Fureau of Standards

# COMMERCIAL STANDARDS STANDARDS MONTHLY Reference book not to ba

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AIRPLANE VIEW OF BUREAU OF STANDARDS (LOOKING SOUTH)

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# U. S. DEPARTMENT OF COMMERCE ROY D. CHAPIN, Secretary

BUREAU OF STANDARDS LYMAN J. BRIGGS, Acting Director

COMMERCIAL STANDARDS MONTHLY, S. F. Tillman, Editor

# The Commercial Standardization Group

A. S. Mc ALLISTER, Assistant Director

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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 com-

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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.

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fications, 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

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changeability, 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 BUREAU OF STANDARDS, Washington, D. C., for further information

STANDARDIZATION ...IS.. A CONTINUING PROCESS G↔0 ITS AIM IS NOT FIXITY OR STAGNATION ...BUT.. TO ADD SERVICEABILITY AS OFTEN AS THE POTENTIAL GAIN MAKES IT WORTH WHILE

# COMMERCIAL STANDARDS MONTHLY

# A Review of Progress in Commercial Standardization and Simplification

VOLUME 9

# WASHINGTON, D. C., JANUARY, 1933

NUMBER 7

# SUBJECT ANALYSIS

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# AN INVITATION TO VISIT THE BUREAU OF STANDARDS

A cordial invitation is extended to all interested in scientific progress to visit the laboratories of the 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.

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# Dry-Goods Men Consider Improvement of Quality Standards

# 3

Establishment of new standards of merchandising, advertising, and service, with particular emphasis on quality and on the reduction of the costs of distribution, featured the 1933 convention of the National Retail Dry Goods Association, held January 16–20 in New York.

The association has given careful study to the matter and recently launched the National Quality Movement, which has for its purpose an improvement in the quality of goods manufactured. The association has in mind a general readjustment of standards, in every field of retail operation, to present-day economic requirements and changed consumer buying habits.

"The retailer knows now that quality pays," recently stated P. A. O'Connell, the president of the association, in discussing the National Quality Movement, "so he goes to a manufacturer of quality merchandise and from him buys garments that he is sure are well made—fast dyes, good fabric, and good workmanship.

"The return to quality must likewise extend to all other divisions of business activity—quality in advertising, quality in transportation, quality in banking, quality in the investment securities that are offered, quality in real estate, quality in labor, and quality in service," he added. "These and other fields of activity are all part of the vast machine we call business. A return to a basis of solid quality value will create the confidence and economic saving necessary to keep this machine running."

# PLANNING OF CONSTRUCTION ON BASIS OF RESEARCH

Research Activities of Bureau of Standards for Modernizing Construction Standards for Use of Industry

By HENRY D. HUBBARD, Bureau of Standards

The Bureau of Standards of the Department of Commerce has two main branches, research and testing and commercial standardization.

Both conduct work of direct interest to the construction industries in both the commercial and technical aspects of these industries. The purpose of this brief series is to point out how these activities are coordinated in the interest of the business groups and of the consumers.

The Department of Commerce, through the Bureau of Standards, aids the construction industries in many ways. In the following brief summary details will be given only to illustrate the scope or success of such

aids as those relating to fundamentals of planning, standards, materials, equipment and devices, assembly, processes, cooperation, and information.

The first article will touch upon the subject of planning. The bureau's work in this field relates to the testing of measuring instruments, strain

gauges, testing machines; to the standards of dimension and quality which precede intelligent planning; to the physical constants and properties of materials which to the technical designers are the basis of accurate quantitative planning; to the coordinating systems of city planning and zoning within which public purposes and rights are wisely achieved; and to the processes which the architect and builder may choose to achieve their projects.

achieve their projects. In the technical laboratories of the bureau, hundreds of researches have been made and the results have entered current building practice. In the special division devoted to building and housing, a service unique in its nation-wide scope and application is rendered by the compilation of pertinent data—economic, statistical, industrial, and scientific—relating to construction.

The planning of construction involves the use of such data, which include the location of structures as affected by zoning and city planning; the choice of materials on the basis of their properties ascertained by research, the use of systems of construction such as welding; the safeguards suggested by experience and research to insure minimum hazards from fire, lightning, noise, corrosion, wear, leakage, and the like; such being assured by efficient waterproofing, thermal insulation, and acoustical insulation, to cite examples.

The bureau has been especially active in expert collaboration in preparing specifications (cement, lamps, and builders' hardware being examples of great interest and success) and in formulating codes (such as those for electrical service, gas service, lumbering, lightning protection, and elevator practice); in research and testing of building materials (notably metals, brick, building tile, concrete, paints, and many others); and finally has investigated structural processes such as welding, the promotion of which is recently assuming significant interest.

The success of the work lcd the American Institute of Architects, through a special committee, to recommend in 1918 that the Bureau of Standards draft standard building-code requirements to serve as guides for cities in preparing or revising local ordinances.

Congress, upon recommendation of Mr. Hoover, then Secretary of Commerce, gave the bureau the necessary funds, and in 1921 he organized a division of the department under his immediate direction.

This is one of a series of articles by Mr. Hubbard, assistant to the Acting Director of the Bureau of Standards, outlining the work of the bureau as it concerns the construction industry. These articles will cover research, testing, simplified practice recommendations, commercial standards, and the certification and labeling plan. This was later made the Division of Building and Housing of the Bureau of Standards and has from the beginning been most active in promoting the interests of construction, particularly in the smallhouse field.

The union and close contact between the research laboratories of the bureau and the above-mentioned

division stimulated specific rescarches and formed an outlet for the results, permitting the better technical plauning of codes for building, and of the equipments and materials entering into the design of structures. The Advisory Committee on Building Codes, appointed by Mr. Hoover, has been active in laying a basis for relieving obsolete strictures on active building operations, as illustrated in the committee's formulation of the minimum requirements for small dwelling construction in the light of recent progress in building technology.

Every feature of building construction has received expert attention at the burcau, from the concrete of the foundation to the materials for roofing; from the testing of the surveyor's steel tape and the strain gauge of the engineer to the layout of lightning protection or noise-eliminating construction; from location in harmony with advanced principles of city planning and zoning practice to the practical family problems of home ownership and maintenance; from the technical specifications for the small dwelling to tests of the structural members for giant bridges; and finally, from the pure physical chemistry and physics of building materials to the practical phases of concrete mixing.

The Advisory Committee on City Planning and Zoning appointed by Mr. Hoover in 1921 has promoted the modern movement for planned cities. City planning and zoning have merited public interest because they promote civic efficiency, orderly growth, stabilized values, and better distribution of industrial, business and residential occupancies by segregating them according to needs, facilities, and services required. Cities have grown like weeds in an open lot. But few had limits to the height of buildings or the area of the lot they might occupy or the use to which they might be put. It was a new idea to enact zoning regulations suited to each class of activity in segregated groups.

Planning helps to preserve residence districts intact, free from noisy industries or unsightly service shops. To protect the rights of citizens, the committee drafted the standard State zoning enabling act, providing authority for municipalities to enact zoning ordinances suitably safeguarded. In 11 years of committee activity the number of zoned municipalities has increased from 60 to 1,165. The number of States which have zoned municipalities has increased from 12 to 47, with populations in zoned areas having increased from 11,000,000 to 47,700,000, comprising more than twothirds of the urban population of the Nation and ranging from villages to great cities like New York and Chicago.

The Bureau of Standards makes surveys of zoning progress and disseminates information on request to civic bodies, municipal officials, and others interested. The City Planning Primer has received wide circulation and the standard city planning enabling act has served as a model for a number of States and has stimulated legislation of this character.

The model act provides for the creation of city planning commissions, which among other functions, are given a control over the layout of new subdivisions. To date, 840 city and town planning commissions have been created.

The Zoning Primer has been accepted as the most influential single publication in the field. A recent publication prepared by the committee is The Preparation of Zoning Ordinances, a reference manual to aid officials and others in preparing ordinances. The committee is now completing a special report on subdivision regulations.

In connection with home building and home ownership problems, a number of booklets were prepared and issued by the bureau, including How to Own Your Home, Present Home Financing Methods, and Care and Repair of the House. Of the first, 350,000 copies have been sold, and of the last named, 45,000 copies have been sold.

Mimeographed bulletins are available on home heating, home building and maintenance, and building materials, respectively. Copies of talks on drives for better homes, new trends in home design, and related

# CONSTRUCTING A SUNDIAL

One of the earliest methods of determining time was by observing the position of the shadow cast by an object placed in the sunshine. As the day advances the shadow changes, and its position at any instant gives an indication of the time. The relative length of the shadow at midday can also be used to indicate the season of the year. It is thought that one of the purposes of the great pyramids of Egypt was to indicate the time of day and the progress of the seasons.

Although the origin of the sundial is very obscure, it is known to have been used in very carly times in ancient Babylonia. One of the earliest recorded topics are also available. In this and many other ways a notable informational service has been conducted on the economic, statistical, practical, and legal phases of home building and home ownership.

This brief review can not touch upon all lines of work of concern to the construction industry and the Government's construction projects, and the ultimate owner or user of houses and other structures. As a net result of 11 years of educational effort, in cooperation with all groups concerned, the industry has advanced, construction has been facilitated by new materials, new processes, new designs, and by safe reduction in needless restrictions on building. The aim has been to relieve housing deficiencies and unemployment, to mitigate seasonal nnemployment, and modify the number and variety of building codes throughout the country. The latter were studied by the advisory committee on building codes and experimental researches were conducted on such doubtful points as fire hazards and plumbing requirements. Since the beginning of this work, about 300 cities have used the bureau's findings in the preparation or revision of their building codes.

Among the helpful services rendered may also be cited the drafting of a standard State mechanic's lien act aimed to remove certain difficulties in the present practice. This was formally approved on October 5, 1932, by the National Conference of Commissioners on Uniform State Laws.

The director of the Bureau of Standards cooperated in the President's Conference on Home Building and Home Ownership, and served as chairman of the correlating committee on technological developments. The bureau's specialist on engineering mechanics compiled an elaborate report covering a progressive collation of many ingenious ideas for consideration by architects, engineers, and home makers. In all, members of the bureau staff have cooperated, as officers or members, with 18 of the 31 committees of the conference and have aided in the editing of the 11 volumes of its published reports.

As a result of the President's conference, a permanent committee is at work promoting the reconditioning, remodeling, and modernizing of homes. In this work the bureau is taking an active interest. This committee is now advisory to the bureau's division of building and housing. Late reports now available indicate that some 78 cities have organized modernizing campaigns during 1932, and secured an aggregate of \$65,000,000 in pledges for reconditioning, remodeling, and modernizing.

is the dial of Ahaz, eighth century B. C., mentioned in the Bible, II Kings XX: 8–11. The Greeks used sundials in the fourth century B. C., and one was set up in Rome in 293 B. C. To-day sundials are used largely for decorative purposes in gardens or on lawns, and many inquiries have reached the Bureau of Standards regarding the construction and erection of such dials.

To take care of these inquiries the Bureau of Standards has issued letter circular No. 347, in mimeographed form, which may be had without charge upon application to the bureau. This circular gives an outline of the generally accepted best practices for the construction and erection of sundials.

# **TESTING OF RUBBER GOODS**

Résumé of How Rubber Goods Are Tested at the Bureau of Standards Indicates the Ways in Which the Testing Saves Money for Federal and State Governments, as Well as Assisting the Manufacturer and Consumer

By A. T. MCPHERSON, Bureau of Standards

The Testing of Rubber Goods was the title of one of the first publications on rubber issued by the Bureau of Standards about 20 years ago. Since that time the bureau has maintained a position of leadership in setting standards and developing methods of tests for the rubber industry. This service has been of especial value during a period when the industry has undergone radical changes, and the consumption of rubber has increased almost tenfold because adequate standards and test methods were used by the manufacturer as a guide to new development, and by the consumer as a means of intelligent and economical purchase.

The testing of rubber goods conducted by the Bureau of Standards is of two general types. One is a

relatively simple, and often routine type of testing that is conducted to ascertain whether certain rubber products conform to the specifications set up for their purchase. The other type of testing is broader and more fundamental, and has for its purpose a study of the

composition, design, construction, and performance of rubber articles to determine how well they serve their intended purposes. Often the latter investigational type of testing is carried out to provide an adequate basis for the preparation of specifications.

Virtually all of the rubber products purchased by the Federal Government are bought under specifications, as was indicated in the previous article in this series. Representative samples of a great many purchases, ranging from dredging hose to hot-water bottles and from truck tires to electric cables, are tested for compliance with specifications at the Bureau of Standards. Last year about 9,000 tests were made on 1,500 different rubber articles. The testing services of the Bureau of Standards are as freely available to the State Governments as to the various branches of the Federal Government. A number of the larger States make very extensive use of such services in connection with their own purchases.

There is a popular misapprehension regarding the nature and scope of this testing of rubber products. The most frequent inquiry regarding rubber from visitors at the Bureau of Standards is, "What make of tire do your tests show to be the best?" The answer is that the tests are neither designed nor conducted to place a relative rating on tires. The Government does not test all available tires and buy the best, but rather it buys the cheapest tire offered which meets a given standard of quality. In the majority of cases tests are made only on the tires supplied by the lowest bidder, and furthermore, such tests are conducted only to such a point as to ascertain that the tires conform

to the minimum requirements of the specification. Except in the case of the rejection of the lowest bid. no tests are made on the tires of the next higher bidder.

While the testing of rubber products under specifications is done for the specific purpose of insuring the quality of purchases by the Federal and State Governments, there are certain definite which accrue to the industry. This testing aids in the maintenance of uniform test methods and procedures throughout the country, a service which is especially needed in the case of rubber because of the technical difficulties involved in testing. Another benefit is the setting up and maintenance of standards for rubber products which frequently find wide acceptance. For example, the commercial standard for hospital rubber sheeting

This article, the third and last of the series on rubber, tells how rubber goods are tested at the Bureau of Standards and indicates the ways in which the testing saves money for Federal and State Governments, assists the manufacturer, and benefits the public. recently adopted by the industry is identical with the Federal specification for the same commodity.

The other type of testing, construing testing in a broad sense, is different in character from specification testing, and sometimes involves detailed investigations and scientific

studies on rubber products. One illustration of this type of testing is the study that was made on the subject, The Wearing Quality of Tire Treads as Influenced by Reclaimed Rubber. This investigation was conducted in 1925 when the price of new rubber was high and was subject to wide fluctuations. At that time reclaimed rubber was used in tires to quite a large extent and many manufacturers claimed that it could be employed in reasonable proportions as satisfactorily as new rubber. As a matter of fact, some laboratory abrasion tests indicated that this was the case. The bureau investigators, however, recognized that the laboratory abrasion tests then available were frequently not in accord with road tests, so they secured the cooperation of two manufacturers each of whom built 50 tires in which the treads were made up of sectors containing varying proportions of reclaimed rubber. Performance tests on these tires showed that the rate of tread wear increased directly in proportion to the per cent of reclaimed rubber used. The logical conclusion from this finding was that the use of reclaimed rubber in tire treads was of no economic advantage.

This conclusion did not find immediate acceptance, but was for a time the subject of discussion and controversy. The situation was recently summed up in a paper by C. W. Sanderson, of the Goodyear Tire & Rubber Co., which was published in Industrial and Engineering Chemistry (September, 1931). This author states, in part:

Therefore, it can be said that up to 20 per cent, the use of reclaim will cut down the resistance to road wear by approxi-

mately the percentage used. This is essentially the conclusion reached by Holt and Wormeley (authors of the Bureau of Standards paper). Their method was severely criticized, but this criticism was not justified, and their conclusion was essentially in line with the facts.

Partially as a result of this investigation, the practice of using reclaimed rubber in the tread of tires has been very largely discontinued, and the saving to the motorists of the country as a result of increased tire mileage is very material.

Incidentally, it should be understood that the above discussion is in no sense a general indictment of reclaimed rubber. As is indicated in another Bureau of Standards publication, reclaimed rubber has a legitimate place in rubber manufacture, and its use in certain types of rubber goods that are not subject to severe wear may be advantageous. Other tests of this type will be mentioned briefly to indicate the varied scope and application of this type of work.

A study was made of the rubber balloons used by the Weather Bureau to determine the height of the ceiling at flying fields and the velocity and direction of the winds aloft. The results of these tests were employed to draw up specifications to permit the

# BOOK OF A. S. T. M. TENTATIVE STANDARDS FOR 1932 AVAILABLE

Announcement of the availability of the 1932 Book of A. S. T. M. Tentative Standards, has just been made by the American Society for Testing Materials. The book includes all of the 226 tentative specifications, test methods, definitions of terms and recommended practices effective as of October 31, 1932. Of this number, 47 were accepted for publication for the first time in 1932. A general classification of the tentative standards with the number pertaining to each group follows:

Ferrous metals	39
Nonferrous metals	20
Cement, lime, gypsum, concrete, and clay produtes	31
Preservative coatings	25
Petroleum products and lubricants	15
Road materials	26
Coal, coke, timber, timber preservatives, shipping con-	
tainers, waterproofing and roofing materials, slate, and	
building stone	24
Electrical insulating materials	15
Rubber products	8
Textile materials	14
Miscellaneous subjects	9
Total	226

This book which is issued annually by the American Society for Testing Materials, includes all of the tentative standards in effect at the time of publication. The term "tentative" is applied to a proposed standard, which is given approval throughout the various steps of American Society for Testing Materials procedure, and which is published for one or more years to elicit comments and criticism, of which cognizance is taken before it is formally adopted and issued as an American Society for Testing Materials standard. Although in the trial stage, these tentative standards are in wide use due to their careful preparation.

The 1932 book contains a comprehensive subject index and a complete table of contents which lists under the general class of materials covered, all of the tentapurchase of more serviceable and more reliable balloons.

A series of tests on the lateral movement of the tread of a tire as it comes in contact with the road were of especial interest to designers of automobile tires, and the results published were used by some manufacturers as the basis of redesigning their tread patterns.

In answer to numerous requests for information on puncture-sealing compounds, tests were conducted on the different types of commercial preparations available. The results were published in a circular which has had wide circulation.

Tests that were made on garden hose were published in a circular entitled "Selection and Care of Garden Hose." This publication tells the householder how to make an intelligent selection of hose without undertaking any laboratory tests and also gives timely advice on the proper care of hose.

The Bureau of Standards, through its varied activities in the testing of rubber, benefits the Federal and State Governments as purchasers, maintains standards for the industry, and furnishes accurate and reliable information which is of value to the manufacturer and the public.

tive standards pertaining thereto. The publication, comprising 1,236 pages bound in blue cloth, is obtainable from the headquarters of the American Society for Testing Materials, 1315 Spruce Street, Philadelphia, Pa., at \$8 per copy, with copies in heavy paper binding available at \$7 each.

#### FEDERAL SPECIFICATIONS

Twenty specifications were acted on by the Federal Specifications Board during the month of December. Of this number, 5 proposed specifications and 15 revisions have been sent out for official comment and criticism. Copies of these specifications are available in mimeographed form and further information can be obtained from the Federal Specifications Board, Bureau of Standards, Washington, D. C.

New designa- tion	Specifications proposed	Old F. S. B. No.
	Reindeer meat	
	Specifications for revision	
GG-S-751	Sterilizers, accessories and portable lockers for use with	00-
GG-T-311	Thermometers, clinical	68a 309
PP-S-51a	Sardines, canned	
QQ~C-541	Copper-nickel-alloy, bars, plates, rods, shapes, sheets, strips, wire, and seamless tubing	585
QQ-F-181	Ferrosilicon	145
QQ-N-321	Nickel-silver (German silver), bars, plates, rods, shapes,	468
RR-C-251	Chain ship	1719
SS-M-501a	Mold-wash silica	11110
ZZ-B-719	Rogs politzer	
$77_M_71$	Matting rubber	382
77_P_351	Pillows oir rubber	2325
77_8_451	Slooves dradging	42
GGG_I_51	Janko	481
GGG_8_201	Shears tinners' hand (snins) and hanch	451
L L L = D = 1010	Bacantaclas wests paper fiber office and lobby	401
111-11-101d	receptacies, waste-paper, inter, once, and lobby	

# EXPOSURE TESTS OF WIRE CLOTH FOR INSECT SCREEN

# Work Carried on by Bureau of Standards Aided by American Society for Testing Materials

By G. WILLARD QUICK, Bureau of Standards

The serviceability of a number of commercial insect screen wire cloths has been the subject of a cooperative investigation by the American Society for Testing Materials and the Bureau of Standards since 1920.

Committee D-14 of the society was organized at that time to initiate the program. The committee consisted of representatives of manufacturers of the wire, of the woven wire cloth, and of the fabricated screens, together with representatives of several Government departments. The Bureau of Standards' representative was made chairman of the committee and of the subcommittee on tests. It was thought that under this arrangement the laboratory tests and the gathering of data on weather exposure tests which might extend over a number of years would be done by a continuing responsible body in a strictly impartial manner.

Standard specifications for nonferrous insect screen cloth, sponsored by the committee, have been accepted by the society and are published in the American Society for Testing Materials Standards, Part I, 1930, page 773.

Materials to be investigated were furnished by the members of the committee. Laboratory tests and the preparation and setting up of the specimens for exposure to the weather in a variety of atmospheric conditions were carried out by the Bureau of Standards.

The atmospheric exposure tests have been under way for about seven years. The exposure specimens are in the form of screens of No. 16 mesh, woven from nonferrous wire, 0.0113 inch in diameter and of seven different compositions. Two of the compositions, the 90 copper, 10 zinc, and the unalloyed copper, correspond, respectively, to class A and class B materials of the specification referred to above. The other materials are all obtainable commercially under various trade names. The nominal compositions of the seven materials are shown in Table 1.

TABLE I.—Approximate composition of wire cloths

	No.	Copper	Zinc	Nickel	Tin	Alumi- num
1		Per cent				
2		80	20			
3	• • • • • • • • • • • • • • • • • • • •	75 30	5	20		
5	•••••••••••••••••••••••••••••••••••••••	100				
7	•••••••••••••	98 95			2	5

Each kind of cloth was placed in three types of frames; namely, (1) 30 by 36 inch wood, (2) 30 by 36 inch copper, and (3) 12 by 12 inch wood. The cloth was mounted in the large frames by a manufacturer of screens according to regular commercial practice. The cloth in the small wood frame was mounted so as to be under very little tension. The wood frames were painted with white-lead paint free from such impurities as might be harmful when washed over the cloth. Through the courtesy of several Government bureaus, the materials were exposed at four locations representing different corrosive conditions; namely, the Bureau of Mines at Pittsburgh, Pa., with a "heavy" industrial atmosphere; the Bureau of Lighthouses at Portsmouth, Va., with a temperate seacoast atmosphere and considerable industrial contamination; the Panama Canal, with a tropical seacoast atmosphere; and the Bureau of Standards, Washington, D. C., with a normal inland atmosphere and no industrial contamination. The seven materials were exposed in each of the three types of frames at the four locations; hence, 21 specimens are under observation at each location, or a total of 84.

Through the cooperation of several Government laboratories, daily determinations of the sulphurdioxide content of the atmosphere over a period of one year were made at or near the four exposure stations. These results were published in the Proceedings, American Society for Testing Materials, Vol. 30, 1930, Part I, page 864.

After seven years' exposure no failures have occured in any of the screens exposed at the Bureau of Standards. A number of screens exposed at the other stations have failed.

Portsmouth, Va.—After four years' exposure, material No. 2 failed in the large wood frame, and subsequently in the other two frames. The cloth became very brittle and fell in pieces when slightly crushed. The fractures of the material showed a deterioration of the alloy by dezincification, which had penetrated deeply into the wires and had rendered them quite brittle. Small holes were found in some of the other materials but they appear to have resulted from some external object striking the screens. The wires in materials 3 and 4 were in good condition and were not brittle, whereas the wires in materials 1, 5, 6 and 7 became somewhat brittle.

*Pittsburgh*, *Pa.*—After four years' exposure material No. 4 failed, and since that time failures occurred in materials Nos. 2 and 7. The other materials show heavy coatings of corrosion products, but no further failures have been reported.

Panama Canal.—The only failures occurring at Panama were in screens of material No. 2. The failures started after about four and one-half years of exposure. After five and one-half years' exposure the failure had progressed so that the screens would have been unfit for service. The specimens mounted in the small frames were destroyed by vandals several years ago, so that only the materials in the large frames remain at this location.

*Exposure tests.*—The exposure tests have not proceeded far enough to ascertain the extent to which they parallel the laboratory accelerated corrosion tests. However, the exposure tests checked the laboratory results for the alloy with 80 per cent of copper and 20 per cent of zinc, which has failed at three exposure stations and given the poorest results in accelerated corrosion tests. On the other hand, the

alloy with 30 per cent of copper and 70 per cent of nickel which withstood repeated immersion in weak sulphuric acid and in the salt-spray tests with less loss in weight than the other alloys was the first to fail at Pittsburgh; hence, the laboratory tests did not serve as a criterion for this service. No failures have occurred with this alloy at the seacoast and Bureau of Standards.

Details of the exposure tests and of some laboratory tests on the materials are given in the Proceedings,

# AMERICAN STANDARDS ASSOCIATION

Current developments of the following standardization projects under the auspices and procedures of the American Standards Association have been reported by that association:

Spur-gear tooth form.—A new American standard, spur-gear tooth form, has been aproved. It is a combination of the data on the  $14\frac{1}{2}^{\circ}$  composite system and the 20° stub involute system approved by the association in 1927 as an American tentative standard, with new data referring to the  $14\frac{1}{2}^{\circ}$  and 20° full-depth involute system. The committee having charge of the project is jointly sponsored by the American Gear Manufacturers Association and the American Society of Mechanical Engineers.

Steel-flanged fittings.-The new American standard, steel-flanged fittings and companion flanges, recently approved, is a revision of the American tentative standard. In this revision, the pressure ratings of 250 and 1,350 pounds per square inch, have been increased to 300 and 1,500 pounds per square inch, respectively. The standard now covers the same flanged fittings as the old standard, and in addition to these fittings for a maximum steam service pressure of 150 pounds per square inch at 500° F. (or 100 pounds per square inch at 750° F.) and flanged base-fittings for pressures of 300, 400, 600, and 900 pounds per square inch, companion flanges are given for the pressure ratings of 150, 300, 400, 600, 900, and 1,500 pounds per square inch. The 31/2-inch size flanged fittings in the 900 and 1,500 pound series have been established. The revision of the standard has resulted in changes of certain dimensions, such as the minimum metal thickness of some fittings which was increased on account of the increase in two pressure ratings.

Electrical standards committee.—The electrical standards committee, at its November meeting, assumed sponsorship for the following projects organized under A. S. A. procedure, which were formerly under the sponsorship of the American Institute of Electrical Engineers and the National Electrical Manufacturers Association: Insulators for electricpower lines, power-switch gear, electrical measuring instruments, and rotating electrical machinery.

The project on power-switch gear is a consolidation of two former projects, oil circuit breakers and disconnecting and horn gap switches. The new project has the following scope: Oil circuit breakers, large air circuit breakers, disconnecting and horn gap switches.

The committee also approved a new scope for the project on electrical measuring instruments as follows: Definitions, classification, rating, methods of test, and construction details for all types of electrical measuring instruments, but not including (1) American Society for Testing Materials, volume 26, 1926, Part I, pages 487–498. In volume 30, 1930, Part I, pages 864–880, the status of the exposure tests and the results of determinations of sulphur dioxide in the atmosphere at the exposure stations are given.

The present status of the exposure tests will be published in the Report of Committee D-14, Screen Wire Cloth, Proceedings, American Society for Testing Materials, volume 32, 1932, Part I, which will be available within a short time.

watt-hour meters, (2) demand devices and their auxiliary apparatus, and (3) low precision or special instruments.

A new project on transformers, which is a consolidation of the projects on instrument transformers, recommendation for the temperature operation of transformers, constant current transformers, and transformers, induction regulators, and reactors, has been initiated. The scope is as follows: Formulation of standards for transformers (exclusive of auto transformers used as part of auto starters, automotive ignition transformers, and communication transformers), voltage regulators of the induction or transformer type, and reactors.

#### STEEL SPIRAL RODS

Revised simplified-practive recommendation No. R53–32, steel spiral rods for concrete reinforcement, has been accorded the required degree of written acceptance from members of the industry, and became effective as of December 15, 1932.

The diameters of the fourth simplified rods listed in the original recommendation remain unchanged in the revised program. Their corresponding areas, in square inches, however, have been added to the table of simplified sizes. A detailed tabulation which shows the application of the sizes of simplified reinforcing spirals to all normal column core diameters with onefourth inch intervals of vertical spacing between successive turns, has been included to facilitate the use of spiral rods by specifying authorities.

## CANADA LISTS "APPROVED " MOTORS

The Canadian Engineering Standards Association has recently completed the first draft of Essential Requirements and Minimum Standards Covering Electrical Equipment (Specification No. 11) Construction and Test of Fractional Horsepower Motors. These specifications cover general requirements, construction details, markings, and tests—all related to fire and casualty factors.

Under the existing Canadian conditions, the hydroelectric power commission's testing laboratories at Ontario, the Dominion laboratories of Canada at Ottawa, or Underwriters' Laboratories, may list or approve motors complying with these specifications. In those Provinces where required, only motors listed by one of these laboratories will be accepted for sale. No definite time has yet been set for the adoption of the requirements.

# APPLICATION TO TEXTILES OF SIMPLIFIED PRACTICE

Cooperation of Bureau of Standards with Industry to Eliminate Redundancy and Reduce Variety of Products

By EDWIN W. ELY, Bureau of Standards

Simplification when applied to industrial products consists of reducing unnecessary variety and of selecting from among a large number of sizes or types the particular items in sufficient demand to justify establishing them for regular stock purposes. The idea of simplification is not new; in some form or another, it is as old as industry itself.

The first attempt at nation-wide simplification was made during the World War, when the War Industries Board surveyed the entire field and assisted industry in eliminating nonessential items and in establishing those items which should be placed in regular production. The result was a great increase in essential items, reduced to fewest practical sizes and types, and the release of enormous quantities of basic materials for war purposes.

rials for war purposes. The division of simplified practice was established in the Bureau of Standards following the war, when peace-time activities required economies in production, distribution, and use similar to those obtained by simplification during the war. Its function was to assist industry, with the difference that cooperation by industry was to be voluntary. With the establishment of this division, the term "simplified practice" first came into our industry. Simplified practice is simplification applied throughout an entire industry, rather than by a single company. It is a voluntary activity, in which manufacturers, distributors, users, and all other concerned with a particular article or commodity cooperate to reduce the number of varieties regularly manufactured as "stock" items. The division of simplified practice does not initiate projects, nor does it attempt to dictate or even suggest definite things to be done. Most simplified practice recommendations are initiated by the manufacturers of a product, but they may be initiated by distributors and users, and quite frequently the original suggestion comes from a distributor or a user.

The experience of the division of simplified practice has shown that the success of a simplification project depends on four fundamental steps: First, a comprehensive survey of the demand for existing variety; second, a sound and conservative elimination of nonessential items, with proper consideration of the needs of all groups affected; third, enlisting the active support of producers, distributors, and con-sumers; and fourth, maintaining interest and adherence by keeping the program abreast of current practice through periodic revision. The work in connection with steps 1 and 4 is carried on through com-mittees selected by the industry, called, respectively, the simplified practice committee and the standing committee of the industry. These act as liaison agencies and perform the necessary duties which precede and follow a general conference. The simplified practice committee, usually composed of representatives of one element of an industry; for example, producers develop step 2 in the procedure in cooperation with the entire group, and often with existing committees of other groups, such as distributors. Quite often the simplified practice committee is an existing committee of a trade association appointed to cooperate with the division of simplified practice.

The third step in the procedure is undertaken by the division, following a general conference where the recommendation of the simplified practice committee is presented for the consideration of all elements of the industry concerned with the commodity.

The general conference approves the appointment of the standing committee, composed of representatives of each branch of the industry; that is, manufacturers, distributors, and users, and this committee carries out step 4. The standing committee through its chairman represents the industry in respect to all questions which may be brought up during the life of the recommendation, and generally it is the agency through which the industry may be promptly consulted on any question of operation or revision. This committee also receives all information showing departures from the recommendation, and applies such corrective measures as appear to be in the best interest of all concerned.

Various industries have utilized the clearing-house facilities of the division in the development of recommendations in the past 10 years, and a total of more than 130 recommendations are in effect to date. Of these, several are for textiles, or for commodities in which textiles are used.

One of the first recommendations developed was for beds, springs, and mattresses. As a result, bed sizes were reduced from 78 varieties to 4, automatically reducing the number of sizes of stock mattresses. Since textiles are used in the construction of mattresses as well as mattress covers, this program was of direct benefit to the textile industry. The simplification of bed blankets made of cotton, wool, and cotton and wool mixed, reduced the number of sizes of blankets from 78 to 12. Those concerned with this program have recently expressed the opinion that further reduction in the number of stock sizes could be effected without interfering in any way with the normal requirements of the trade.

The simplification program for hospital beds, like the earlier one for beds, springs, and mattresses, had for its purpose the reduction in the number of sizes in current production, which in turn required the production and distribution of a large number of sizes of springs and mattresses. As these components are bulky, much storage space was needed for stocking only a few sizes. The program effected a reduction in number of lengths from 33 to 1, and number of widths from 34 to 2, one of which was considered "Special." The benefits to the textile industry resulting from such a program can readily be appreciated.

Another program of great importance to that portion of the industry concerned with production, distribution, and use of cotton duck is the simplified practice recommendation for this material, which has been in

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use for many years. This program established the widths for the various numbers of duck and the weight per square yard. The reduction in variety was from 460 to 90 for stock purposes, with resulting economies to manufacturers, distributors, and users.

to manufacturers, distributors, and users. The recommendation for hospital and institutional cotton textiles is of equal importance to producers, distributors, and users of textiles. This project was proposed by the American Hospital Association after a study of their requirements, and was accepted by the industry for promulgation by the division of simplified practice. It covers sizes of bed pads, pillowcases, sheets, draw sheets, spreads, towels, etc., for hospital and institutional use, and resulted in reduction in variety from 575 items to 26.

Elastic shoe goring is a textile into which is woven rubber threads during the process of manufacture. It is used in certain kinds of shoes and slippers. The simplified practice recommendation developed by the industry, for stock varieties of this material, resulted in a reduction from 70 to 29, considering widths and qualities of this material.

The recommendation for surgical gauze covers widths and constructions of surgical gauze and crinoline in bolts; and constructions, widths, and lengths of bandage rolls, bandages, and package goods. In this case the industry was able to reduce the variety of constructions of this material, from 15 to 7. A recommendation for surgical dressings, made of surgical gauze, has recently been approved. This recommendation is based on a study made by the hospital research and information department of the American College of Surgeons, in cooperation with hospital executives, surgeons, manufacturers, and scientific laboratories. The results of this study were made available to all concerned through the development of the simplified practice recommendation at the request of the American Hospital Association. The program covers nomenclature, sizes, and methods of preparation of the following dressings: (1) Sponges, dressings for sponging and wiping; (2) abdominal pads, dressings for walling off; (3) sterile guaze dressings, dressings to

# WALNUT VENEERS

The commercial standard grading rules for walnut veneers, as approved by a general conference of the industry, were circulated for the acceptance of the trade on November 10, 1932, and thus far they have been indorsed by 106 companies, representing the leading producers and users of the product.

Certified Grading of Walnut Veneers is the title of an announcement issued by the American Walnut Manufacturers' Association which explains the plan as follows:

*Certified walnut veneers.*—The American Walnut Manufacturers' Association, representing approximately 70 per cent of all domestic walnut veneers, is pleased to announce the inauguration of a system of grading walnut veneers.

Plans for grading of walnut veneers were formulated by a group of veneer producers and were then submitted to a number of important panel and furniture manufacturers to assure a plan which would serve the interests of veneer consumers in every particular. The grading rules as finally adopted and here set forth represent the ideas and efforts, therefore, of producer and consumer alike. These rules have been thoroughly proved at test inspections during the past six months; and they have already been strongly indorsed by a number of individual purchasers. cover incisions after operations; and (4) pads, dressings to absorb drainage after operations. The methods of preparation of these dressings are illustrated by sketches showing the sequence of folds, sewing, etc. Tabulated information gives details as to the amount and kind of gauze to be used for each class and kind of dressing.

Fast selvage Terry towels, or Turkish towels, were made in 74 sizes, between 16 by 30 inches and 24 by 48 nches. The industry's simplification program reduced these sizes to six, which are now the regularly stocked sizes for this kind of towel.

Various other recommendations have been developed for commodities in the production of which textiles enter in some form or another. Among these are coated abrasive products, adhesive plaster, and full disk buffing wheels. Twines of all kinds are classified as textile products and in these industries four simplified practice recommendations have been developed. These are: Hard fiber twines, soft fiber (jute) twine, polished cotton twine, and flax and hemp twine. These programs established twine numbers, or ply, feet per pound, tensile strength, and put ups for the various kinds of finished and unfinished twines made of hard fibers, jute, cotton, and flax and hemp. Each program effects substantial reductions in variety for regular stock purposes.

Other textile products and related items have been suggested for simplification from time to time. One of these, of great importance to the entire textile industry, covers textile machinery parts, such as bobbins, spindles, spools, paper and wooden cones, and paper tubes. Part of the program for textile-machinery parts was recently approved by a general conference of the industry. This program deals with paper tubes and cones used for winding various kinds of yarns. This recommendation specifies the length, inside diameter, and weight per 1,000 for parallel paper tubes, and the length, taper, and weight per 1,000, etc., for paper cones. Its adoption should result in the benefits which have been found to follow the adoption of a simplification program.

Under this plan, specifications for minimum quality are determined and all veneer footage is graded in accordance with these specifications.

They constitute complete assurance of uniformity of manufacture, and in addition, serve to increase greatly the yield value to the purchaser.

It is confidently believed that the new grading specifications will eliminate much of the doubt from the purchase of walnut veneers, will facilitate the selection of proper stock from samples or swatches submitted, and will reduce manufacturing costs and will greatly improve the guaranteed yield value.

"Bonded" quality.—Under the provisions of the grading rules, all veneer must be of the same grade as was the sample upon which sales are based. A latitude of only 4 per cent is allowed for unavoidable human error.

The producers who are operating under these grading rules have placed themselves under bond to meet these exacting requirements. Should they fail to meet the required specifications, one can readily secure adjustment—and the producer is under bond to see that the adjustment is made promptly and satisfactorily.

# U. S. S. R. REORGANIZES WEIGHTS AND MEASURES AGENCY

# New Institute Will Foster Progress in Metrology and Standardization

In order to insure uniformity, correctness, and mutual conformity of measures, measuring instruments, and methods of measurement applied in science, engineering, industry, and commerce, the U. S. S. R. Main Chamber of Weights and Measures has been reorganized into the All-Union Scientific Research Institute of Metrology and Standardization (VIMS), under the All-Union Standards Committee of the U. S. S. R. State Planning Commission.

The primary functions of the institute includes: (a) The development, construction, custody, and maintenance of reference and working standards obligatory in the U. S. S. R.; (b) adoption of technical standards for standard measuring appliances (secondary stand-ards); (c) checking of standard measures and measuring instruments, which are to serve for further checking of measures and instruments, supplying the former with special brands; (d) study and development of methods of physical and chemical measurements; (e) scientific and technical assistance in the manufacture of measuring and controlling instruments to be used in the Union; (f) to act as an expert organization for the All-Union Standards Committee as to problems of planning the production of measuring and controlling instruments as well as problems concerning the import of such instruments from abroad; (g) to elaborate projects of dimensional and quality standards (specifications) in the field of meas-uring and controlling instruments, as well as to work out, on the recommendation of the All-Union Standards Committee, draft standards and specifications for items within the activities of the institute, and to draw conclusions on such draft standards and specifications; (h) to develop scientific methods of control over adherence to the all-union standards; (i) to train and raise the qualification of workers in the field of metrology; (j) to bring to a conformity, the plans of scientific research work in the field of metrology, which the committees of the federated Republics, state departments and institutions in U. S. S. R. are concerned with, and are to work out a compound all-union plan for such work to be submitted to the All-Union Standards Committee for approval; (k) to set up a contact and cooperation with the committees of the federated Republics by means of mutual and regular

# TYPE SIZE IN ADVERTISING WOOL AND PART-WOOL BLANKETS

At a joint meeting of the merchandise managers and sales promotion divisions of the National Retail Dry Goods Association and a committee representing the manufacturers of wool and part-wool blankets held in New York, the following recommendation relative to size of type for use in connection with labeling and advertising wool and part-wool blankets was adopted:

In advertising matter applying to part-wool blankets, the words "not less than — per cent wool" shall be shown in the same size and style, and as legible and distinct type, as the words "part wool" and shall follow immediately after the information on the progress of work and of mutual assistance in scientific and engineering activities in the field of metrology and standardization.

The institute is entitled to organize, with the permission of the All-Union Standards Committee: (a)Commissions for scientific research work, consisting of experts, foreign specialists included; (b) congresses and conferences for the elaboration of scientific research problems and metrology and standardization; (c) competitions, lectures, shows, and scientific demonstrations relating to metrology and standardiza-tion; (d) to publish, through the publishing office of the All-Union Standards Committee, transactions, scientific papers, reports, etc.; (e) to organize, in accordance with the plans approved by the All-Union Standards Committee, bureaus, laboratories, and auxiliary shops; (f) to receive from abroad, scientific technical books and papers, scientific instruments, appliances and materials, with the rights and privileges granted to U. S. S. R. scientific institutions.

The institute is headed by a director, with two substitutes approved by the All-Union Standards Committee. The assignment of functions among these officials must be approved by the U. S. S. R. Standards Committee, which approves also the organization and procedure of work for the institute (VIMS).

For the solution of scientific research problems, arising in the progress of work, under the director of the All-Union Institute of Metrology and Standardization there is provided an advisory body, known as the scientific and technical council, consisting of the following members: The director of the institute, his substitutes, individual workers of the institute, and of members personally appointed by the All-Union Standards Committee upon representation of the director of the institute. The latter is entitled to invite experts, whom he may consider necessary, with deliberative votes. The scientific and technical council will meet not less than once in every three months.

The maintenance of the institute is determined by the estimates of the All-Union Standards Committee of U. S. S. R. State Planning Commission and within the budget of the U. S. S. R., and is entitled to use the seal of the All-Union Standards Committee with the name of the institute (VIMS) engraved thereon.

words "part wool" or be set up within three consecutive lines in the following order and relative position:

#### Part Wool

#### BLANKETS

#### Not Less Than — Per Cent Wool

This recommendation has been approved by the standing committee on wool blankets and at an early date will be circulated to the industry for acceptance. If it receives the indorsement of the industry it will become a supplement of the Commercial Standard CS39-32 for Wool and Part Wool Blankets and be included in the next edition of the printed pamphlet.

# STANDARD CLASSIFICATION OF FELDSPAR

# Chairman of Standing Committee Reviews Status of Commercial Standard for Feldspar

By B. C. BURGESS 1

When the classification for feldspar (CS23-30) was drawn up it was realized that there might be points which would need revision from time to time, so provision was made for annual meetings to consider recommendations for revision. A majority of the consumers and producers of feldspar accepted this standard when it became effective on September 1, 1930.

There seems, however, to be some need for a clearer understanding of the classification. The following questions have come up:

(1) Assumption that the standard would destroy existing or established grades.

(2) An impression that the classification is a set of grades on which feldspar producers have standardized which would cut out individual consumers' specifications.

(3) The physical classification, based on the designated mesh and 200-mesh, has been considered inadequate by some consumers.

An explanation of these points is:

(1) The commercial standard does not interfere with existing grades. Chemically its scope covers the entire range of alkali feldspars. Physically it covers the full range of particle sizes in general use in the ceramic industry. Its effect is felt to be rather toward giving an adequate and comprehensive means of classifying the existing grades according to the  $SiO_2$  content and the ratio between alkalies.

(2) Individual consumers' specifications are in most cases a help to the feldspar producers, and all of them welcome individual specifications from their customers and adhere to them as far as possible. However, all of these specifications can be classified according to the commercial standard grades, though the commercial grade may be wider than the individual specification. The individual specification then serves as a supplement to the standard.

(3) The physical classification according to particle size is a remarkably close specification as to grinding. However, it represents limits which are commercially practical to maintain on all of the types of grinding equipment now in use for grinding feldspar. At the time the standard was drawn up it

<sup>1</sup> Manager, Tennessee Mineral Products Corporation, Spruce Pine, N. C.; chairman of the standing committee on commercial standard for feldspar.

# CERTIFICATION PLAN FOR GRAY-IRON CASTINGS

A certification plan is being developed by the Gray Iron Institute through which casting buyers will be able to purchase castings produced for a particular service condition, according to Arthur J. Tuscany, manager of the institute.

Under this plan members of the institute will submit a test bar from each heat of iron to be checked at the laboratories of the institute. The technical department of the institute will then furnish the member was realized that additional grain sizes might need to be added to complete the physical classification. To determine the extent of this classification a large number of sieve analyses of feldspar ground and classified in different types of equipment were plotted and the relation at 200 mesh was shown to be maintained on the finer meshes down to 325 mesh. In consideration of these data the committee decided to allow the original size classification to stand rather than to complicate the standard by specifying limits on finer sieves.

Use of the commercial standard for feldspar has a number of advantages over any other means of classification now in use. Some of the advantages that may be mentioned are:

(1) Silica content is a major factor in controlling the shrinkage and thermal expansion of a ceramic body. Specification of silica content is of great assistance along this line.

(2) Fusion point is primarily a factor of the ratio between the alkalies, another of the fundamentals of the commercial standard.

(3) Certification that the material is of the specified grade under the standard is an excellent assurance to the user as to what he is getting.

the user as to what he is getting. (4) Standardization of particle size simplifies calibration of classification equipment and allows the producer to furnish more uniform grades, thereby giving the consumer less trouble from lack of uniformity of size.

(5) The consumer has a direct comparison of prices.

(6) The comparison of quality is simplified.

(7) The standardization allows the producer to give better values, more uniform quality, and better service.

The questions raised during the first year and a half of the operation of the commercial standard for feldspar are the ones outlined above. The committee will welcome suggestions concerning the standard and will be glad to offer explanation of any points in the standard which are not clearly understood. Those not having copies of the standard may secure it from the Superintendent of Documents, Government Printing Office, Washington, D. C., for 5 cents per copy.

Office, Washington, D. C., for 5 cents per copy. The standards committee of the American Ceramic Society has requested that feldspar be included in the 1933 report of the committee.

complete information as to the results secured in his bar and, if necessary, the steps to pursue to maintain or improve the quality of his output.

By this arrangement, every foundry producing certified gray iron will be under the direct technical control of competent authorities, who will only certify as to the quality of members' output after a given organization has shown conclusively that it is able to produce iron of the quality under consideration. The certification plan requires continuous testing of bars so that members who avail themselves of the plan must maintain specified quality in their product.

# STANDARD METHODS OF TEST FOR METAL-WORKING TOOLS

# Industrial Engineer Presents His Views on Standard Methods of Tests, and of Presenting Test Results, for Metal-Working Tools

#### By ROBERT COREY DEALE, Industrial Engineer

While much information has been published on various phases of the cutting of metals, the production superintendent attempting to make use of this intelli-gence, finds it very difficult to set feeds and speeds in his own shop. Practically all of this information is incomplete, and therefore of little value in other than the shop where the tests were made. To make full use of available experimental work, not only should the experimenter give full information as to all perti-nent details, but there should be a certain amount of standardization in the method of making the tests, and

of presenting the results. It would be highly desirable to be able to make exact comparisons of two different tools, whether of tool steel or other material, as for example, stellite or tungsten carbide, and to know exactly how much bet-ter one may be than another. While it may be known in general that one tool is better than another, it is highly desirable to know the amount of this difference when there is a difference in cost between the two.

At present, the manufacturers of metal-cutting tools give only very general instructions as to the permissi-ble speeds and feeds to be used with their tools. In selling them, they rely on unsupported assertions as to the merits of their tools, or, in cases where the amount of the prospective sale warrants the procedure, they put an application engineer in the shop of the prospective purchaser. This man, who does not seem to be supplied with any definite information as to possible speeds and feeds, depends on a series of trials to determine the best speeds and feeds to be used on each operation. By this means, it is not at all uncommon for the new tool to be credited with a large gain over the tool previously used, when it might have been possible to have run the old tool at a greatly increased speed. While these men are usually excellent mechanics, and consequently are able to improve conditions greatly when the shop has been depending on their own mechanics in the past to find the best speed and feed for each cut, it is believed that these practices are neither economical, nor do they insure that the shop makes use of the best tool for each operation.

It should be possible to buy a tool, with a guarantee as to its performance under standard conditions, which may be duplicated in any shop, should it be desired to check the guarantee. A guarantee of this kind might very well consist of a performance curve for the tool, under standard conditions. A performance curve of this sort, which would consist of a series of curves giving the cutting speed as a function of feed, for a given depth of cut, in a standard test material, as for example, S. A. E., No. 1020 steel. Curves designed to show the comparative value of some particular material for use as a cutting tool, might well be based on a standard size of tool, such as

a 5% by 1¼ inch forged tool. The experiences of the writer—and in this he is confirmed by other industrial engineers-indicates

that it is entirely possible to make up standard information in the form of curves which will be entirely applicable for all shops of a given class. To make such curves of universal use the power required for any cut must be given, so either speeds or size of cut may be reduced when necessary to prevent overloading of shop equipment. To be complete the results of any metal-cutting test should include the following information:

1. Cutting speed.

2. Feed.

3. Depth of cut.4. Tool life (with a notation as to the method of determining the end point).

5. Horsepower required.

6. Type of metal cut, giving complete identification, so that the test might be repeated in another shop if desired. Steel may be designated by S. A. E. number or by composition. A hardness test, such as Brinell or Rockwell, is desirable, particularly if the steel is heat-treated before the test. Tests with cast iron should report the presence of any important alloying element, i. e., as nickel, while the Brinell number should be given as the best available indica-

animoter should be given as the best available indication of the hardness of the metal.
7. Material of tool. (The heat treatment of high-speed steel tools should be in general accordance with the recommended practice for heat treatment of the American Society for Steel Treating.)
8. Dimensions of tool.
9. Share of the tool.

9. Shape of the tool.

10. Rake and clearance angles of the tool.

11. Description of the machine on which the test was made. (As this is largely in order to indicate the possible influence of the machine in causing tool breakdown, any abnormal looseness in the machine should be reported, because of its great effect on the results.)

12. Definition of tool condition at the end of the test and method of determining the end point.

13. The coolant used, if any, and the approximate quantity supplied per minute.

Of the above, particularly in those tests designed to measure the relative value of various tool materials, there are a number of points which might well be standardized, in order to facilitate the comparison of results, and to make comparisons more reliable. These points, with a suggested form of standardiza-tion, are outlined below.

1. Form of data.—All data shall be presented by means of curves showing the variation of cutting speed for each feed, for a given depth of cnt, and a given size and form of tool.

2. Tool life.—The cutting speed shall be given on the basis of a tool life of 60 minutes. If possible, six to eight tests shall be made for each point of the curve. and the cutting speed computed from an average of these results. In most cases, it will be satisfactory to make the test cuts from 10 to 15 minutes long, and

reduce the cutting speed determined from this condition to that for the 60 minute tool life by use of an equation of the form  $VT^{n=c}$ , as developed by F. W. Taylor, in which V is the cutting speed, T is the tool life, and n and c are constants for any given cutting conditions.

3. *Metal cut.*—All data made up for the purpose of comparing tool material and form shall be based on the cutting of S. A. E. No. 1020 steel, or of gray unalloyed cast iron having a Brinell hardness of 150 to 180.

4. *Tool.*—All data made up for the purpose of comparing tool material and form shall be based on the use of a standard  $\frac{5}{8}$  by  $1\frac{1}{4}$  inch roughing tool.

5. Preparation of the work piece.—Before any test cut is taken, the test piece shall be inspected, and if it is found to be eccentric, tapered, rough from a preceding cut taken with an unusually wide feed, or glazed from a tool failure, a light truing cut shall be taken to make sure that the test cut is uniform throughout.

6. *Test cuts.*—When tests are being made on standard machine tools, in which the speed steps are relatively coarse, it is recommended that the piece to be cut be long enough to insure the destruction of the cutting edge of the tool in a single pass.

7. *Coolant*.—All standard results shall be based on dry cutting, although additional work showing the effect of a coolant is highly desirable.

# MEASURES TO PROTECT HOME VALUES PROPOSED

To the millions of Americans who have seen their investments in lots and homes shrink in the present deflation the President's Conference on Home Building and Home Ownership offers, in the publication of Volume IV of its reports, a timely and commonsense program to increase the stability of residential property.

Instability is due primarily to the periodic booms to which American real estate is subject. These booms are said to be based on false hopes inspired by ignorance of the true situation. Knowledge of the percentage of vacant lots, of new construction, of real estate transfers, of vacancies, and of related phenomena in each community, correlated with a knowledge of the population trends of the community would, according to the report, deflate these false hopes and prevent booms and their after effects. The report analyzes long-time trends, seasonal variations, cycles, and random movements and illustrates each with pertinent examples selected from the history of real estate in this country.

As a further protection of the home-owner's investment, the volume includes some carefully detailed advice to the prospective home owner on many points, including time of purchase, location and neighborhood, features of construction, budgeting the purchase, and zoning and deed restrictions. In this connection the report says: "The decision to buy a home should not in any way depend upon making profits out of buying a home for resale. The satisfactions of home ownership do not depend upon making money out of holding the property." There are relatively few published recommendations covering the feeds and speeds which may be used with modern cutting tools. The Bureau of Standards has done valuable work in this connection, but very little other than this may be used with any confidence. Incidentally, this work by the Bureau of Standards is the only published information since the classic paper, On the Art of Cutting Metals, presented more than 25 years ago in a paper to the American Society of Mechanical Engineers, by Frederick W. Taylor, in which the cutting of metals is presented in a way to be thoroughly useful to any shop, as well as giving complete information as to the conditions of the test.

Cutting data, determined from a standardized method of test which may be repeated in any shop, and presented in a standardized manner, will be of great value in giving the machine shops of the country information which will enable them to obtain the maximum productivity. The purchase of cutting tools would be placed on a definite basis, as the manufacturers of such tools would furnish data showing the speeds at which their tools will run under definite, reproducible conditions.

Tools believed to be defective could be checked against a known standard. Mechanics could be given a chart showing the proper speed to use for any combination of feed and depth of cut for any metal cut. If properly used, such data would enable much more effective use of the present shop equipment, and enable costs of production to be reduced materially.

The present volume, called Home Ownership, Income, and Types of Dwellings, contains part of the program formulated by the President's Conference on Home Building and Home Ownership at its meeting at Washington in December, 1931, to raise the standard of American housing. The complete reports of the conference have been published in 11 volumes, which can be purchased for \$1.15 each, postpaid, from Dr. James Ford, President's Conference on Home Building and Home Ownership, Department of Commerce, Washington, D. C.

# WATERPROOFED COTTON FABRICS

In order that the waterproofers and tent and awning manufacturers may have an opportunity to study the method of test developed at the Bureau of Standards by W. C. Smith, research associate of the American Association of Textile Chemists and Colorists, and proposed by that association for use in establishing a system of rating and classifying waterproofed fabrics, outlines of this method have been circulated to the industry for comment.

The proposed test will include exposure of the sample for 45 hours to a fadeometer, a mechanical aging treatment which consists in drawing the sample back and forth under a thin weighted bar in such a way that the sample is subjected to bending, rubbing, and distortion. This operation is performed when the sample is dry and again when it is wet. The specimen is then clamped over the side of a box in a position so that it receives the full weight of the water as the box is filled. The proposed rating of the fabric is based upon the quantity of water that flows through the fabric in a given time.

# WHY QUALITY STANDARDS?

#### Consumers Demand Means of Judging Quality and Justifying Complaints

By I. J. FAIRCHILD, Bureau of Standards

In examining the questions, "Why are commercial standards?" "What is the incentive for the establishment of commercial standards?" and "What needs do they fill?" it seems natural to consider the woman's point of view since women buy at least 85 per cent of consumer goods.

On September 29, 1932, Miss Neysa McMein summed up the resentment of American womanhood against so-called bargains, when she said to a national meeting of retailers:

While I'm a little vague on the facts, and don't know whose fault it is, I do know it's wrong to advertise and sell a dress that will barely last until you get home, and won't clean, and pulls out at the seams. This isn't economy. It just makes poor people poorer. The

poor people poorer. The women who can shop around and afford a good dress are so cross with such "bargains" that they end up by not buying anything at all. \* \* \* It may be a little two-faced for me to stand up here and complain about bargains, because I've always loved them. But I've reformed. I have wasted heaven knows how much money, and I've had an expensive and dreadful lesson. So give us our money's worth, and we'll go through your stores like locusts.

Mr. Earnest Elmo Calkins, an experienced advertising consultant, in an article in the December, 1932, Atlantic Monthly says:

"Quality" is an elusive word. A low-priced article can be good of its kind, can have quality within the limits of its price. The contention is that poorly made merchandise is masquerading as something better, that it is being misrepresented. It is not the bargain that it pretends to be. It is not better goods sold at a sacrifice, but cheap goods sold at a liberal profit. If the consumer knew what she was buying, she would not buy it; but she is not an expert in much that she buys. \* \* \* She thinks that the cheap, shoddy, scamped goods are the products of the conscientious manufacturers, or at least some of the same grade. She finds it difficult to discriminate. Even the professional buyers of the retail stores are sometimes fooled.

Mr. Loring A. Schuler, editor, The Ladies' Home Journal, in an address before the recent Boston Conference on Retail Distribution, said:

From all over the country there come to my desk letters from exasperated buyers pouring out their complaints against fly-by-night dealers who had fooled them. As you may imagine it would be both difficult and embarrassing for a woman to burn a piece of silk thread to find out how much tin was in the fabric or to slice open the upholstery of a chair to see what might be underneath.

This brings us to a point on which there has been a good deal of talk but not much action. How can the consumer know? By what means can she learn to buy? Deplorable as it may seem, recent events have left many women in so suspicious a frame of mind that they are beginning to doubt even what they know to be true. "You urge us to buy trademark goods," one woman wrote me only a few days ago, "but how are we to know that it is not a gigantic racket?"

The buyer, whether acting for a large corporation,

- a department store, or a single family is confronted

with a bewildering variety of products, prevalent propaganda, clever claims, glittering guarantees, salient sales talk, and adulant advertising which are difficult to evaluate. How can he compare quality or value with any degree of safety or assurance? Whether he plans to purchase a carload of sheets for a group of hotels or a clinical thermometer for the home, where and what is the yardstick for quality?

Buyers have indeed lost confidence in many products, and manufacturers and retailers are anxious to restore that confidence, for confidence is the keynote of all commerce. The establishment of commercial standards provides a basis for restoring confidence in a given commodity. Let us consider briefly some of

This is the first of a series of articles by Mr. Fairchild, chief, division of trade standards, Bureau of Standards, searching into the whys and wherefores of commercial standards: "Who requests them?", "How are they produced?", "How used?", "How enforced?", and how they have accomplished the desired results without a corresponding extension of governmental function. s consider briefly some of the various methods which have been employed in the direction of making the unscrupulous manufacturer and retailer behave.

Perhaps the most common method is legislation. When 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." Indeed, certain groups have been successful in placing upon the statute books of the Nation, acts intended to prevent cheating in interstate commerce. For example, there is the national stamping act of 1906, forbidding the false stamping of gold and silver articles with particular reference to fineness; the food and drug act of 1906; the act on white phosphorous matches of 1912; the oleomargarine act of 1902, amended in 1925. Many groups have tried to have national legislation enacted to correct trade evils but have fallen short of their final goal for one reason and another.

It may be said that legislation is generally an unsatisfactory method of correcting trade evils, first, because it is difficult to obtain an agreement as to the form and substance of national legislation on any given commodity; second, for most ordinary commodities enactment of national legislation would constitute an abrogation of State's rights; third, legislation by individual States is generally uncoordinated and confusing for those who are trying to do an interstate business; fourth, legal regulations attempting to control quality tend to become fixed and are not sufficiently flexible to cover natural improvements which develop from time to time; fifth, legislative control of quality, grading, or measurements usually involves cumbersome and expensive means of enforcement whether it is to be done by direct Federal policing or whether private initiative is depended upon to report and prosecute violators; sixth, as a correction of trade evils, legislation entails an unwarranted extension of governmental function and taxation.

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 legislation for the control of quality so as to cover the entire gamut of commodities from acetone to zinc or from apricots to yeast would entail an astounding extension of governmental function and a corresponding increase in taxation not comparable with the American ideals.

There is ample evidence of the interest being taken in the proposition of providing some means of assurance to the consumer regarding the character of goods purchased. Several periodicals such as Good Housekeeping and Popular Science Monthly are making laboratory tests of the items which they indorse as satisfactory, although it does not seem to be customary to reveal the specifications or other criteria upon which indorsement is based.

Trade associations are standing behind association grade rules and other standards through the use of trade-association labels applied to the goods; for example, the "lavelle" label sponsored by the Silk Association of America which permits this label to be used only on wash silk meeting the minimum specification of the spun-silk research committee, or the grade marking and tree mark on lumber sponsored by the National Lumber Manufacturers Association. Then there is the trade agreement sponsored by large companies such as the crown label applied to rayon goods and garments, under contracts with the Viscose Company.

## SMALL HOUSE OF THE FUTURE MAY BE REVOLUTIONARY

Houses of steel and copper, and even of aluminum, as well as of wood and masonry, built at the factory, with rooms such as the kitchen and bath completely equipped, and the rest ready to be assembled at the site, insulated against heat and cold and noise, costing perhaps only half as much as the present small house, and placed in cities virtually free from smoke, are described as merely awaiting the application of knowledge already largely in hand in the eleventh volume of the reports of the President's Conference on Home Building and Home Ownership.

This statement comes from a committee of nationally known scientists and engineers, led by the late Dr. George K. Burgess, Director of the Bureau of Standards. It is supported by a careful analysis of practices and materials at present employed in small-house building, which leaves no room for doubt as to their relative wastefulness and inefficiency. For example, the committee shows that the adoption of the practice of welding pipe would permit the use of thinner tubes and eliminate the laborious threading by hand at the site which now raises the cost of plumbing. This practice, plus the possible reduction of numbers of pipes, fittings, and fixtures by simplification and standardization, would, in the opinion of one contractor who has installed a great deal of welded piping, "reduce the cost of heating and plumb-ing installations by one-half." The committee's analysis takes no aspect of the pres-

ent small house for granted, and concedes no authority

A number of organizations have sprung up with a view toward giving the consumer confidential information about various products or to hall mark the goods which are recommended or to maintain and promote quality merchandise in one way or another; for ex-ample, Consumers' Research, National Standards Council, Public Approval Bureau, Quality Standards (Inc.), Quality League of America, National Quality Maintenance League of America, American International Academy, Consumers League of U. S. A., and Rice Leaders of America.

An increasing use of references to laboratory tests is noted in national advertising, and when definite laboratory data are lacking the advertisements are frequently embellished by photographs of laboratory apparatus to give the impression that the statements are based on scientific data.

It is clear, therefore, that there is a definite and growing demand among buyers for real information about the products they buy and for some authorita-tive assurance that they meet certain tests, that they are definitely of certain grade, or that they are really satisfactory for the service intended. The buyers are increasingly skeptical, and they insist upon proof of the claims made or evidence of definite responsibility.

In other words, the buyers are no longer satisfied with ordinary guarantees; they are demanding and receiving direct from the sellers certification based on printed specifications properly established and recorded, namely, commercial standards. They are insisting further that restitution or a satisfactory adjustment shall be forthcoming in the event the goods are later found to be substandard.

to tradition. Beginning with the foundation and cellar and going through the walls and floors and finishes to the roof, every feature of the house as we now know it is made to answer as to whether present materials and practices are less efficient than others that might be used. As a result, a good many things which we now take for granted are found wanting. The universal practice of fabrication at the site and the use of the sloping roof are alike condemned as costly and unnecessary and practical substitutes are recommended. It is definitely shown that some of our present heating practices are wasteful and that it is possible to reduce the cost of heating to the home owner and eliminate the dirt and the smoke nuisance.

This final volume of the President's conference reports, entitled "Housing Objectives and Programs," completes the program, formulated by the conference at its meeting at Washington in December, 1931, to raise the standard of American housing. The report of the committee on standards and objectives gives a picture of the quality of housing that Americans ought to enjoy. The statement of these standards reveals how far short of the possible our present housing falls. It also reveals the complex nature of housing-its dependence upon the neighborhood, public utilities, the financing system, and the government of the community.

The 11 volumes of the conference reports can be purchased for \$10.50 a set, postpaid, or for \$1.15 each, postpaid, from Dr. James Ford, President's Conference on Home Building and Home Ownership, Department of Commerce, Washington, D. C.

# EXPERIMENTAL WORK FORECASTS PLUMBING ECONOMICS

Progress of Interest in Good Plumbing Traced and Experimental Work Conducted at the Bureau of Standards Briefly Described

By George N. THOMPSON, Bureau of Standards

Millions of dollars are spent on elaborate waterworks systems to provide a pure water supply. Other millions are devoted to sewage disposal. All this, for a few brief moments when the water emerges under pressure from a closed system of pipes, is used, and then disappears through the beneficence of gravity into an open system. These critical moments of use are when the plumbing system comes into play. If it does its work well, there is no danger to health, no offensive odor, no unsightly and destructive overflowing. If otherwise, the money and care spent at the points of origin and disposal of the water may be wasted. It is not, then, simply plumbing with which we have to deal and to think about, but a great coordinated system in which plumbing is an essential link.

The problem of plumbing design is a special and complicated one. There are certain materials to be moved—considerable water, a great deal of air, and a relatively small amount of waste material. The rate at which the water and waste flows away depends on a number of factors, such as the size of pipe, its slope, the condition of its interior, the number of bends, and so on. Some means has to be provided to get rid of the air, since this will tend to block the water and even blow it back through some fixture. Rain water has to be conducted off from the roof so that it will merge with the house drainage without disturbance.

In spite of the need for accurate knowledge, plumbing until comparatively recent years has remained a neglected subject. The reason for this is simple. A century ago primitive means of disposal, still observable in sparsely settled districts but representing merely folklore to the most of the younger generation, were sufficient. Where running water was available in urban districts buildings were comparatively low, served with few plumbing conveniences, and consequently expense was not much of an item.

With the coming of higher buildings plumbing became a matter of real concern. It was no longer possible to deal with a situation simply by providing a pipe obviously too large for any possible demand upon it. Rather, attention was directed to sizing pipes so that they bore some relation to expected deupon it. The controlling force was, of course, cost, mands. and this was felt to be a matter of importance in all buildings, since owners of dwellings were commencing to think in terms of complete bathroom and kitchen equipment instead of merely having running cold water. But, as plumbing is primarily concerned with health and convenience, it was evident that reductions in cost must not extend beyond the point where these considerations were paramount. The question was how far could we go in effecting economies or, more properly speaking, what were the absolute necessary features for health and convenience.

Up to this point the field had been left almost exclusively to the master plumbers, among whose numbers there were certain progressive members who attempted practical experiments and demonstrations. Plumbing regulations had grown up, based on observation and experience, but these varied widely and there was no common stock of scientific information. The hydraulic engineer was largely preoccupied with problems of water supply and distribution. But the importance of plumbing as the connecting link in the complete system of sanitation could no longer be minimized.

To-day, as the result of developments occurring since the war and chiefly in the last decade, a new attitude toward plumbing is evident. The research that has taken place in university laboratories and at the Bureau of Standards has gone far in substituting facts for opinions.

The work at the Bureau of Standards has been divided into two phases. The first was concerned with plumbing in dwellings and similar buildings. Typical layouts were tested under various conditions and the results obtained were submitted to qualified sanitary engineers and others for interpretation. The second phase is an extension of the first and is concerned with performance in higher buildings.

The experimental work now going on is being done in a tower 12 feet square and 100 feet high, surmounted by a 3,000-gallon tank. Ten floors in the structure provide locations for various plumbing fixtures that may be used in various combinations and the results noted at stations along the drainage pipe. By varying the type and size of this pipe a very good idea of what happens in plumbing systems is obtained. As the work progresses observations in existing buildings will be made, so that a correlation between experimental work and actual working conditions should be established.

The original experimental work was performed to establish a basis for issuing recommended minimum requirements suitable for use in local plumbing codes. The varying and often conflicting requirements in use throughout the country were studied by the subcommittee on plumbing of the Department of Commerce building code committee and the tests, performed at its suggestion, were directed toward clearing up points where there were outstanding differences of opinion. Later recommendations by the subcommittee have extended by the scope to higher buildings, but in a tentative way. They were prepared by using the experimental data on small installations together with observations in high structures, both where no trouble had occurred and where difficulties had developed.

It is these difficulties that indicate the need for caution in reducing pipe sizes now required and used without some more substantial basis than theory and opinion. With the facts fairly well established it will be possible within the next few years to indicate more precisely just how far we can go in more economical plumbing installations. At that time, further recommendations will be made available.

The connection of health with good plumbing is so close that scientific determination of what is necessary touches the daily life of every citizen. Health is, and always will be, the prime concern, but the citi-

# HARD-FIBER TWINE AND LATH YARN

Printed copies of the revised simplified practice recommendation No. R92-32, hard-fiber twine and lath yarn (ply and yarn goods), are now available and can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., for 5 cents each.

The revised recommendation is based on a survey of current demand made by the standing committee of the industry, composed of representatives of manufacturers, distributors, and users. Important features of the revision are the substitution of classes for fiber names and the addition of lath yarn to the schedule. As in the original recommendation, the program deals with twines made of hard fiber only, such as Manila, Java, New Zealand, Sisal, and Istle.

The original recommendation resulted in a reduction from 1,304 kinds and put-ups to 391, corresponding to the elimination of 70 per cent in 8 classes. The current revised schedule reduces the 8 classes to 5, with 1 quality in each class. The number of put-ups is increased to provide adequately for the requirements of all sections of the country.

#### STREET AND HIGHWAY SAFETY

The activities of the National Conference on Street and Highway Safety were directed, during the past year, mainly toward assisting States and municipalities in bringing State motor-vehicle laws and municipal traffic ordinances, signs, signals, and markings into harmony with the uniform vehicle code and other standards prepared and recommended by the conference for nation-wide adoption. The recent contribution of the conference toward this end consisted largely in supplying detailed information regarding the recommended standards and the beneficial effects of these measures in the States and municipalities which have adopted them.

A significant feature in the progress of uniform motor-vehicle regulation in 1931 was the adoption in several States of the Middle West and Far West of the standard drivers' license system with examination of all new drivers, which had previously been in effect only in the North Atlantic States and California. Early in 1932 Virginia was also added to the States having drivers' license laws in harmony with the uniform Operators' and Chauffeurs' License Act of Uniform Vehicle Code.

Another feature of the legislation adopted by eight States in 1931 and 1932 based on the uniform vehicle code has been a closer adherence to the text of the code than in any previous legislative periods.

Thirty-four States now have adopted the code in whole or substantial part or have made changes in their motor-vehicle laws bringing them into closer harmony therewith. zen is also entitled to know whether the plumbing systems now in common use do what they are supposed to do and whether some requirements are really necessary or merely represent an inroad on his pocketbook without conferring any particular benefit. The work now going on should go far to establish a basis that may be accepted with confidence.

The model municipal traffic ordinance was adopted by a number of cities and towns during the past year and further progress has been made in the adoption of standard traffic signs, signals, and pavement markings.

Work is now under way to develop complete uniformity in traffic signs, signals, and markings in both urban and rural districts. The national conference on street and highway safety and the American Association of State Highway Officials have created a joint committee to combine and make any desirable revision of the manuals for these traffic guides and markers, prepared by the two organizations, respectively, for urban and rural districts. This is one of a series of steps to promote uniformity in traffic laws, ordinances, and driving practices throughout the country.

Research work on several projects, recommended by the executive committee of the national conference as urgently important to promotion of safe and orderly traffic conditions, has accordingly been undertaken by the Bureau of Public Roads of the Department of Agriculture under authority of the Federal Aid Highway Act. The Bureau of Standards is also assisting with needed research work.

The conference and its participating organizations are continuing close cooperation with State and local officials responsible for traffic conditions.

# STANDARDIZATION OF CAST-IRON SOIL PIPE AND FITTINGS

The standardization of cast-iron soil pipe and fittings was actively undertaken by industry in January, 1931, with the American Society of Sanitary Engineering and The American Society of Mechanical Engineers as joint sponsors under the procedure of the American Standards Association. The work of devoloping this standard was divided into three main subdivisions: (1) Nomenclature, (2) materials, markings, and inspection, and (3) dimensions and weights.

A standard nomenclature has been completed, consisting of terms and names of the component parts of soil pipe and fittings, which it is proposed to recommend for promulgation. The work on materials, markings, and inspection has resulted in the development of a simplified specification compared with that now in use, but which is nevertheless more rigid in the essential features, and will therefore be better suited to meet the exacting requirements of presentday practice. The third subdivision, that of dimensional standards and unified weights for soil pipe and fittings, is necessarily of prime importance, and with the exception of a very few items is ready for final approval by the committee members and distribution to industry at large for review and comment, according to C. B. Le Page, assistant secretary, American Society of Mechanical Engineers.

# STANDARD APPLIANCES AND FLEXIBLE CORDS

# City of Chicago Conducts Educational Campaign to Eliminate So-called "Substandard" Grades

By CHARLES K. CREGIER<sup>1</sup>

The records of the bureau of electrical inspection of the department of gas and electricity of the city of Chicago for the past two years indicate that the fire department has responded to a great number of fires directly traceable to inferior appliances and materials, commonly termed "substandard."

This resulted in a considerable loss to the public, and a great expense to the city for the cost of attending these fires. During the past two years the use of such appliances and materials has resulted in many electrical shock accidents and four fatal electrical accidents. The constant increase in fires and accidents, due to the increased use of substandard appliances, caused the department of gas and electricity much concern and presented a serious problem.

The corporation counsel of the city of Chicago was consulted with the object in mind of enacting an ordinance to prohibit the sale of substandard materials and devices in the city. It was his opinion that such an ordinance would prove unconstitutional in the courts and he suggested that, "the best way to control the situation at the present time in the absence of express authority from the State legislature authorizing cities to license the sale of electrical appliances, is through the education of the public as to the inherent danger of substandard equipment."

Much time and effort are expended by the bureau of electrical inspection to guarantee the owner of buildings a safe and secure electrical installation. The high degree of safety from fire and accidental contact by persons, guaranteed by the Chicago Electrical Code, is in most instances broken down by the attachment of unsafe portable appliances equipped with substandard flexible cords.

The bureau of electrical inspection of the city of Chicago is a public service organization maintained by the citizens and operated to safeguard life and property by the enforcement of an ordinance, the Chicago Electrical Code. To carry into effect the cor-poration counsel's opinion "that the way to control the situation was by the education of the public as to the inherent danger in the use of substandard portable appliances and materials," and to give to the public the fullest measure of protection in electrical safety, and to comply further with the corporation counsel's opinion, "that it was the duty of the department of gas and electricity to educate the public to the dangers involved in the use of substandard portable appli-ances and cords." The commissioner of the department of gas and electricity immediately sanctioned an educational campaign of the public, by the bureau of electrical inspection, to eliminate inferior forms of flexible cord and to bring about the universal use of approved flexible cords in the city of Chicago, bearing the new bracelet identifying label of the Underwriters' Laboratories, placed at intervals of five feet on the cord.

The electrical inspection bureau in its present educational campaign to eliminate inferior cords, is cooperating with the National Electrical Manufacturers Association (cord section). The bureau has no interest in this organization other than the elimination of dangerous cords as a protection to life and property of the people of the city. The new bracelet label of the Underwriters' Laboratories placed at 5-foot lengths on a cord. seems to be the ideal means of identifying the approved safe flexible cords. The following system or method for educating the public was adopted.

Five of our most experienced inspectors were assigned, part time, to this work and visited more than 500 jobbers, electrical dealers, contractors, hardware stores, drug stores, variety stores, and other retail outlets to learn of existing conditions and to measure the interest of such agencies in the educational work contemplated. These contacts brought much praise for the proposed campaign, and the city was then divided into five zones and each of the special inspectors was assigned part time to a specific zone. Report forms to cover each call were provided, upon which a systematic follow-up might be based. A special oral argument was prepared for the inspectors to fit the type of business called on. By the cooperation of the cord section of the National Electrical Manufacturers Association, small stickers were furnished the inspectors reading as follows:

Notice.—Electrical cord furnished in connection with this order must have wrapped around it, at 5-foot intervals, the new identifying label of Underwriters' Laboratories, Inc.

Retail outlets were, as a matter of cooperating with the inspection bureau, requested to use this sticker on all future orders involving flexible cords. Inspectors also carried samples of nonstandard cords and of standard bracelet-labeled flexible cords to demonstrate the difference between the cords. To date, approximately 20 per cent of the retail outlets have been called upon and the fullest cooperation has been assured.

Some appliance manufacturers were called on, and slight changes suggested in the assembly of appliances, so that approved labeled cords could be used.

One hundred per cent cooperation by the Chicago daily newspapers, including foreign and English languages, was secured by presenting our problem to the city editors, who immediately recognized the inherent danger to the public from the use of dangerous flexible cords, and realizing that they were rendering an important service to their readers, published in their columns the message of warning from the electrical department. Many trade magazines have sent inquiries requesting details as to our plan of procedure in the educational campaign. The newspaper publicity brought many requests from women's clubs, and parent-teacher and civic organizations, for speakers to carry the warning message appearing in the daily papers direct to their respective membership.

Our experience in this matter to date has plainly indicated to us the absolute necessity of endeavoring to eliminate the use by the public of all forms of substandard appliances, materials, and devices, in the interest of safety to life and property.

<sup>&</sup>lt;sup>1</sup> Chief electrical inspector, bureau of electrical inspection, department of gas and electricity, city of Chicago, 111.

# SPECIFICATIONS AND THE CONTRACTOR

# A Contractor's Views of Specifications With an Outline of Their Weaknesses

By WILLIAM D. FOY<sup>1</sup>

When plans and specifications are completed they are generally sent to a selected list of contractors for competitive bids. The drawings as prepared by a competent architect are usually so excellent that they provide a clear index of quantities of the various materials required and as a result there is little variation in the quantitative analyses of the bidders.

When bids are received and opened, there is almost invariably a considerable range between the high and low bids, frequently as high as 25 per cent. The bidders are practically equal in ability and reputation. There must be a variable factor somewhere. It lies in the contractor's qualitative analyses of the requirements of the specifications and his speculation as to just what will be the architect's interpretation of the superlative adjectives generally used in qualifying materials, and his tolerance in the acceptance of alternates for products named and qualified with the words "or equal" appended to them.

Each bidder is eager to secure the contract, and under the competitive bidding system he is in effect selling short on the building market, paring his bid to the lowest possible figure, his hope resting on his trading and buying ability to secure a profit.

The work done by general contractors themselves is generally confined to masonry and carpentry, and subcontractors' bids are secured for the remaining branches and used in compiling the general bid. The speculation as to specification requirements is thereby more involved, as there is a great variation in subbids and the contractor is frequently placed in a quandary, fearing to use certain of the low bids as received and realizing that their use by competitors will result in lower bids than his own. It may be said that the uncertainty in bidding and the subsequent misunderstandings that so often arise are due more to indefiniteness in specifications than in drawings.

The use of superlative adjectives is indefinite. A specification will require that all plaster surfaces be perfectly straight and true, when in actual execution there are no such surfaces, at least not in commercial work. There are many such instances scattered throughout the text of the average specification.

Generally, in writing a specification the architect in naming a manufactured product, specifies his first choice, adding the word "or equal." The "or equal" product assumed by the contractor may cost 50 per cent less than the article named and this provision gives rise to speculation as to what will be accepted.

A specification should be definitely segregated by branches to enable the contractor to secure definite and clear subbids and care should be taken to see that trade jurisdictional requirements are observed, so as to avoid the trouble that will inevitably result if certain elements are specified in the wrong branches of the work. Considerable assistance has been afforded the architect by groups outside of the profession. Reference is made to the various associations formed by manufacturing groups, such as the Portland Cement Association, the various lumber manufacturers, the associated tile manufacturers, and others. Their literature is entirely reliable and truthful in setting forth the uses, merits, and limitations of their products and has proven invaluable to the specification writer. Incidentally, this literature is most sparing in the use of superlatives in describing the various products.

The schools of architecture turn out skilled designers and draftsmen but give their students little or no training in the matter of specifications. Specification writers are often accidental. A man with general experience in drafting and superintending is frequently selected for this task by his employer as the necessity arises and by that mere chance becomes a specification writer. Incidentally, the writer has never met a specification writer who was in love with his task. The job is a difficult one requiring intense concentration. If no trouble develops, the specification has performed its task, its praises unsung, but let misunderstanding arise and criticism is heaped upon it.

The specification is a vital factor in the production of a building, just as important as the drawings and yet it is produced under the most severe handicap. The specification writer is require to complete his work simultaneously with the drawings, the architect being under pressure from his client as to time. This means that the specifications must really be completed ahead of the drawings, as time must be allowed for proofreading, printing, and binding. As a result, the specification writer has little opportunity to perfect his work and is forced to cover eleventh-hour notes and changes in the drawings by addenda to the specifications. These addenda may affect all trades and force a great deal of refiguring and adjusting of estimates by the bidders.

It would certainly save time to give the specification writer an opportunity for final review of his specification after the completion of the drawings and before bids are obtained.

As to training in this field, it would seem obvious that such an important factor in architecture should receive more attention from the schools and also from the architectural societies and an opportunity to learn specification writing should be extended to all who are engaged in the profession. At present, it receives less consideration than the preparation of the drawings.

The contractor would welcome a definite specification, containing a description or schedule that will inform him of the location of the various materials as well as qualifying them. Perfected specifications will result in a far better understanding and unity of effort on the part of all parties concerned with carrying out the intent of the specifications.

<sup>&</sup>lt;sup>1</sup> For many years the author was in charge of specifications and contracts for Holabird and Roche and Holabird and Root, architects; now with Ralph Renwick, general contractor of Chicago.

# GLASS CONTAINERS FOR PRESERVES, JELLIES, AND APPLE BUTTER

Simplified practice recommendation No. R91-32, glass containers for preserves, jellies, and apple butter, has been accorded the required degree of written approval by all elements in the industry, and became effective on December 15, 1932.

This simplified practice recommendation was originally formulated by the industry in 1928. It is expected that by the inclusion of the 48-ounce jar for preserves in the new schedule, the recommendation will prove of more value to the industry. The revised program limits the stock sizes, based on avoirdupois weight of the food content of glass containers for preserves to 9; jellies to 7; and apple butter to 4.

## ELIMINATING UNSAFE EQUIPMENT

A campaign against the sale of electrical equipment and merchandise not approved by the Underwriters' Laboratories is being conducted by the Electrical Department of the District of Columbia government. To date the entire campaign has been educational, no compulsory action being taken against the retailers.

Representatives of that department point out the hazard and lack of economy in substandard equipment. The retailers, particularly the department stores, are urged to specify on all orders for electrical appliances and equipment, that every piece shall have the approval of the Underwriters' Laboratories. It is stated that the stores are not only demanding that their merchandise be approved, but, in many cases, are insisting that a seal or sticker, indicating such approval, be attached to each article. They are calling the attention of purchasers to the value of this labeling.

# UNIFORMITY OF UNDERGROUND RAILROAD EQUIPMENT

The underground mileage in coal mines of the United States is one-fifth of that of all the steam railroads in the United States. With 50,000 miles of underground track over which cars operate in handling coal from the 6,000 collieries in the United States alone, it will be readily seen that the correct details for underground track is a matter of very considerable importance.

Chief among the problems of standardizing the details of underground track is that relating to uniformity of frogs, switches, and turnouts. Frogs and switches last from three to eight years. When a new one is needed it must fit. Unless standards exist that maintain the dimensions of these track parts the same over a long period of years, repair parts will not fit and a considerable loss ensues. Again, there is the matter of cars that jump the track when the proper track details are not supplied.

To meet this problem, the standardization division of the American Mining Congress in 1926 formulated standards, under the procedure of the American Standards Association, that have come to be pretty widely used. A new edition of these standards called American Recommended Practice for Frogs, Switches and Turnouts for Coal Mine Track has just been issued that brings up to date, revises, and reduces the number of these items. The standards include all the structural details for a complete mine turnout including frogs, switches, plates, braces, etc. Complete assembly drawings are included also, with over-all dimensions for all standardized turnouts from a 3-foot 6-inch to a 10-foot switch.

# WHEELBARROWS

Revised simplified practice recommendation No. R105-32, wheelbarrows, is now available in printed form and can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., for 5 cents a copy.

The original recommendation, as formulated by the industry, contained 41 sizes and types of wheelbarrows. In the revised schedule this number has been reduced to 27. Designation numbers have also been given the wheelbarrows listed in the revised program. The use of this uniform terminology by the manufacturers is expected to prevent confusion in the mind of the customer.

# ADVOCATES STANDARD LIMITATIONS FOR SIZE AND SPEED OF TRUCKS

Standard maximum weight, height, length, and speed limits for motor vehicles, limiting busses and trucks to a speed of 45 miles an hour and barring all vehicles more than 35 feet long from the highways, except by special permit, were recommended for adoption by the States in a recent statement issued by the American Association of State Highway Officials, following consideration of the problem at its recent annual convention in Washington.

Under the suggested standard requirements, solidtire vehicles would be limited to a speed of 10 miles an hour, no vehicle with or without load could exceed a height of 12 feet 6 inches, combinations of vehicles could consist of not more than two vehicles with a total length of not more than 45 feet, and no wheel could carry a load of more than 8,000 pounds. The load limitations, it was explained, should not apply to metropolitan areas if the State so desires.

The recommendations were described as necessary to establish one of the fundamental prerequisities of highway design, to assure safety, and to promote efficiency.

# **DOUGLAS FIR PLYWOOD**

General approval of the commercial standard for Douglas fir plywood has been indicated by a satisfactory majority of the trade, and accordingly an announcement of the success of the project was circulated by the division of trade standards, Bureau of Standards on December 15, 1932.

This standard definitely outlines the several grades of Douglas fir plywood and should facilitate the procurement of the proper material for its various uses.

Mimeographed copies of the standard, designated Commercial Standard CS45–33, may be obtained gratis from the division of trade standards, Bureau of Standards.

# TO ENLARGE RAILROAD RESEARCH

Cooperative research on problems of railroad supplies and operation through the offices of the American Railway Association, on a wider scale than ever before, was planned at the recent annual fall meeting of the association at New York City. More than 3,000 specifications, rules, and standards of importance have already been adopted through such a program. Topics slated for early consideration include the following items of importance.

To determine what improvements can be made in the manufacture of steel rails and car wheels; whether the exhaustive air brake tests recently completed by the railroads show that any changes are necessary in present equipment, and, if so, what improvements should be made; further standardization in the construction of freight cars with a view to increasing their capacity but with a saving in weight of equipment; improvements in design of tank cars and tank car appliances and devices; standard specifications for draft gears, which is the mechanism back of the couplers on cars designed to absorb the shock caused by the starting and packing all kinds of freight in order to reduce the amount of loss and damage to commodities in transit; modernization of terminals, shops, and freight yards; and standardization and disposition of obsolescent materials.

# MAKING BRITISH STANDARDS EFFECTIVE

In order to increase the benefits to be derived from standardization by small consumers as well as large consumers, the British Standards Institution is licensing manufacturers to mark commodities made in accordance with British standard specifications, with the term "British standard" or its symbolic equivalent. This labeling of specification-made goods, already carried on for some time in certain commodity fields, is now being expanded to cover the whole range of industry, in view of the recently enlarged scope of the institution. Penalties are attached to the misuse of the "British standard" mark.

A number of the advertisements appearing in the latest combined index of specifications and annual report of the British Standards Institution contain guarantees of compliance with the requirements of British specifications. Among the commodities for which such guarantees are made are incandescent lamps, lighting fittings, wires and cables, conduit and conduit fittings, ammeters, voltmeters, transformers, switches and circuit breakers, motors, motor starters, fans, and other electrical apparatus and supplies; identification plates for pipe lines; malleable iron pipe fittings; and nonferrous alloys and products.

# COLOR MARKING OF AIRPLANE EQUIPMENT

National standard colors for the identification of the operating parts of airplane equipment are being used with great satisfaction by the entire German airplane industry, according to information received from the Standards Committee on Aeronautics of Germany, by the American Standards Association. The standard colors are considered to be an important safety device, because of the great number of pilots who frequently change planes, so that familiarity with the location of controls and equipment is important.

The standards, which are also being accepted by other European countries, for use on handles, handwheels, etc., are as follows: Fire extinguishers, fire alarms, short-circuit switches, red; temperature regulator for cooling water (cooler valves), green; gas levers (throttles), yellow; temperature regulator for lubricating oil (coolers), brown; and ignition levers (change of ignition), black.

# NEWS IN BRIEF

The chapters of the American Institute of Architects can render a valuable service to the profession by taking an active interest in building-code revision and by urging the adoption of accepted national standards, states F. Leo Smith, in the structural service department of The Octagon, the official publication of the institute.

The British Standards Institution has issued a specification for mortised, dowelled and ledged, and braced doors for internal and external purposes. The tables of dimensions, which provide for 27 British standard door sizes, including garage doors, are based on the principle of uniform height, which, it is hoped, will eventually replace the existing practice of varying the height of the door with the width.

Steadily growing in importance as a substance in chemical and technoligical processes for industrial purposes, wood is now being converted into a wide variety of products other than lumber, ranging from explosives and motor fuel to yeast and soap, according to the national committee on wood utilization of the Department of Commerce, in an announcement pointing out that the wood industry is gradually changing into a series of coordinated industries.

.Garnet wheat will be graded as a separate variety in the wheat crop of western Canada after August 1, 1933, if a bill to amend the Canada grain act, which will probably be presented to Parliament early this year, is given approval. It is likely that only two grades will be set up for the Garnet variety instead of three, as recommended a year ago by Western Grain Standards Board, this being a sufficient number in the opinion of overseas buyers.

Standard time for railroads first became effective on November 18, 1883. Prior to that date there were some 80 different standards of time used by the railroads alone. In view of the fact that 1933 will see the observation of the golden anniversary of standard time, readers of the Commercial Standards Monthly should find Time Zones of the World by Ralph E. Gould of the Bureau of Standards staff, which is scheduled for a forthcoming issue of the magazine, of timely interest.

The American Electric Railway Association has changed its name to American Transit Association, and its affiliated organizations (engineering, accounting, claims) changed their respective names, the former American Electric Railway Engineering Association becoming the American Transit Engineering Association.

The National Electrical Contractors Association has readopted its former name, changing it from the Association of Electragists International by which name it was designated for the past several years. The trade-mark Electragists will be retained for use with the association title by the members as identification of their membership. The Exhibition of Chemical Plant and Equipment (Achema VII) will be held in Cologne, Germany, June 2 to 11, 1933, inclusive.

The Province of Manitoba has adopted the Canadian Electrical Code, which has now been adopted by the nine provinces of Canada. It is now possible to secure complete uniformity in electrical rules from coast to coast.

A "sectional meeting" of the World Power Conference will be held in Scandinavia in 1933 for the purpose of discussing the supply of energy to largescale industrial establishments and transportation services. The meeting will open in Stockholm, Sweden, on June 28, 1932, and continue until July 7.

"Standardization is something much broader than the various definitions invented for it by the critics," editorially observed the Saturday Evening Post of November 19, 1932, pointing out that "it is, in one sense, the spirit of democracy applied to the forms of everyday life. It is the one process by which some of the finer things of life can be stepped down to the masses, and the sole method of distributing the direct benefits of progress to everyone."

In China the officially recognized standardizing agency is known as the national industries standardizing committee, with headquarters at the Ministry of Industries, National Government of the Republic of China, Nanking. The committee is under the direction of a commissioner and general secretary, with directors in charge of six divisions, covering civil engineering, mechanical engineering, electrical engineering, dyeing and textiles, chemicals, and mining.

The Canadian Engineering Standards Association has announced the issuance of its publication, Standard Blade Punching for Road Grading Machinery. The chief object of this standard is to secure interchangeability in the attachment of cutting blades and mold boards used in road-grading machinery in Canada. This standard has been unanimously approved by all highway departments in Canada as well as by leading manufacturers of road-grading machinery.

In Sweden they have standardized the milk bottles in sizes of one, one-half, one-third, and one-quarter liters, according to information received from T. O. Klath, American commercial attaché at Stockholm, Sweden. Provisionally, there has been accepted a standardization of industrial cost accounting terminology. Furthermore, states Commercial Attaché Klath, plans have practically been completed respecting the standardization of certain Swedish, Finnish, Norwegian, and Danish wood products. The work in Sweden is under the supervision of the Swedish Committee on Standards which, since 1929, has been active in developing rules and standards for the products of the Swedish machinery, iron, agricultural, building, and electrical industries.

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The Government of Luxemburg has established a board to inaugurate a system for the grading, classification, and standardization of agricultural and horticultural products grown within the Grand Duchy. In guaranty of origin, quality, and condition of all agricultural and horticultural products, a national mark will be created.

The November, 1932, issue of the Journal of Electrical Workers and Operators, reprints the article Interior Illumination, by G. H. Stickney and Walter Sturrock of the General Electric Company, from the September, 1932, issue of the Commercial Standards Monthly. In commenting on the article the Journal stated that the "Bureau of Standards is taking the lead in getting manufacturers, business men, managers, personnel men, and labor, to realize the high conservation value of correct illumination. The value of correct illumination depends upon adequacy of interior wiring." The standard sales agreement and trade customs of the gray-iron industry defines clearly just what is expected of the seller and just what the buyer is to contribute to the transaction, thus eliminating misunderstandings, and saving money, according to Arthur J. Tuscany, manager, the Gray Iron Institute (Inc.).

The Canadian Engineering Standards Association has received the suggestion that consideration be given to the preparation of a safety code for passenger and freight elevators. Certain Provinces and some of the leading cities of Canada have rules dealing with elevators, but it is felt that uniformity in these rules is most desirable, and that they be as complete as possible. Invitations have therefore been issued by the association to the various Dominion and Provincial Government departments interested in the proposal, as well as the leading technical and insurance organizations, and manufacturers, to cooperate in this study.



To determine whether an applicable specification exists for any commodity—consult—

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"\* \* \* this department \* \* \* is devoted solely to aiding and fostering the development of higher standards of living and comfort of our people \* \* \* its ideals are clear: That by cooperation and not by compulsion it should seek to assist in maintaining and giving the impulse of progress to commerce and industry in a nation whose successful conomic life underlies advancement in every other field." -President Hoover, at the laying of the corner stone of the new building of the U.S. Ddpartment of Commere, June 60, 1939

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

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