The Division of Chemistry has examined the factors involved in the preparation of rennet casein suitable for the manufacture of plastics, particularly buttons, and the highly efficient packings for fractionating columns and scrubbing towers designed in the laboratories are now being developed in forms specifically suited for larger scale operations. Active contact has been maintained with the laundry and cleaning industries of Canada, and the Division has also co-operated with the Sub-committee on Textile Specifications of the Canadian Government Purchasing Standards Committee. An investigation of the laundry cleaning process with sodium hypochlorite has been concluded, and work carried out on the efficiency of wetting compounds and mixtures for use in the first or 'break' operation where thorough wetting of the fabrics is of importance. The magnesian products laboratory of the Division has made available to the Canadian metal industry better refractories and a wider range which can be obtained from Canadian materials, notably the product of high-grade refractories from dolomite.

Various barks have been investigated as a source of tannin for the leather industry, and in the rubber laboratory much work has been done on bonding rubber to leather, particularly the application to the manufacture of automobile engine mountings of a bonding material previously developed in the laboratory. Numerous tests have been made of such materials as paints and textiles on behalf of the Canadian Government Purchasing Standards Committee, while a process for the preparation of organic mercury derivatives, particularly alkyl mercuric halides and other salts used for seed disinfection, has been developed. Use of the disinfectants in the form of a dust consisting of an inert carrier adapted to adhere to the seed has also been studied, and Canadian bentonites or talc proved satisfactory as carriers, the dust being equal in disinfecting power to the best imported products. Work on synthetic resins has been extended to cover the formation of polymers from chloromethyl compounds.

The Division of Chemical Engineering has a wind tunnel for testing aeroplane models and streamlined locomotives and other equipment in which air resistance is important, and a model-testing basin in which similar problems in regard to water can be investigated. Safety tests are continually made of domestic oil, gas- and gasoline-burning appliances. Five ship models were tested during the year in the towing basin in connexion with the design of private and Government vessels. Numerous aircraft instruments, gasoline and lubricating oils have been tested for various branches of the Government service.

In the Division of Physics and Electrical Engineering an increasing amount of standardization and testing work of all types has been carried out. In addition to studies of the heat insulation properties of building materials, the development of a suitable thermostat for refrigerator cars has received much attention. Thousands of aircraft castings have been examined by X-ray methods; and the cathode ray compass and direction finder, detection of fire through haze, estimation of forest fire hazards, vibration in aircraft and ultrasonic generators for depth sounding are other problems under investigation.

Steps were taken during the year to reorganize the Division of Research Information and establish a Section of Research Plans and Publications, one function of which is to provide technical secretarial services for the president and some of the associate committees. Stress is laid in the report on the organization of an Associate Committee on Medical Research. The Associate Committee on Grain Research has outstanding achievements to its credit in the solution of problems relating to bread wheat. Studies of the drying of tough and damp wheat have established the conditions under which this can be done without injury to the milling and baking quality of the grain. Other investigations dealt with seed injury by fungicidal treatments, effect of formaldehyde treatment on the growth of wheat and prevention of heating of damp grain in storage.

R. H. THURSTON: ENGINEER

CENTENARY CELEBRATIONS

THE celebration of the centenary of the birth of the distinguished American engineer, Robert H. Thurston, held at Cornell University on October 25, was the occasion for the delivery of several addresses in which tribute was paid to the great influence Thurston had on engineering education and progress, and also reference was made to the part the engineer should take in the solving of social and economic problems. The addresses were given in the Bailey Hall before an audience of more than a thousand persons, which included many of Thurston's old students and delegates from no fewer than sixty universities and institutions in the United States, Great Britain, Canada, France and Germany.

When inaugurating the proceedings, Dr. E. E. Day, president of the University, said that in the tense and hurried living of this twentieth century of ours, it is difficult and at times well-nigh impossible to keep in clear view the importance of the really durable values of life. No corrective for this difficulty is so sure as the occasional review of the qualities of leadership in great men. War-racked and depression-ridden though this world may be, the force of individual character remains undiminished. As the years of Thurston's active service recede, his contributions to the upbuilding of Cornell lose none of their impressiveness, while the lives of the men who went out from his tutelage continue to attest the strength of his mind and spirit.

After speeches in which Thurston's training at Brown University, and his work as a naval engineer and as an instructor at the United States Naval Academy had been recalled, Dr. H. N. Davis, president of the Stevens Institute of Technology, Hoboken, dealt with "Pioneering in Engineering Education at Stevens". Thurston had joined President Henry Morton at Stevens in 1870, when thirty-one years of age, and he brought to bear upon the problem of an engineering curriculum an original mind, a wide outlook and great force of character. There were two aspects of his work at Stevens, said Dr. Davis, that seemed likely to be permanent parts of the Thurston

tradition in engineering education. First he seems to have invented the idea that a mechanical laboratory is an appropriate part of an American Engineering School. It is, of course, difficult in 1939 to realize that in 1870 this idea had to be invented.

Thurston's conception of such a laboratory was a threefold one; first, it should be a place where a student could become practically acquainted with working machinery; secondly, it should be a place where staff and students, working together, might by research make important contributions to the progress of engineering; and thirdly, it should be a place to which industry could bring its problems, whether of testing, of design and development, or of a still more fundamental nature.

For his laboratory Thurston invented testing machines, and as a servant of industry the laboratory played an important part when few, if any, industries had their own plant for routine testing. From "a schedule of charges" dated 1877, and signed by Thurston, it appears that a test on the "autographic recording testing machine, of strength, ductility, resilience, and determination of elastic limit, elasticity, homogeneousness of structure and amount of internal strain, with strain-diagram and record" could be had for three dollars. A trial of a steam engine or boiler could be made for twenty-five dollars plus sixty cents an hour for field and office labour.

Thurston also had a conception of the fundamental position in mechanical engineering of the two great fields of the study of the properties of materials and of the problems of power. Further, he foresaw the position engineers were likely to occupy as industrial executives, and himself set an example to others by taking part in public affairs. He exemplified, concluded Dr. Davis, "a conception of the scope of the service of the engineer that may well be our inspiration and ideal for many years to come".

The fourth address was by Dr. W. F. Durand, his biographer, who dealt with Thurston's eighteen years, 1885–1903, at Cornell, and the concluding address was by Prof. S. C. Hollister, dean of the College of Engineering, Cornell, and was entitled "Looking to the Future". After referring to the great material developments since 1868, when engineering was first taught at Cornell, Prof. Hollister asked, "What has all this development done to human living?" New problems have arisen of vast social import, and to every phase of the scene, as he saw it, the engineer has a direct relation. He must be prepared to cope successfully with changes wrought by scientific and technical advance; he is concerned with production, processes and organizations; he is involved in problems of management, finance, public relations and government. It seems clear that he is bound to be involved more and more in the social and economic problems that lie ahead.

There is but one way of preparing young men for our expanding technical future, namely, to train them broadly and deeply in the fundamental sciences. Some feel that engineers are not trained in civic consciousness and usefulness. Prof. Hollister thinks it only fair to say that the whole educational field awaits with interest convincing testimony that any given curriculum accomplishes this very desirable end. Civic consciousness is a matter of community attitude rather than the result of studying any system of subjects. The surest way to provide the right community attitude is to prepare men and women thoroughly for the parts which they are to play in the community. Cornell for many years has, in varying degrees, been functioning in this direction.

MANUFACTURE OF RADIO SETS FOR EXPORT

ACCORDING to the *Electrical Times* of November 16, British manufacturers are often criticized for not studying the requirements of overseas markets. The reason for much of this criticism is easy to understand, as the conditions in the home markets of several of our international competitors are very similar to those in overseas countries which are large purchasers. To take a case in point, consider the export of radio sets.

It is common knowledge that, in the early days of foreign competition in the radio market, foreign competitors took the lead. In the United States, for example, where a widespread short-wave broadcasting system was employed, manufacturers found that little modification to the standard models was required to make them suitable for reception to distant parts of the world. British manufacturers had no similar home experience to rely on. Several of the leading firms in Great Britain have now built up an export market for models which have been specially designed for overseas use and have achieved success in winning back lost ground. The General Electric Co., Ltd., has an organization of a world-wide network of completely equipped and technically staffed branches which offer great facilities for before and after sales service. Its experts travel the world studying reception conditions and problems at first-hand. In one tour alone Nigeria and Siam, Canada, India, New Zealand and Hawaii were visited, the total distance traversed being 50,000 miles. As a result of the valuable information obtained great improvements in design were facilitated and many special tests, which every G.E.C. overseas radio receiver now undergoes as a matter of routine, were devised.

Illustrations are given in the *Electrical Times* of the apparatus used in the special laboratory and factory tests on the sets in the 'humidity cabinet'. In this cabinet any required temperature and relative humidity can be obtained and also the cyclic variations representative of tropical climates. Synthetic resin insulation, used for wave change switches, and rubber insulation receive special treatment in respect of both electrical and mechanical properties. In the artificial ageing test, specimens are subjected to high temperatures in an oxygen atmosphere and must remain unimpaired after 200 hours' treatment. One of the tests for the mechanism of switches is to perform satisfactorily 50,000 operations. A motor-driven reciprocating mechanism operates the switch during the test. An instrument is also used to check the moisture content of wooden components to ensure that seasoning has been thorough. During the manufacture of mica condensers all the operations are carried out in a filtered air-conditioned room and glass screens protect the condensers from the operator's breath.