cords used in field work and in the buildings of the various companies. The standard purchase specifications cover varnished cambric insulated cable, rubber insulated cable, weatherproof wire, tree wire, buried nonmagnetic sheath cable, vertical distribution cable, and bare wire.

Data sheets summarizing the sizes made standard were recommended and approved by executive order, each sheet being associated with specifications for the class of cable and giving detailed data for purchase, including standard stock lengths and factory tests. These sheets also give the data on standard cables in form convenient for use by construction forces.

In view of the success attained in this project, the method of organization is of interest. One of the first acts of the president, who assumed responsibility for the five system companies late in 1928, was the organization of two advisory committees—the Technical Advisory Committee and the Accounting Advisory Committee. These committees soon organized numerous subcommittees and working committees for the study of various problems. Two of the working committees were the Committee on Standard Specifications for Cable and the Committee on Sizes and Types of Cable. Both were subsidiaries of an Electrical Standing Committee.

Appointed in October, 1928, these committees began to function soon thereafter. In the short time of about a year and a half, their studies and recommendations resulted in executive orders producing the results already noted. During the work various associate committees were appointed on special problems so that those directly concerned with particular items were given an opportunity to assist in making the most advantageous decisions. According to the reports of the working committees the success attained is in no small measure attributable to the valuable assistance given by the various associate committees. In order to keep the standardization alive and up to date the members of the two working committees have been reappointed under the new designation of Working Committee on Cable Standards.

NEW SIZES OF PACKAGES CONSIDERED FOR SHIPPING EGGS IN NORWAY

In Norway eggs are generally shipped in wooden boxes containing 1,000 eggs each. These boxes are returned to the shipper for reuse. As eggs often get broken in these boxes, and, as the carton inlays are not removed each time, it makes them rather unsuitable for packing. Furthermore, these boxes are too large to be handled by one man.

According to information received from Commercial Attaché Marquard H. Lund, at Oslo, Norway, a proposal has been made by the Norwegian Standardization Committee to develop standard packing. Boxes for 360 eggs only have been recommended, which is similar to American-Canadian standards. The boxes would be of wood or corrugated board, with inlays of cardboard. Standards for smaller boxes of cardboard have also been proposed, containing 10, 20, 40, 60, and 100 eggs.

As egg packing for export shipment is dependent on the wishes of the foreign buyer, it is not found advisable to propose any standards for this service as yet, according to Commercial Attaché Lund.

VALUE OF PURCHASE SPECIFICATIONS

Surface Only Scratched in the Development of Specifications

By G. A. Renard, *Secretary National Association of Purchasing Agents*

Prominent purchasing executives have repeatedly stated that at least four important elements are involved in satisfactory purchasing. Listing them in the order of their importance, they are:

1. Suitability of the material to the requirement.
2. Availability of the material which covers deliveries, service, and the time element, including turnover problems.
3. Credibility or responsibility of the supplier.
4. Price.

The first and most important element, selection of the material or equipment most suitable, can not very well be determined with satisfaction to either the vendor or vendee without some form of specification. In fact, some form of specification is used in every transaction, the use of "same as before," is a specification, and so is the ordering of "Smith's hammers." In the first case we use a previous purchase as a satisfactory standard and in the second, the standard of "Smith's hammers" is our standard and specification. The use of the term "Smith's or its equal" is another example of specification use, although we may not realize it at the time.

Frequently, without realization of the fact, we use performance specifications when we advise our suppliers of our requirements. We furnish him a specification, but leave the selection of the material largely in his hands. A responsible vendor can usually be depended upon to meet performance requirements satisfactory. Not only must he back up the particular material furnished, but he must consider the customer's good will.

The above facts are, of course, well known to most readers of the Commercial Standard Monthly. One can readily and truthfully say, that all buying is based on either a properly prepared specification of the consuming organization or a specification or standard established by others.

Formal specifications are the result of standardization or simplification, or both. Their value depends upon their preparation and use. A specification should contain a definite method for testing or determining by a fixed process, if the material meets the requirements of the specification. The use of specifications with no check on the material furnished is seldom satisfactory, although many suppliers may be depended upon. Failure properly to check up the material received is unfair to those suppliers who are honest and dependable. Therefore, proper inspection, test, and analysis of material procured upon specifications, the determination to be made by a definite formula, is essential to specification use, and failure to do so results in an enormous waste.

There is also considerable waste in the preparation of specifications through failure to include all available advice and experience of the purchasing organization, the suppliers and agencies that specialize in standardization and specifications. Speaking of the individual industrial organization, we often find a complete lack of understanding between the various divisions as to the requirements for, and purpose of, specifications. Technical men are frequently individualists and in the preparation of specifications, ignore all others and attempt to display their knowledge which often is only technical.

Unless carefully prepared, a specification may limit or entirely prevent competition, by restricting the requirements to the products of one firm or a very few firms. This may be necessary in some instances, but generally speaking it is an unsound business practice and is unfair to those suppliers who are eliminated. The Comptroller General of the United States Government recently ruled that such restrictions upon competition must be avoided in governmental purchases.

There is also an inclination to confuse specifications with purchasing, when, in fact, the specification is only one of the important elements of a satisfactory purchase. When a specification is properly prepared, with the understanding that the intention is to reflect the requirements of the using departments and permit all possible competition in furnishing those requirements, the purchasing department is placed in a position to negotiate advantageously, and the other elements of a sound business transaction are given proper consideration.

In order to avoid off-standard requirements as much as possible the using departments should in nearly all cases be thoroughly considered, and also the producers of the material. In many organizations a satisfactory arrangement is secured by having standards and specifications developed by agreement between the using, technical, and purchasing departments. Such an arrangement also provides for necessary revision. The continued use of fixed specifications is often disadvantageous, as they do not make use of changes in the requirements or take advantage of the developments made by others, principally the producers. The company that can properly develop specifications and eliminate all the professional and departmental selfishness and jealousy has gone a long way toward success, for the same formula will insure successful specifications for production and distribution.

Development of specifications for general use meets not only the difficulties in professional and departmental cooperation, but the additional and very serious handicap of being made to satisfy both the producer and consumer. This producer-consumer conflict runs through our political, economic, and commercial life to an extent we hardly realize. We all have the utmost respect for the several organizations that are devoted to standardization and specification work. However, when serious consideration is given to the waste in the duplication of effort in this field there possibly will be some elimination.

Our Government has in the National Bureau of Standards the best equipment and personnel available for this work. They also represent all elements in the development of standards and specifications. It is

very hard to understand the very real opposition to their work in some quarters. The old wheeze, "Less Government in business and more business in Government," hardly explains the attitude of some, especially technical men and organizations, to the work of the National Bureau of Standards. With that bureau in the hands of technical men, almost exclusively, with a large part of its development due to men like Stratton, Hoover, and Burgess, I don't think it too much to expect our technical men some day to give the bureau complete cooperation, and, with the best facilities available, develop specifications that are perfectly satisfactory to both producers and consumers.

The consumer is always interested in securing more units of performance per dollar. He may be selfish at times, but generally speaking the producer has shown his selfishness as frequently as the consumer has.

We should be enabled to select from at least three qualities under a general specification, high, medium, and low. There is a sound requirement for differing qualities for various uses, and the specification that develops just one standard of quality, and incidentally price, must necessarily be a compromise or represent an arbitrary selection that is unfit for some uses because of either too high or too low a quality and price.

Business could not be satisfactorily carried on without specifications; we have them and use them either purposely or subconsciously. We have, however, only scratched the surface in the development of specifications for either individual or general use, and the possibilities for improvement in their preparation and use challenge all of us.

FEDERAL SPECIFICATIONS

Status of 61 Projects Announced

The Federal Specifications Board promulgated 31 specifications during the month of March. In addition there were submitted for criticism and comment 24 specifications, now under consideration for revision, and 6 proposed specifications.

The promulgations and revisions contain the new identification and classification symbols and title designations in accordance with the system used in the Federal Standard Stock Catalogue. Copies of the specifications, other than those promulgated, and further information relating thereto can be obtained from the Federal Specifications Board, National Bureau of Standards, Washington, D. C. Copies of the promulgated specifications desired by those in the commercial world and others outside of the Federal Government may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 5 cents each.

New designation	Specifications promulgated	F. S. No.
H-B-191	Brushes, dust, ceiling, and wall	397a
H-B-451	Brushes, radiator, bronzing	517a
H-B-621	Brushes, stencil (flag ends cut)	519a
H-B-731	Brushes, whitewash	524b
P-S-561	Soap, automobile	30
P-S-566	Soap, chip	31
P-S-571	Soap, grit, cake	33
P-S-586	Soap, laundry, liquid	246
P-S-596	Soap, laundry, powdered	245
P-S-606	Soap, powdered	28
P-S-611	Soap, salt-water	29
P-S-618	Soap, toilet, liquid	27
P-S-621	Soap, toilet, milled	244
Q-C-571	Coke, foundry	
AA-F-791	Furniture and cabinets, office, sectional, steel	408
AA-S-71	Safes, burglar-resisting	363
EE-E-911	Extracts, flavoring, and flavors, nonalcobolic	
EE-S-631	Spices	364
FF-P-101	(Errata) padlocks	
HH-C-451	Clay, fire	334a
SS-A-681	Aspbalt, emulsion, slow-breaking-type (for use in road work).	
SS-M-501	Mold-wasb; silica	
SS-R-191	Refractories, fire-clay, plastic	335a
TT-I-521	Ink, copying and record	163
TT-I-542	Ink, marking, indelible (for) fabrics	266a
WW-P-431	Pipe, welded-steel, black and zinc-coated	162a
ZZ-C-796	Cusbions, ring, rubber	227b
ZZ-H-611	Hose, water, wrapped	48c
DDD-R-271	Ribbons, computing and recording-macbine	169a
DDD-R-291	Ribbons, bectograpb	168a
HHH-H-491	Hops	389

Revisions

New designation	Specifications promulgated	F. S. No.
N-C-501	Corn, canned	627a
N-C-191	Cereals (breakfast foods)	
N-M-51	Macaroni, spagbetti, and vermicelli	648a
FF-B-571	Bolts, nuts, studs, and tap-rivets	548
FF-N-101	Nails, spikes, staples, and tacks	534
HH-C-571	Cork, ground (for insulating purposes)	338
HH-M-51	Magnesia, asbestos, plaster	211
HH-M-71	Magnesia, block, pipe covering (molded)	212
HH-M-351	Millboard, asbestos	54
PP-T-191	Turkeys, dressed	267
RR-T-51	Tableware, silver-plated	411
TT-R-791	Rust-preventive compound, beavy	239
CCC-B-791	Bunting, cotton	611
CCC-B-801	Bunting, wool	497a
CCC-F-451	Flannel, canton	613
DDD-T-511	Towels, crash, cotton, and linen and cotton mixed	633
JJJ-B-151	Beans, string (or snap), canned	625a
JJJ-P-151	Peas, canned	628
LLL-C-571	Cork, compressed (corkboard)	377
	Peacbes, evaporated (or dried)	634a
	Toweling, crasb, cotton, and linen and cotton mixed	633
	Beans, lima, canned	271
	Lard	381a
	Vinegar	364

Proposals

CCC-C-231	Chambray	
CCC-C-321	Cbeviot, cotton	
	Handkercbief clotb, cotton	
	Blankets, cotton, and cotton warp, and wool filling	
	Linen, table (napkins and table clotbs)	

STEEL BONE PLATES

The American College of Surgeons has requested the cooperation of the National Bureau of Standards in establishing a commercial standard for steel bone plates and screws used in the reduction of bone fractures. This standard is to cover the physical and chemical requirements of the metal, dimensional standardization of plates and screws, marking and labeling as a means of guaranteeing quality to the surgeon.

Specifications covering the physical and chemical requirements of the steel used in the manufacture of steel bone plates and screws are being drafted by the committee on fractures, with the cooperation of the National Bureau of Standards laboratories, for subsequent submission to the American College of Surgeons.

STANDARDIZATION OF ROAD-BUILDING EQUIPMENT AND PURCHASING METHODS

Survey of Purchasing Agencies Reveals Need of Standardization of Equipment, Materials, and Practices

By Lyle A. Brookover

Standardization of equipment, materials, and practices played an important rôle in the 1930 program of the American Road Builders' Association, as was evidenced at the recent annual convention in St. Louis.

Outstanding in interest and value to the highway field was the work on standardization of methods for purchasing equipment. After completing a 2-year study of this subject, the following recommendations were made:

That all purchases of equipment of more than $500 be by formal lettings, and that all purchases of from $50 to $500 be by informal lettings, and purchases in amount not to exceed $50 be made by private negotiation.

That the exchange and comparison of experience and information on service, cost records, and purchase prices be encouraged. That, in purchasing equipment, no trade-ins enter into the transaction; and, furthermore, that in disposing of equipment each transaction be independent of any purchase of new equipment, and that it be handled by public letting. That in awarding contracts for the purchase of equipment the determining factor shall not be first cost alone, and that many other elements of value shall be considered. That the purchase of county equipment be handled by clearing through State highway departments, when so requested by the counties.

That in order to help level the seasonal production curve, to afford opportunity for inspection of equipment before purchase, and otherwise to effect greater economy in buying and manufacturing, bids on general equipment requirements be received, in so far as possible, just prior to the annual exhibition of the American Road Builders' Association, and that orders for such equipment be placed as soon as practicable after the exhibition.

That the authority to specify and select highway equipment be vested in a highway department of materials and/or equipment, headed by an experienced highway engineer, rather than by the maintenance engineer.

That an effort be made to effect as general a standardization as possible of the details of equipment and parts, in order to increase interchange ability, and to eliminate the excessive stocking of spare parts.

That the principles here formulated be extended so far as desirable and practicable to the purchasing of equipment by counties, cities, towns, and other units of public administration.

A report on standardization of steel side forms for concrete pavements was developed in the interest of obtaining smoother riding pavement surfaces, and to permit the standardization of manufacture of forms, this action to be approved by the various State highway departments. This report was submitted by a committee composed of highway officials and manufacturers' engineers, which made two recommendations:

1. That all steel side forms of 8 inches and over in height shall have a width of base of 8 inches, and that all other side forms having a height of less than 8 inches shall have a base width of 6 inches. Option is meant to be left to the States as to whether these recommended sizes shall be made a part of the specifications.

2. That the State highway department recognize field inspection of forms, before installation, in accordance with the following practices:

(*a*) On the top of the vertical tolerance per standard 10-foot section of form shall be not more than one-eighth inch.

(*b*) On the upstanding leg the lateral tolerance per standard 10-foot section of form shall be not more than one-fourth inch.

A specification for standard weighing devises for concrete aggregates to be used in connection with small mixers for bridge and similar structure work was recommended. This recommendation supplemented a report prepared the previous year covering this equipment as used with both the bin batcher and the central mixing type of plants. This specification has been adopted by, and appears in the specifications of many State, county, and city highway departments.

A survey of the needs for and the availability of maintenance equipment showed that the various types in general use were well standardized, and further desirable standardization is under way.

Methods and equipment used for construction and compaction of embankments were found by the committee studying this subject to vary widely, and variable results were obtained. Practically all specifications require the embankment to be placed in layers for the full width of the cross section. However, the thickness of the layers specified varies from 6 to a 24-inch maximum, with occasionally no maximum limit. Methods of compaction employed include the use of rollers of various types and weights, trucks, track-type equipment, wheel-type equipment, jetting, ponding, the use of explosives, tamping, and puddling.

Full and complete settlement of embankments is desired, and compaction must be obtained by artificial methods before the surfacing is placed. Due to wide variance of soils, the method to be used and the equipment to be employed must be given careful study, and standardization can not be generally applied.

The specifications as to the actual thickness of the layer of loose material placed, and the method of compaction required should be enforced, and while adequate compaction may be secured with various types of rollers, the use of a power-driven mechanical device for spreading the fill material evenly in layers is essential, if the best results are to be obtained.

An extensive investigation was conducted on the subject of highway guard rail through questionnaires to all State highway departments relating to the type of guard rail considered most effective in preventing personal injury or safeguarding life; in preventing damage to contacting vehicle; in withstanding shock

with minimum damage to rail and posts; in withstanding weather and soil conditions; for low cost of construction; and for low cost of maintenance.

In 40 States wire-cable railing is strongly favored for each of these 6 conditions; wire-mesh railing is a poor second in the first 4 cases; and timber railing is a poor second in the final 2 cases; with wire mesh third. The summary of replies indicates that approximately 70 per cent of the engineers considered the wire-cable type most effective in preventing injury to life, the vehicle, or to the railing itself, while more than 73 per cent considered it the lowest in cost of construction and maintenance.

A summary of the details of the latest available specifications or plans in each State shows that 31 specify or permit the construction of wooden guard railings in some form, while 17 do not; 23 specify or permit the use of wire fabric, while 25 do not; 42 specify or permit the use of wire cable, while 6 do not; other types specified or permitted by a few States consist of guideposts, guardstones or bowlders, earth mounds, concrete rails and patented types.

INSPECTING FIGS AND DATES

Imported Dried Fruits Subject to Rigid Inspection Under National Pure Food Laws

Americans are assured the best quality of imported figs and dates in the world market, according to the eastern district of the Federal Food and Drug Administration, U. S. Department of Agriculture. Most figs and dates imported into the United States arrive at eastern district seaports, and must meet the strict requirements of wholesomeness, freedom from impurities, and honesty of labeling set by the national pure food laws.

During 1930 district officials examined more than 14,000,000 pounds of imported figs, and detained about 30 per cent of them for failure to meet Federal food and drugs act standards. Total date imports for the year amounted to 41,853,271 pounds, of which 2.7 per cent were detained.

Imported figs in 290 lots, amounting to 9,825,162 pounds, were released following inspection by Federal officials, and 142 lots, or 4,319,454 pounds, were detained because of wormy or moldy condition, or in a few cases, because of short weight or failure of shippers to furnish certificates of sanitary handling, required by the law. Regulation 223 of the Food and Drug Manual requires a special declaration for importation of figs from Smyrna. Through arrangements with the State Department, consuls certify invoices of figs on a special form which, in addition to the usual information, bears on the reverse side an indorsement by the consul certifying that the figs were packed under prescribed sanitary regulations. The consul's certification is based upon reports from medical officers appointed to make sanitary inspection of packing establishments and these inspections are carried on regularly and systematically. This system is unique, in that it involves the control by one government of sanitary conditions within the territory of another government. Figs detained were disposed of as follows: 1,622,917 pounds were reexported; 971,679 pounds were released for reconditioning, which means sorting out and destroying objectionable figs; and 112,000 pounds of original lots were destroyed. The administration will require exportation or destruction of the remainder of detained figs. Under the domestic provisions of the food and drugs act, the Government also held 123,100 pounds because the figs were entered illegally in violation of the import bond.

The eight lots of dates were held because they were wormy or misbranded as to quantity of contents. The wormy lots, 134,225 pounds, were reexported. Dates misbranded were released as soon as their importers labeled them in compliance with the food and drugs act.

UNIFORM RULES ON AVIATION

Ratification of Air Treaty Will Make for Uniform Rules Between Countries of the Western Hemisphere

Ratification of the Havana Commercial Aviation Convention of 1928 will bring into operation international agreements between countries of the Western Hemisphere on uniform rules and understandings which are essential to the development of international air commerce, according to the Aeronautics Branch, Department of Commerce.

Advice and consent of the Senate for ratification was given by a two-thirds vote on February 10, and to date the treaty, according to the treaty division of the Department of State, has been ratified by 4 of the 21 signatories.

Prohibition of flight over fixed zones is allowed the contracting parties with the provision that no distinction shall be made between a State's own private aircraft engaged in international commerce and those of other countries so engaged.

The International Convention on Commercial Aviation was designed especially to meet conditions existing in the Western Hemisphere, and to permit the normal development of air transportation by the gradual adoption of such rules and regulations, pursuant to the general principles set forth in the convention, as may be found by experience to meet the requirements of air navigation in this hemisphere.

One of the primary purposes of the convention is to establish the right of innocent passage of aircraft of the contracting parties, subject to the conditions laid down in the convention and without discrimination. It is believed that the convention will prove to be of value in bringing about an understanding as to the principles that are to govern in the operation of aircraft among the contracting States. This is absolutely essential to a proper and comprehensive development of international air commerce.

STANDARDIZATION BRIEFS

Color characteristics of paints.—A standard method of analysis for the color characteristics of paints in terms of fundamental physical units was adopted by the American Society for Testing Materials at its last annual meeting.

International conferences.—A series of meetings on technical subjects is planned by the International Standards Association to be held in May, 1931, at Copenhagen, Denmark, at the time of the conference of secretaries of national standardizing bodies.

Smoke pots.—Smoke pots for use as airport wind indicators are now commercially available. Any shade of smoke may be produced, varying from a white to jet black. The smoke is heavy and tends to roll along the ground, showing the pilot each gust of wind and its velocity.

Dust explosions in industry.—The value of large window-glass area in buildings devoted to industries which are liable to dust explosions is emphasized by the Bureau of Chemistry and Soils, United States Department of Agriculture, which has been conducting a study of causes and prevention of dust explosions in industrial plants.

Standardization of oil-field equipment.—Standardization Bulletin No. 105, containing reports of meetings held by various American Petroleum Institute committees on standardization of oil field equipment during the eleventh annual meeting at Chicago, Ill., November 10 to 13, 1930, has been published by the institute.

Uniform vehicle code.—The Uniform Vehicle Code (Hoover), sponsored by the National Conference on Street and Highway Safety, was indorsed by the American Petroleum Institute at its meeting held in March, 1931. The code provides for uniform State laws pertaining to truck operation, truck sizes, weights, and other items involved in automotive transportation.

International economic conference.—The causes and possible remedies in the present world economic depression will be discussed by the Council of the International Chamber of Commerce at a meeting to be held December 5, 1931, at Paris, France. Each of the 28 countries represented in the council has been asked to send a special delegation in addition to its regular members.

Belgian royal decree pertaining to foreign aircraft.—A royal decree which became effective February 15, 1931, regulating air navigation in Belgium provides that foreign aircraft flying over the territory or territorial waters of that Kingdom must be provided with a certificate of navigability complying with the regulations in force in the country of origin.

Accurate broadcasting frequencies.—That radiobroadcasting stations are trying to keep closely on their assigned frequencies is indicated in the December report of W. D. Terrill, Chief of the Radio Division, of the Department of Commerce. Although a deviation of 500 cycles is allowed by the radio law, 101 stations out of a total of 339 stations inspected kept within less than 200 cycles.

Measuring air permeability of fabrics.—A self-contained instrument for measuring the flow of air through fabrics is described in Research Paper No. 261, reprint from Bureau of Standards Journal of Research, vol. 6, January, 1931, entitled "A Portable Instrument for Measuring Air Permeability of Fabrics." This pamphlet may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C. Price, 10 cents.

Measurement of candlepower of 5,000-watt lamps.—Cooperative measurements of the candlepower of 5,000-watt lamps are in progress. The photometric laboratories of the General Electric Co. at Nela Park, Ohio; the Westinghouse Lamp Co. at Bloomfield, N. J.; the Electrical Testing Laboratories, New York; and the National Bureau of Standards are cooperating in making spherical candlepower measurements on these large tungsten filament lamps.

Safety glass for Paris taxicabs.—A proposal requiring that all taxicabs and other public vehicles in Paris be equipped with safety glass is now before the city's municipal council, according to advices received in the Commerce Department's automotive division. It was stated that 67 per cent of all injuries resulting from automobile accidents are due to shattered glass.

Certified aeronautical lights.—Under the air commerce act the Secretary of Commerce is charged with the promulgation of regulations governing the examination and rating of air navigation facilities. These regulations provide that certificates for all beacon lights of aeronautical character, except those established and maintained by the Federal Government, shall apply for periods of one year.

Revision of safety code for elevators, dumb waiters, and escalators.—The completed revision of the American Standard Safety Code for Elevators, Dumb Waiters, and Escalators has been submitted to the sponsors. It is expected to be approved promptly and made available in printed form by the American Society of Mechanical Engineers, which with the National Bureau of Standards and the American Institute of Architects, are joint sponsors for this project.

National Electrical Code revised.—An extensive revision of the National Electrical Code was made at a meeting of the Electrical Committee of the National Fire Protection Association held in February. Among other changes, new methods of interior wiring were recognized, and the rules for overload protection of motors were entirely rewritten. The revised code will be presented for approval to the annual conven-

tion of the association, to be held at Toronto in May, 1931.

Map indexing.—The experience of map users and of libraries reveals great need for a standard map-indexing scheme sufficiently simple to be readily understood, easily recorded, and generally used. At present there are many different systems in use. A special committee of the Board of Surveys and Maps of the Federal Government, which has been studying the subject for several months, has recommended that the map makers consider the project and seek a common standard, if possible.

Tentative standards for canned goods.—Tentative United States standards for canned tomatoes, cherries, and apricots were made public in March by the U. S. Department of Agriculture, under the terms of the McNary-Mapes bill. The announcement of the department stated that public hearings would be held in Washington and San Francisco not later than April 15, at which time the trade would be given an opportunity to express its opinion on the proposed standards.

Annual meeting of A. S. T. M.—A feature of the thirty-fourth annual meeting of the American Society for Testing Materials will be the series of joint meetings with the members of the American Society of Mechanical Engineers, the American Foundrymen's Association, and the Western Society of Engineers. These meetings will be held June 22 to 26, 1931, at Chicago, Ill. For the first time an exhibit of testing apparatus and machines will be held in conjunction with these meetings.

Cotton goods for rubber and pyroxylin coating.—The recommended commercial standard for Cotton Goods for Rubber and Pyroxylin Coating has been circulated by the National Bureau of Standards for written acceptance to interested producers, distributors, and users of this product. Since the work of the several associations interested in the project has paralleled commercial standards procedure to a certain extent, no general conference was deemed necessary. (See Commercial Standards Monthly for February, 1931. p. 261.) Copies of this recommended standard are available upon request to the National Bureau of Standards.

Standard color card for flexible cord.—The first standard color card for flexible cord has just been issued by the National Electrical Manufacturers Association. The card contains samples of colored cotton and rayon braids, 14 colors of each, together with corresponding color names and numbers. This plan of issuing through the N. E. M. A. headquarters a single color card under their insignia is of benefit to both purchasers and suppliers of cord, officials point out, since purchasers now need keep only one kind of card, and the makers of cord will be saved the expense of distributing their own cards.

U. S. ship act.—Under the U. S. ship act, every vessel, foreign or domestic, clearing from ports in the United States for ports 200 miles or more distant, carrying 50 or more persons including passengers or crew, or both, must be equipped with a radio apparatus in good working order capable of transmitting and receiving signals over a distance of 100 miles or more, day or night. Emergency power supply independent of the vessel's main electric plant must also be provided which will enable the sending set to function for a period of at least four hours and to send messages over a distance of 100 miles, day or night.

Standards for butter.—War on impure foods, particularly butter and its substitutes, has been declared by the director of health of the Philippine Islands, in a set of recommendations submitted by him to the acting secretary of public instruction, according to information received from American Trade Commissioner Harvey V. Rohrer, at Manila. These recommendations, approved by the acting secretary of public instruction, were immediately adopted by the board of food inspection and issued to all manufacturers and dealers. The recommendations prescribed definitions and standards of butter, renovated or "process" butter, butter compound, oleomargarine, and margarine.

Artificial light tests adaptability of plants.—With the aid of powerful electric lamps to lengthen the day in the greenhouse in the winter, plant breeders of the U. S. Department of Agriculture are attempting to determine the adaptability of new varieties of strawberries to the various strawberry-growing sections of the country. Since the length of day varies with the latitude, they believe these tests will indicate approximately the regions to which the newly developed varieties are adapted. Heretofore it was necessary to send all new varieties to the field stations in all different regions to determine their adaptability by special tests.

Spark-testing of steels.—There are distinct differences in the characteristic sparks formed when steels of various compositions are rapidly abraded by a high-speed grinding wheel. This subject forms the basis of one of the current metallurgical researches in progress at the National Bureau of Standards. It is expected that this method of spark testing of steel, when perfected, will prove exceptionally useful in the sorting of scrap iron and steel before the scrap is sent back to the furnace to be remelted. At present, the fact that miscellaneous scrap gathered from various sources is of unknown composition is a deterrent in its use for many lines of steel making.

Standard fiber stresses of wood poles.—The standard ultimate fiber stresses of wood poles of the National Electrical Safety Code (rule 261A4) have recently been superseded as a consequence of A. S. A. approval of American Standard for ultimate fiber stresses of wood poles (A. S. A. 05a—1930). The standard values are as follows: Northern white cedar, 3,600 pounds per square inch; western red cedar, 5,600 pounds per square inch; chestnut, 6,000 pounds per square inch; and southern yellow pine (creosoted), 7,400 pounds per square inch. These values will effect a change in the National Electrical Safety Code where the fiber stresses of western red cedar, chestnut, and southern yellow pine are involved.

Colored beacons on foggy airway.—Colored lights outlining the safe flying region are being installed by the U. S. Department of Commerce in the Columbia River gorge for a distance of about 50 miles. Winding through the Cascade Mountains, the river has provided the most practicable route for a difficult flying region, but peculiar climatic conditions cause dense fogs in the upper part of the gorge. Low ceilings, about 250 feet, frequently result, blotting out regular long-range rotating beacons and necessitating a system of low-altitude lights. The low-altitude beacons will be equipped with colored shades to aid pilots in orienting themselves, and green lights will be seen on the Washington side and red on the Oregon bank of the Columbia River.

Foreign candy meets demands of Food and Drug Administration.—Only a small proportion of the 6,000,000 pounds of confectionery imported into the United States in 1930 failed to meet the requirements of the Federal food and drugs act, according to the United States Department of Agriculture. Most of the packages of candy detained last year at the eastern ports violated the law merely in the matter of label statements. The few lots that contained prohibited material, such as alcohol and unpermitted coal-tar dyes, were returned to the country of their origin. Manufacturers the world over appreciate the need for care in production, for discrimination in selection, for sanitation in handling, and for honesty in branding goods bound for the United States.

Grain inspection.—The United States Department of Agriculture has under consideration a proposed regulation under the United States grain standards act dealing with grain which moves in interstate commerce between two places at neither of which is an inspector licensed under that act, but which in the course of its transportation passes through an inspection point. At the present time grain may be sold by grade and shipped from a noninspection point to a noninspection point without any requirement that it be officially inspected and graded by a licensed inspector, regardless of whether it passes through a point at which official inspection under the act is maintained.

Engine stoppage in automotive equipment.—Engine stoppage in automotive equipment due to boiling of the gasoline in the feed system, called vapor lock, has markedly increased during the past few years. Since the boiling temperature of gasolines has not changed much during this period, the increasing trouble from vapor lock is largely due to the design of fuel feed systems. Road tests on 27 diverse cars last summer, under a variety of conditions, indicated that the temperatures reached by the gasoline in many cars were much higher than necessary and that simple changes in design would greatly lower these temperatures. Some of the car manufacturers have improved the design of fuel systems in 1931 cars, and others are rapidly following this lead. After such changes have been made, there should be little trouble from vapor lock.

Variable-automatic control.—The street railway operator, to be successful in his competition against vehicle traffic, has found it imperative that he increase the schedule speeds of his cars. Variable-automatic control is one of the most important recent developments which makes this increase in speed possible, as it provides considerable increase in the acceleration rates—the acceleration period, on the usual number of stops per mile, being a very considerable portion of the running time. Features of the control are variable accelerating rates, automatic progression, smooth, rapid starting, quick response, effective notching and emergency dynamic braking. Instead of the customary hand notching on the old drum controller, the operator places the controller handle on the selected speed position and the car accelerates, in even steps, to that speed automatically.

Aviation law.—State law is a source of constant concern to the pilot wandering across unfamiliar country especially if he be flying an unlicensed airplane. Twenty States now require the Federal license for all planes and their pilots in order that they may operate within State boundaries. Nine more make the same stipulation whenever commercial flying is to be indulged in. Six require some sort of additional action in every case if there is to be a prolonged stay within the State, even with federally licensed equipment. Sometimes a State license must be taken out to supplement the Federal one, while in other instances it is only necessary that the pilot file with the local authorities a notification of his presence, but in all six cases some special account may be taken of the State law, and the pilot or owner must become familiar with what that law is.

Mark of origin.—It has been officially announced that under the provisions of the merchandise marks act, 1926, effective May 12, 1931, all ice skates, fountain pens, propelling pencils, steel shafts for golf clubs, and wallboard imported into the United Kingdom must bear an indication of the country of origin at the time of sale or exposure for sale, and wrought enamelled hollow ware of iron and steel at the time of importation and sale, both wholesale and retail, according to a radiogram received in the Department of Commerce from Acting Attaché Donald Renshaw, London. The indication of origin may be either the word "Foreign" or, as an alternative, a definite indication of the country in which the goods are manufactured or produced, such as "Made in U. S. A.," and should be applied to the goods in the manner prescribed by the order-in-council.

Tests for foundry sands.—Until very recently, practically the only test used by foundrymen in judging the suitability of their sands for molding purposes was used by most of us as children in our "sand sculpture" at the seashore. The degree of success attained was dependent largely upon the consistency of the sand, as determined by squeezing it in the hand. The past few years has witnessed a marked change, however, and there are now available for the foundrymen, reliable test methods for measuring those properties of the sand (grain, size, and distribution, permeability, compressive strength, moisture content, etc.), which determine its suitability for molding purposes. Work along this line, in cooperation with a committee of the American Foundrymen's Associa-

tion, constitutes one of the major researches in progress in the experimental foundry of the National Bureau of Standards.

Generators for Fifteen Mile Falls.—The generators for the new Fifteen Mile Falls development of the New England Powers Association, have several claims on the attention of the electrical engineer: They are the first really large water-wheel generators of the new umbrella type to go into service and they have several different and interesting features of design to make sure of stable operation. Generators of the new umbrella construction have but a single guide and a single thrust bearing, both located in one water-cooled oil pot just below the umbrella-shaped rotor spider. The result is a considerable saving in machine height and building headroom. Fifteen Mile Falls is at the upper end of a 126-mile transmission line and, as continuity of service is essential, stable operation under short-circuit and surge conditions must be insured. To do this each of the four 39,000 kv-a generators is built with unusually low transient reactance, large flywheel effect, a double-cage damper winding, and is provided with a quick-response excitation system.

Radio-frequency of broadcasting station.—A small, thin slab of quartz is the guiding hand which keeps the modern broadcasting station upon its assigned frequency. When associated with the proper apparatus, the quartz exhibits the remarkable phenomena of changing its thickness many thousands, even millions of times a second. It is this oscillatory motion that controls the frequency of the broadcasting station. The thickness of the quartz bears a definite relation to the frequency at which it will oscillate; consequently, a quartz crystal may be cut to oscillate at any frequency desired by making it of the correct thickness. As is well known, heat causes an expansion and cold a contraction in solids and so it is with a crystal. Since the frequency of the quartz depends upon its thickness, it is essential that the temperature of the quartz be kept constant at all times; otherwise, the frequency will shift. Elaborate means are employed to keep the crystal at an even, unvarying temperature.

Canadian tests effect of drying damp wheat.—The conclusions of tests commenced in 1927, by Canadian scientists, on the storage and commercial drying of damp wheat, have been submitted to the Canadian National Research Council, according to a report from Herbert W. Barrett, Assistant Trade Commissioner in Ottawa, Canada. The conclusions reached in the report are as follows: (1) In drying wheat the baking quality was impaired more by the high air temperature than by any other factor, and 180° F. must be regarded as the maximum safe temperature; (2) the moisture content of the wheat before drying appeared to have little effect on possible resultant damage; (3) drying in cold weather when the air is excessively dry and cold seemed to increase slightly the risk of damage; (4) drying very damp wheat in two stages appeared to possess no advantage over the single-stage method in preventing injury; and (5) wheat decreases in weight per bushel as moisture content increases and heat drying never brings it back to the original bushel weight.

Relative visibility of various kinds of light.—The International Commission on Illumination, meeting in Geneva in 1924, adopted a standard set of values for the relative visibility of radiant energy. The visibility function indicates the relative light-producing powers of the various parts of the spectrum. The values adopted at wave-length intervals of 10 millimicrons have served the very useful purpose in photometry and colorimetry of unifying the choice of visibility function. It frequently is necessary, however, in the varied uses to which the standard visibility function is put, to know accurately a value of the visibility at a wave length intermediate between those for which standard values have been adopted. Through the use of the formula for "osculatory interpolation," the National Bureau of Standards has computed nine values between each two specified values of visibility, and has prepared a table of visibilities so that standard values of the relative visibility function may be read at wave-length intervals of 1 millimicron. A more complete report is given in the "Bureau of Standards Journal of Research," vol. 6, page 465, March, 1931.

Standardization by industries indorsed.—The Federal Trade Commission has placed itself on record at various times as being in favor of the standardization and simplification activities of associations. In its report on February 13, 1929, to the Senate on Open Price Trade Associations, the commission stated: "Some of the most valuable kinds of association work may be classed as measures looking to greater economy and efficinecy in business. Among these are standardization, simplification, grading, and inspection. In general, standardization and simplification and related movements should tend greatly to lower distribution costs—a development much to be desired." In no manner has the commission ever held the standardization of commodities by the members of an industry to be violative of any of the statutes it has the duty of enforcing. It regards the promotion of standardization of commodities among the members of an industry as peculiarly the work of the Department of Commerce. In calling attention recently to the fact that there has been no departure from its early attitude toward standardization, the commission has stated that it regards the work of the department in encouraging standardization of commodies as important and beneficial to the public.

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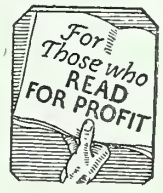

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—President Hoover, at the laying of the corner stone of the new building of the U. S. Department of Commerce, June 10, 1929.

THE UNITED STATES DEPARTMENT OF COMMERCE

R. P. LAMONT, Secretary of Commerce

AERONAUTICS BRANCH, CLARENCE M. YOUNG, Assistant Secretary of Commerce for Aeronautics.

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U. S. GOVERNMENT PRINTING OFFICE: 1931