younger men are sometimes said to stand in the way of insisting on effective individual and group work. It is true that some individuals are unable to maintain their intellectual balance when partaking of the "strong wine of freedom," but such men are out of place in the teaching staff of an engineering school. It is a strain on the doctrine of academic freedom to retain such men unless age, length of service or laches of the institution appeal for tolerance.

Thinking with accuracy is no child's accomplishment. That accomplishment must be learned first in thinking analytically and then in thinking synthetically. Such education goes much faster when the effort is stimulated by the interest of mastery rather than when only sustained by the urge of duty. Each classroom and laboratory should be a space redolent with curiosity and discussion.

To secure the needed results it is important to utilize foresight and judgment applied through measures such as my answer comprises. All these measures depend upon developing among engineering schools a greater unity of purposefulness designed to result in a larger sentiment among their staffs in favor of migration than is now observable.

Finally, to secure the ends, in my opinion it is necessary for the engineering schools to maintain salaries in the higher levels which are equal to the highest which their universities support. Otherwise the ultimate attractions are insufficient to appeal to the fitting youths. I often hear it suggested that the upper available salary level has only small influence on the ambition of the younger teachers, but I am convinced that this is an erroneous interpretation of the attitude of the most able of our younger men. The opportunities of the life are compellingly attractive to men of suitable ambition, but the opportunities can not be most fully developed unless finally accompanied by a generous situation in support of a professional self-respect that comports with a distinguished reputation for learned mastery in the field.

A sustained effort to accomplish these ends will, I believe, maintain engineering education on an enviable level of achievement among the great educational processes of the nation.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

SECTION M (ENGINEERING)

By Commander N. H. HECK

SECRETARY, U. S. COAST AND GEODETIC SURVEY

IN SCIENCE for July 28, 1933, there was a review of the scientific sessions of the American Association for the Advancement of Science and affiliated societies. For several reasons that of Section M and affiliated societies was not included, the chief reason being that it required additional time to prepare a report of the many sessions in such a way that the relation between science and engineering would be emphasized. The meetings of all affiliated engineering societies are discussed, except that the joint meetings of the Econometric Society and several engineering societies have already been described in SCIENCE under Section K (Social and Economic Sciences). Numerous other engineering societies met in Chicago, but this report includes only affiliated societies. The Western Society of Engineers, an associated society, held no session, but played a very important part in arrangements. Owing to the delay in presenting this record of the meeting many of the papers mentioned have already been published in full or in abstract. Information can be obtained in regard to these from the secretaries of the societies concerned.

The second week of the joint meeting of the American Association for the Advancement of Science and affiliated societies at Chicago on pure and applied science during A Century of Progress was devoted to applied science and, since nearly all the engineering societies took part, it was generally known as Engineers' Week, though there were numerous meetings in other fields of applied science. Section M (Engineering) was the connecting link. It held a joint meeting with all the engineering societies and a joint meeting with the American Society for Testing Materials, these being the occasions of addresses by distinguished foreign speakers made available through the association.

At the general meeting on Tuesday night, A. P. M. Fleming, of the Metropolitan Vickers Company, had as his subject "A General Review of the Development of Industry and Engineering During the Century."

Reviewing the past one hundred years of development in industry and engineering, certain considerations are outstanding. First, engineering is the basis on which the magnitude and rate of progress depends. Through the growth and application of scientific knowledge it has made the world a small place; it has increased speed of travel by road, rail, air and water; through speed of communication, it has eliminated time and distance; it has enabled the earth's resources to be made universally available; it has been the means of providing for the growth and maintenance of populations with increasing standards of living. In other directions, medical science

and its universal availability has made enormous strides, not only in the curative aspect of disease but in disease prevention and in improved hygienic standards. Similarly, there has been an extension of the availability of all grades and phases of education.

The wealthiest of the community one hundred years ago had only a fraction of the amenities that every one enjoys today. Hours and arduousness of labor have steadily diminished and provided the leisure for cultural pursuits, physical recreation and amusements.

It is sometimes said that human nature can not control the machines that science and invention have produced, and that this is largely responsible for the present state of world derangement. It is true that, due to the creative impulse of war, facilities for production attained a century's advance within a few years and that exchange and distribution did not keep pace with this abnormal growth, but surely this is a problem of organization only, and should not be beyond human intelligence to solve. There are moreover certain features in the trend of affairs that should give us cause for confidence. The early part of the century—in fact, the greater part of it—saw very rapid development of wealth and its acquisition by comparatively few people. The material progress of the community seemed to matter most. To-day there is a tendency, which the economic stress has served to emphasize, to regard industry as a service, as a means to an end, the end being the greater development of intellectual life and higher ethical standards. It is surely the responsibilities of us, who are engineers, scientists and industrialists, to foster this spirit.

On Wednesday, Engineers' Day, at a colorful ceremony on Soldiers' Field, the Daniel Guggenheim Medal was awarded to Juan de la Cierva for development of the theory and practise of the autogiro. Dr. Cierva arrived by autogiro, landing near the speaker's platform. A. A. Potter, president American Society of Mechanical Engineers, who presided, said that "Progress has always been dependent upon persons with courage and vision to explore the unknown and upon those who made life easier through invention and discovery."

At the Engineers' Dinner, arranged by the Western Society of Engineers, Edward J. Mehren, in his address on "The Contribution of Engineering to Progress," showed that the long road which mankind is traveling has many ravines and chasms, such as greed, oppression, war and many other hindrances. The engineer has helped to bridge these chasms. During the machine age, which is but 3 per cent. of recorded history, there has been too lavish use of the new gifts which it has brought us, but we are learning to master the new instrument. The engineer is not only making new bridges across the chasms, but is providing materials which can be used for higher bridges if those responsible in other fields can use them.

Karl T. Compton, in his address "The Century of Progress—What Next?," after reviewing the progress predicted that research in pure science, engineering and social science will receive greater attention and become more effective. He showed that there is a tremendously important job, largely due to the work of the engineer, for which the engineer will have to take a large share of responsibility. There is reason for optimism.

AMERICAN SOCIETY OF CIVIL ENGINEERS

The American Society of Civil Engineers functions in technical matters through divisions, each relating to a branch of the field. Most of the papers were delivered before sections. There follows a general review with reference to papers where appropriate.

In introducing a symposium on "Can Government Costs be Reduced?" Charles Keller pointed out the lack of need for many proposed new projects. Planned economy requires expenditure of the taxpayers' money for indispensable services only, with consideration of his ability to pay and the preservation of his consuming power. E. P. Goodrich feels that, inasmuch as the government's entry into the field of business will involve increased cost, means should be found to offset this. Frank Bane held that since 80 per cent. of state expenditures go to education, welfare, highways and public health, even if economies can be effected, great reduction will be only at the cost of curtailment of needed services which can be provided most economically by the state. Reorganization of the state was discussed by Luther H. Gulick. He feels that in all matters of broad economic problems the state has failed. It should turn over all such matters to the federal government, through constitutional amendment if necessary, and confine itself to local government. This would make possible a reorganization of local government with many reforms. C. E. Rightor showed the difficulty of curtailing local taxation without loss of essential services.

A Century of Progress in Construction: In discussing "The Construction Engineer—A Centenarian," W. C. Huntington pointed out the important place of engineering works in the developments of the century. The construction engineer has a fascinating task in carrying through his projects in spite of difficulties imposed by man and nature. T. L. Condron, in discussing "The Development of Industrial Building," showed that the outstanding cause of progress was the introduction of iron as a structural element. New construction methods are exemplified in many of the buildings of the Century of Progress. P. E. Sabine showed that sound control is going to be demanded in buildings of the future. Acoustical engineers can solve the problems. O. H. Ammann showed the advancement in bridge construction. The

George Washington Bridge, with eight times the suspended weight, was built in one third the time required for the Brooklyn Bridge. New understanding of stress and new materials point to revolutionary changes in bridge design and construction. Elwood Mead used Boulder Dam as an illustration in discussing "Modern Methods used on Reclamation Projects." Many new and difficult problems have required solution. Lytle Brown, on the subject "National Defense Facilities on Land," showed that the great work of the engineer in war relates to mobility, fortification and shelter. All the problems are on a large scale and structures have to be built with high speed and without specifications and often without proper materials. Resourcefulness and valor are needed. F. C. Ruhloff showed that modern construction machinery has mobility or portability, speed of operation and ease of control. With decrease in manual labor power per man has increased. All visitors to the fair will find interest in V. G. Grove's discussion of the unique problems in the design of the skyway and observation towers.

Transportation: F. C. Jonah discussed "One Hundred Years of Transportation." The pioneers were without transportation in the present day sense since practically all and certainly all rapid transportation belongs to the present century. We have not yet reached the limits of development. J. H. Gardner discussed the development of water transportation during the century. He stressed the present importance of the merchant marine. W. J. Cahill dealt with water terminals. Though ships seem to have reached their maximum size, the terminal problems are numerous and different at every port.

Highways: E. J. Mehren stressed the necessity of selling the idea of improved highways to the public as a background of a proper program and its maintenance. Other papers dealt with methods of making traffic counts and of arriving at the loss through traffic delays.

Basic Surveys for Engineering Works: W. Bowie, in his paper on one hundred years of control surveys, showed that largely as a result of improvement in instruments and methods, the control surveys of the United States have been speeded up without loss of accuracy so that the basic surveys are nearing completion. G. D. Whitmore discussed the many uses of control surveys in cities. M. L. Greeley listed the many difficulties arising from poor character of early land surveys. He stressed the need for better status for land surveyors.

Sewage Disposal Problems: Several engineers of the Great Lakes region outlined the many problems of sewage disposal without detriment to water supply and fish life. Pollution of lake water is a serious problem. A. L. Fales pointed out that even with treatment there is necessity for discharge of effluent in such a way that tidal currents, river flow or other water movements will carry it away. L. F. Warrick pointed out the value of waste utilization as a profitable means of preventing stream pollution. S. A. Greeley discussed the broad subject of "Municipal Facilities for Public Health." There has been urgent need for improved municipal facilities, including water works, sewerage systems and disposal plants. These have been provided and the standard of living increased with little increase in unit cost.

City Planning: H. E. Young dealt with "The Value of Planned City Development." Cooperation of all interests is needed to meet community needs such as boulevards and recreational areas. Sometimes social and sometimes economic view is uppermost. J. H. Miller showed that slum clearance and the elimination of poverty go hand in hand. Low cost housing projects provide the remedy but are hard to bring about. D. H. Sawyer pointed out the new opportunities of the engineer in city planning. He outlined the requirements for projects which should receive consideration at the present time. J. L. Crane, Jr., with the subject, "Planning for Planning," pointed out the need for a national agency to coordinate all the plans to fit into a proper national program of development. No individual or organization can achieve planned guidance, but only the government expressing the popular will.

American Society of Mechanical Engineers

The contribution to Engineers' Week consisted of 44 sessions with 126 papers. The technical sessions were well attended and the discussion was lively and profitable. Several interesting conclusions can be drawn from a review of the papers on the program. The demand upon mechanical engineering is for greater refinement and higher accuracy in design and development. The engineer, therefore, must use the latest applications of knowledge in the basic field of mathematics, physics and chemistry. Ample evidence appeared of a broader and deeper use of engineering and scientific principles than was brought out at similar meetings forty years ago. There is obvious need for closer cooperation between the workers in pure and applied science.

The following is necessarily a brief abstract covering some of the papers which present research results:

Aeronautics: Seventeen papers dealt with nearly every phase of design, operation and test. Th. Von Karman and C. B. Millikan discussed "The Use of the Wind Tunnel in Aircraft Design Problems." The paper dealt with the extrapolation of wind tunnel results to full scale and with actual solution of many problems of design. C. Witoszynski, of Poland, con-

tributed a paper on "Wing Profiles with a Given Initial Moment." C. Wiesel Levy, of Germany, gave other results of a theoretical and experimental investigation of the influence of the fuselage on the wing. A. Klemin's paper on "The Spin" gives rules for spin design.

Applied Mechanics: Only a few of the many subjects discussed can be mentioned. R. Bernhard, of Germany, discussed a theory of vibration of bridges and a means of measuring them. Graphostatics was interpreted by H. M. Westergaard as statics in which geometry plays a part. He outlined its uses. "Amplitude of Non-harmonic Vibrations" was considered by J. P. DenHartog. New experiments on wind force and wind pressure on buildings were presented by O. Flachsbart, of Germany. He recommends the use of models of buildings and aerodynamic testing to determine stress. D. H. Young presented a rational equation for the design of steel columns to replace the present empirical formulas. S. Timoshenko proposed a new method for proportioning plate girders. The influence of rate of shear on shearing stress was discussed by Jas. Jamieson on the basis of experimental results. A new test method of determination of inherent stress was described by Josef Mather, of Germany.

Mechanical Springs: R. F. Vogt, in his paper on "Stresses in Helical Springs," developed a combined formula suitable for practical purposes for determining the maximum torsional and bending stresses in helical springs. Other papers dealt with the effect of corrosion pits on fatigue and fatigue tests of springs.

Fuels: "Smoke Abatement" was the chief subject under discussion. The subjects included grindability, the effect of preheated air on underfed combustion and measurement of cinders and fly ash. H. F. Johnstone discussed the removal of sulfur compounds from waste gases. The human side of smoke abatement was considered. There was also a paper on "Fuel Technology and the Human Side of Smoke Abatement."

Process Industries: The subjects discussed included grindability, the industrial dust problem and the deairing of clays during processing. Mechanical methods in the treatment of sewage and garbage disposal were also discussed.

Steam Power: A thermal study of the available steam turbine cycles was presented in convenient form for use by G. A. Hendrickson and S. T. Vesselowsky. Other papers dealt with the prevention of calcium sulphate scale and the problems presented by the precipitation of moisture in the low pressure region of condensing turbines.

Hydraulics: There was a symposium on water hammer, the first comprehensive treatment of this subject in the English language. Theories and methods of dealing with the problem were discussed. The existing situation was clarified and the way pointed to further needed research.

Another symposium dealt with boiler feed water. There were presented the results of experimental work in measuring the priming of boilers, a method of determining the sulphate ion in boiler water, and the problem of the determination of dissolved oxygen in feed water.

Metal Cutting—X-Ray—Cast Iron: Investigations in the problems of cutting metals were presented. Testing by a single point cutting tool, results of investigations on cemented carbide cutting tools and the removal of a metal chip with a cutting tool were discussed. In presenting the last-named subject, Frederick Schwerd, of Germany, described the use of photographs with a light exposure of one millionth of a second. H. R. Isenburger outlined the need for an effective x-ray machine for field inspection of welded joints. Newly discovered properties of cast iron for machine construction were also discussed.

Railway Research: A symposium on research in railway engineering was presented with the following conclusions: First, criticisms directed against the railroads for lack of technological progress have little basis of fact. Second, there exists a spirit of cooperative understanding between the railroads and industry. Third, there are the following general tendencies in railroad development: Cars of lighter weight and greater strength; development of standard equipment interchangeable with maximum ease and maintained at minimum expense; use and development of materials to produce lighter, better and more economical equipment with greater capacity or power per unit of weight leading to simplification of design and reduction of number of parts; development of boilers for higher pressures; development of valve gears; development of locomotives to reflect the best power plant experience and development of materials and practises to reduce wear and tear on rails and structures and reduce operating expenses.

Printing Research: In addition to a number of papers reflecting mechanical developments in the printing industry, two papers of importance to research were presented. H. D. Hubbard gave an analysis of printing research dealing with legibility of printing, type, design, printing papers, ink and color. A. C. Jewett presented a program of cooperative printing research in America and projected an agency to conduct it.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS

The American Institute of Electrical Engineers had a well-rounded program, covering six technical sessions where heavy attendance and lively discussion

attested to the timeliness and general interest value of the subject-matter.

The Lamme gold medal was awarded to Past President Edward Weston, originator of the Weston Electrical Instrument Corporation. This award was established for the encouragement and recognition of meritorious achievements in the development of electrical apparatus or machinery.

The address of President H. P. Charlesworth had as its topic "The Engineer and A Century of Progress." Emphasizing the effects of science and engineering upon the life of man and the basic need for a better understanding of these effects on human society, he urged engineers to take a greater part in all affairs affecting human welfare.

One session was devoted to protective devices which are essential to high voltage transmission. E. E. George described the various methods that have been developed for testing high speed distance relays. H. P. Sleeper gave from the operating engineer's view-point the practical and theoretical problems involved in applying relays for the protection of high voltage, open wire, interconnected transmission lines. He outlined the requirements for satisfactory relay protection. R. M. Spurck and W. F. Skeats discussed the factors involved in the heavy duty laboratory testing of circuit breaker equipment. They showed that while conditions at laboratories do not permit the testing of larger capacity breakers at the desired conditions, extrapolation from tests can be accepted with confidence. R. C. Van Sickle and W. E. Berkey discussed "Arc Extinction Phenomena in High Voltage Circuit Breakers Studied with a Cathode Ray Oscillograph" and showed how records, obtained with a rotating film operated in a vacuum, give the full story of the arc, subsequent reignition and final extinction. D. C. Prince described a compression type low voltage air circuit breaker, which has been developed to replace the fuse for slow voltage circuits in ordinary use. A subcommittee report on recently developed high voltage lightning arresters showed that they are more effective than the earlier types. The investigation emphasizes the need for information regarding the dielectric strength of equipment made and tested under different conditions and standards in different plants and laboratories.

Session on Electrical Instruments and Measurements: R. W. Carson discussed "Better Instrument Springs." He described new methods of precision testing and measuring of instrument springs and apparently effective methods of artificially aging them. He discussed the methods of treatment both of spring material and of springs. A portable oscillograph with unique features, described by K. A. Oplinger, utilizes several new optical and electrical features. The optical system permits simultaneous viewing and photography of transient electrical phenomena. Other features add to ruggedness and convenience.

Electric Power Transmission: Several papers dealt with methods of minimizing line trip-out due to lightning to avoid system disturbance. Research in new fields relating to electric power cable and their associated dielectrics. These dealt with the life of different kinds of dielectrics; the artificial aging to secure in a few weeks deterioration which ordinarily requires a year, thus making it possible to design better cables; and the effect of high oil pressure on electrical strength of cable insulation, with the conclusion that high pressure adds to endurance strength for long time application of voltage but not for impulses.

Communication and Electric Power Generation: A paper entitled "Carrier in Cable," by A. B. Clark and B. W. Kendall, gave the results of an interesting experiment with a 25 mile loop of underground telephone cable. By interconnecting the 68 pairs of conductors in this relatively short cable telephone circuits 850 miles long were provided, with the result that quality of transmission and methods to prevent interference between them were satisfactory. This advances the horizon of economical commercial communication and promises a high grade of flexibility in telephone plants.

"Precision Timing of Athletic and Other Sporting Events" was discussed by C. H. Fetter and H. M. Stoller. They described a high-speed motion picture device which permits the simultaneous photography of the events to be timed and the dials of a special clock. Accuracy of .01 second with estimation to .002 seconds is possible.

Electrophysics and Related Subjects: A new idea in room heating was presented in a paper by L. W. Schad on "Obtaining Comfort Conditions by Controlled Radiation from Electrically Heated Walls." By heating the walls, the temperature can be kept very uniform at a point which prevents body radiation. He stated that the power requirements could be worked out on an economical basis.

American Institute of Mining and Metallurgical Engineers

The American Institute of Mining and Metallurgical Engineers, in aiming at a well-balanced program between technology, entertainment and opportunity to see the Century of Progress, curtailed the number of technical papers as compared to some other societies.

Special attention was given to the non-metallic minerals (excluding fuels). C. C. Whittier, in a review of "A Century of Progress in Non-metallics," showed that these are key elements in many of the major industrial processes and products. Applica-

tion of new materials is likely to result in substantial changes in types of construction.

M. M. Leighton described the research program of the Illinois State Geological Survey. The survey is organized to bring to the problems of non-metallic research the combined value of all lines of scientific study—geological, physical, chemical and microscopical—and by this means to bring about the most complete knowledge of mineral substances and of new and improved uses for them.

Walter H. Weed discussed the present concepts of formation of non-metallic deposits. Theoron Wasson described the various geologic settings where oil may occur and showed how geophysical methods may be used in detecting them. He considers this one of the great accomplishments of the past century. C. H. Cady described the microscopic study of coal of the kind found in Illinois. In discussion M. M. Leighton brought out the important possibility of the future of pulverization and mixing of coals to provide uniformity and to meet special needs.

AMERICAN SOCIETY FOR TESTING MATERIALS

Outstanding among the important technical contributions presented during the thirty-sixth annual meeting of the American Society for Testing Materials was the Edgar Marburg Lecture on "Crystalline Structure in Relation to Failure of Metals, Especially by Fatigue," delivered by Herbert J. Gough, National Physical Laboratory, England. Dr. Gough was one of the guests from abroad on the joint invitation of the association and the Century of Progress, and the lecture session was a joint one of the American Society for Testing Materials and the American Association for the Advancement of Science. The speaker pointed out how modern knowledge of the atom has changed our views of the cohesion and strength of materials, especially of metals. A piece of metal is made up of millions of tiny crystalline grains; each grain in turn is made up of a regular geometrical arrangement of millions of atoms. The pattern of arrangement of these atoms in each grain is just alike, but the direction of the lines and planes of the pattern is different for each grain.

Dr. Gough for some ten years has been studying the strength of specimens of metal so prepared that each specimen consists of a single large grain. He has found that as the specimen is repeatedly loaded the crystal breaks up into a large number of little "crystallites," and he thinks that the paths of the electrons or the atoms around the nuclei may be affected. The first effect of this action is to actually strengthen the material, but if it goes on long enough, in the process of break-up of crystals, atoms at critical points seem to get actually torn apart, and if this process continues a spreading crack results. This, he thinks, is the beginning of the sudden, disastrous failure, popularly known as "fatigue of metals."

Dr. Gough's lecture was illustrated by many photomicrographs of metals which had been subjected to stress, and the lecture constitutes a very important fundamental summary of our present-day knowledge of the nature of solid bodies. This is a field in which very little work has been done, the atomic physicists having confined their attention almost exclusively to gases. The entire lecture is being printed in pamphlet form and will be available from the society.

In addition to the thirteen sessions of the meeting of the American Society for Testing Materials, at which the formal technical papers and committee reports were presented, there was a round-table discussion on spectrographic analysis and an open meeting of the committee on interpretation and presentation of data.

The program contained 49 reports of committees and 33 technical papers. The committee reports covered their respective activities and gave the various recommendations covering the standardization work under their jurisdiction. The society's second important function of promoting the knowledge of engineering materials was emphasized through the many technical papers which reported the results of extensive research work on properties and tests of materials. This phase of the work is of great importance, for progress in many lines depends upon the efficient and proper use of materials. Of the items the symposium on cast iron and the report on "Significance of Tests of Concrete and Concrete Aggregates" were preeminent.

The cast iron symposium, jointly sponsored by the American Foundrymen's Association and the society, adds much to metallurgical literature. While it is primarily a compilation of information from scattered publications it is a critical compilation, correlation and interpretation by experts and, in addition, contains much hitherto unpublished data. The sections cover physical properties, classifications and specifications, design and effect on physical properties, machineability and wear, corrosion, heat treatment, welding, etc.

The report on the "Significance of Tests of Concrete and Concrete Aggregates" gives an effective summation of the significance, limitations and applicability of the more widely used tests, including a discussion of their importance and other pertinent facts.

In the ferrous metals field, several interesting papers were given. Studies on a modification of the Rohn test for creep of metals were described by C. R. Austin and J. R. Gier. This test offers possibilities as a rapid means of classifying alloys according to

their metallurgical behavior and utility for service at high temperatures.

A paper on impact testing in torsion described this method for determining impact resistance of hard materials, such as hardened tool steel. The method has already been instrumental in obtaining a better understanding of the treatment of hard metals and promises to give reliable data not always forthcoming by the impact methods which are used at present.

An "overnight" accelerated fatigue test was described by H. F. Moore and H. B. Wishart, of the University of Illinois. Because the "short-time" tests which have been developed up to the present are reported as giving unreliable data, the possibilities of this "overnight" test are most interesting. Five or six specimens of a known Rockwell hardness are subjected to about 1,400,000 cycles of stress taking about 15½ hours in a rotating-beam fatigue machine. The ultimate tensile strengths of the specimens are then determined and, after making corrections proportional to the hardness, the stress applied for the period of the cycles is plotted vertically against the tensile strengths—horizontally. The value of the endurance limit is obtained by reading the figure on the applied stress ordinate opposite that point of the curve which is a maximum for the tensile strength. This method checked well for various metals when compared with long-time test results. The theory of the test is that below the endurance limit repeated flexure increases the strength by cold work, while above the endurance limit cracks develop which reduce the tensile strength.

A strong non-ferrous metals program marked the meeting. H. B. Gardner and C. M. Saeger, Jr., discussing "The Effect of Sulfur and Iron on the Physical Properties of Cast Red Brass," showed that casting at a high temperature showed greater influence on lowering the physical properties of this brass composition than the addition of sulfur. Iron, when added, improved all the physical properties, with the exception of electrical resistivity. A paper by C. E. Swartz and A. J. Phillips compared certain tin-base and cadmium-base bearing alloys, pointing out that the cadmium-base showed equal or better properties than the tin babbit. Motor tests showed that the cadmium-base alloys continued to function after the tin-base metals had failed, due to temperature. In discussion Dr. Gillett mentioned that, since tin is controlled abroad and fluctuates widely in price, domestic cadmium may compete with foreign tin for bearing metals, even where the ability to stand up at high temperatures is not required.

The committee on corrosion of non-ferrous metals and alloys presented the results of the first year's exposure of the twenty-four metals and alloys which are included in its extensive atmospheric corrosion tests at nine locations in this country. Extensive tables show the changes in tensile strength and elongation, the change in weight and describe the corrosion films formed on the specimens.

According to E. H. Dix, Jr., who presented a paper on "Corrosion Resistance of Structural Aluminum," beam and column tests performed on full-size sections show no decrease in the load-supporting capacity after exposure to severely corrosive conditions which caused marked losses in the mechanical properties of thin-sheet specimens of the same alloy.

The paper on "The Fatigue Properties of Light Metals and Alloys," by R. L. Templin, gave a considerable amount of fatigue data for nearly all the commercial light alloys of aluminum and for several magnesium-base alloys. In order to define the endurance limits of these light alloys, Templin pointed out, the number of cycles of stress required is of the order of 500 million, as shown by comparison with foreign laboratory tests which give much higher endurance limits based upon tests of a much smaller number of cycles.

At the cement and concrete sessions, P. H. Bates, in his paper on "Status of Specifications for Hydraulic Cements in the United States," presented some very interesting conclusions. He points out that present-day engineers have learned enough about cement to know that any one type will not meet all requirements. He advocates the use of six or seven special cements.

A hypothesis on the permeability of brick masonry walls was presented by W. C. Voss. His more than two years of investigation indicated that a brick, to produce the best results, should absorb from 5 to 10 per cent. of its weight in water in two days and it should absorb this at a low rate after the first 10 or 15 minutes. Professor Voss believes that cement and lime are equally important constituents of a good mortar and neither may be omitted where all the usual conditions of exposure and construction exist.

From the standpoint of industry the paramount significance of the annual meeting of the American Society for Testing Materials was the action taken in developments and changes in many specifications and test methods. Of the new standards approved for publication as tentative, 26 are specifications for widely used material and ten cover methods of test. Of the 228 tentative standards which the society has issued, 60 were recommended at the sessions to be adopted as standard and revisions in many standards were approved.

This great volume of standardization work is some indication of the intense activity of society committees during the past year. There has been no diminution in this important work despite losses in society income and membership.

SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION

This was the fortieth anniversary meeting of the Society for the Promotion of Engineering Education. Numerous conferences were held on a wide range of subjects including: The teaching of English, drawing and mechanics; coordinated engineering courses; cooperative engineering education, a subject particularly difficult on account of disturbed economic conditions; and industrial engineering. Various problems relating to the different engineering courses and to advanced education were discussed.

The presidential address of R. A. Seaton was on "The Future of Engineering Schools on the Economic Life of the Country."

At the annual dinner, Dexter S. Kimball spoke on "The Personalities of Engineering Educators." He stressed personality as of more importance than the subjects taught. A great teacher is one who has a scholarship, power of expression, and particularly the power to illustrate, power to inspire, fairness to student, humor, appearance and character. One of the finest things that can come to any man is to be taken into one of the great university communities. It ought to be difficult for him to get in and just as difficult to get out.

The Lamme Medal was awarded to Dexter S. Kimball. This is given each year to the chosen technical teacher for accomplishment in technical teaching or actual advancement of the art of technical training.

President-elect W. E. Wickenden, in expressing appreciation of the honor conferred on him, mentioned the esteem in which the organization is held and the widening circle of recognition of its active service, not only to the field of engineering education, but to the entire field of higher education. Engineering education no longer needs defense, and it should be commended to our associates.

SCIENTIFIC EVENTS

BOTANY AT THE UNIVERSITY OF OXFORD

ACCORDING to the London *Times*, the increasing numbers of students of botany has made necessary the extension of the buildings of the department of botany of the University of Oxford, which flank Inigo Jones's gateway to the Botanic Gardens opposite Magdalen. The alterations, undertaken with a special university grant of £2,000, were completed by the beginning of the term.

Botanical studies at Oxford are taking on a greater importance with the growth of exploration and research in Africa and in other regions. There are now twenty candidates in the final school of botany. In addition to these the department receives a much greater number of elementary students, for whom the study of botany forms only a part of their work. Their number has grown since the recent establishment of the Honor School of Geography, whose students are required to take an elementary course in botany.

On the other hand, the supply of students from the department of rural economy has ceased, for since the reduction of the government grant in the interests of economy, C. S. Orwin and his lieutenants in Parks Road have had to suspend for a time the teaching—though not the research—side of the department's work. Despite the stoppage of the supply from this source, the botany department last term had the record total of 130 students on its books, including postgraduate research workers. Of the latter, one is a professor of botany recently expelled from Germany because of his Jewish blood.

The main feature of the extension is the addition of an upper story to the west wing of the building. This is for the use of students of mycology, the study of fungi and plant diseases and includes a sterilizing room, a room for demonstrations and a small chamber for inoculation. Above these rooms a flat roof has been constructed for students doing physiological experiments which require an absence of shade.

The new work has been carried out entirely on the existing building and does not encroach at any point on the 300-year-old Physic Garden, the oldest of its kind in England, which, with its symmetrical paths and flower-beds, statues and fountains, remains Oxford's only example of the ideal garden of Stuart times.

SCHOOL FOREST FOR THE UNIVERSITY OF CALIFORNIA

TWENTY-SIX hundred acres of forest land in El Dorado County have been given to the University of California as a school forest for the division of forestry in the College of Agriculture by the Michigan-California Lumber Company. The property will be operated for the benefit of the lumber industry.

The president of the Michigan-California Lumber Company, John W. Blodgett, of Grand Rapids, Michigan, in presenting the gift to the university, said: "We desire to offer to the University of California the title to about 2,600 acres of our land to be managed under forestry principles by the division of forestry of the university."

The University of California offers complete training in professional forestry. At the present time there are approximately 125 undergraduate students