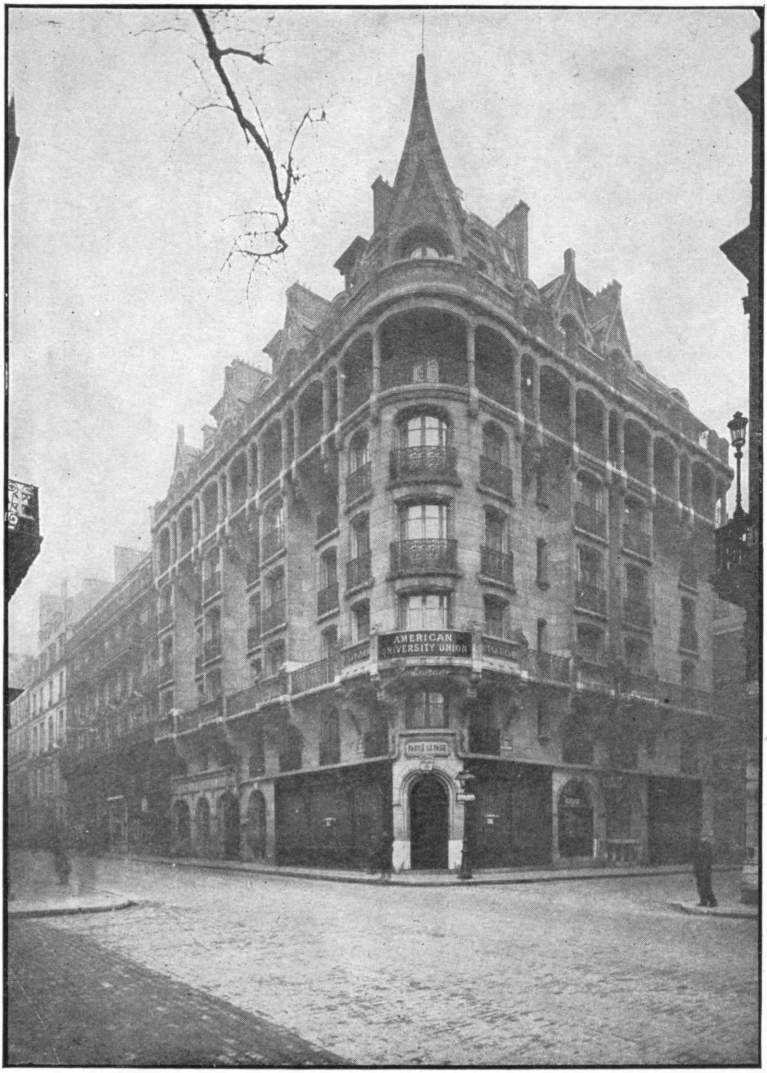

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PRESIDENT MACLAURIN'S REPORT

A Document which Every Technology Alumnus Will Read. Technology and the War. The Harvard–Technology Decision. Our Financial Outlook

To the Members of the Corporation:

In accordance with the By-Laws I beg to submit to your Corporation a report of the affairs of the Institute, appending, as usual, reports from other administrative officers with reference to the work of their special departments. It will be convenient to present the topics to be dealt with under three heads: The War, Coöperation, and The Financial Outlook.

THE WAR

Everything that has happened during the year is, of course, greatly overtopped in importance by the entrance of this country into the war. It is a war that differs from all previous wars in history in many respects, but perhaps in none more strikingly than in the extent to which it is a contest, not between sections of nations but between nations and groups of nations as a whole. The methods with which the war is conducted and must be conducted affect the whole adult population of our nation and put to a new and severe test practically every institution in the country, including, of course, the colleges, universities, and technical schools. As an appreciation of the scientific method and a knowledge of scientific principles is perhaps even more essential in war than in peace, it is not surprising that this Institute has already been called upon to play a very active part in the nation's preparations. When the call to the colors came, our students were eager to serve. The advice given to them in general was that seniors

should immediately enlist in some branch of the national service, but that all others should continue their studies as patiently as possible and thus prepare themselves for more effective service later. Those who enlisted in the national service were recommended for graduation on their records up to the time of their enlistment. This was in May last, and since then there has been an almost continuous stream of enlistments, the movement having been greatly accelerated recently by the publication of the selective draft regulations and more especially by the order closing enlistments on the 15th of December. The rules of the selective draft were of such a character as to place practically all the students in Class I, and this, combined with the recommendations made by high officials in Washington that the draft age should be lowered, caused great unrest amongst the students and threatened to lead to a dangerous depletion of the number of students of engineering throughout the country. The seriousness of the situation was brought to the attention of the authorities in Washington by various individuals and societies and as a result the order regarding the closing of enlistments on December 15 has been given an official interpretation so as somewhat to allay the unrest, and what is of more importance, the draft regulations have been altered within the last few days so as to take at least a portion of the student body out of Class I and put them into Class V. This may not go far enough, but it is at least a step in the right direction. Without such a step the country would almost certainly have repeated the experience of some of the allied countries in the early part of the war and found herself with a serious shortage of men trained to apply science to the problems that the war presents. In order to enable the country to prepare men in as short a time as possible for the service of their country the Faculty of the Institute has agreed that during the war work shall go on practically continuously throughout the year. A great many courses were given last summer to enable men to anticipate the work of this year, and as a consequence a large number will be recommended for graduation at the end of this month instead of in June next. The Faculty has decided to make more systematic provision for summer work during the next few years; and by this expedient and by the temporary omission of some courses that are not of the first importance for purposes of war, a material shortening of the courses will be effected.

It would be impracticable within the limits properly set for this report to give any adequate account of the war services that have been rendered by individual members of the Institute's Faculty or the Alumni Association. Alumni are to be found in most responsible positions in practically all branches of the service, both in the army and in the navy and in the various lines of activity that are almost as essential to success as the army and navy themselves. As regards the Faculty, a considerable number of the members have been granted leave of absence in order to enable them to enter the national service, and a larger number who are still with us are devoting much of their time and energies to problems arising out of the war. Many of our professors have gone into branches of the service that have long existed, but not a few into new branches that have been developed since the war began. One of the most important of these is the Chemical Section of the army, which has been placed in charge of a regular officer with Professor Walker as assistant director. Professor Walker has been commissioned as lieutenant-colonel and, with the aid of an organization that is being built up, is attacking the numerous chemical problems that the novel conditions of this war present. As examples of these problems may be mentioned the gas investigations that are being conducted by a large staff of chemists, including five professors of chemistry at the Institute, who have given up their whole time to the work. These investigations include researches on the artificial production of clouds as a means of screening instruments of destruction from observation by the enemy, the use of incendiary mixtures which the methods of the enemy have forced upon us, and the use of gases in offense and defense. Great advances have been made with all these problems. I have stated that five of the professors of chemistry have been granted leave of absence to give their whole time to work of the kind just referred to. This drain on our Department of Chemistry is felt more acutely because many of the members still remaining are engaged in various ways on war problems. For example, Professor Talbot is a member of a national committee appointed to coöperate with the Bureau of Mines in dealing with the special chemical problems that the war is presenting to that Bureau, and Professor Noyes has taken, and is taking, an active part in dealing with the very important problem of maintaining the nitrate supply, which is absolutely essential in the manufacture of explosives. Eighteen months ago, at the

request of the Secretary of War, the National Academy of Sciences, in coöperation with the American Chemical Society, appointed a committee to report on the best methods of securing a sufficient supply of nitrogen products (nitric acid and ammonia). Three of the professors at the Institute were members of this committee, Dr. Noyes being chairman. The recommendations of this committee were made in due time, but there was a most unfortunate delay in putting them into practical effect, with the result that an acute crisis was threatened in the supply of ammonia. The government is, however, now pushing forward the erection of plants in different parts of the country and meanwhile is carrying on investigations relative to the chemical processes involved in the operation of these plants. Some of these investigations are being made in the Research Laboratory of Physical Chemistry, under the direction of Dr. Noyes. I have mentioned the Chemical Department merely as a type. Time does not permit me to enter similarly into the work being done in other departments (such as that by our professors of mechanical engineering in the development of the Liberty motor and other work of great importance in various fields of applied science), nor to do more than remind you of the important war services of the Alumni Association and its members.

Your Corporation will doubtless be specially interested in the war service of the Institute considered as an organization rather than as a group of individuals. In estimating these services it is necessary to look backwards and remember that the Institute has done a great deal for many years not only to train men in such a way as to be of service in any emergency, but to fit them for particular fields of service in times of war. Amongst other things it has for many years trained all the naval constructors that are in the service of the government. Selected groups of men, after graduation from Annapolis, have been detailed to the Institute for a post-graduate course of three years' duration leading to a Master's degree in Naval Architecture. In this way the whole corps of naval constructors of the United States has been trained at this Institute to deal with the problems presented by the design of ships of the navy of all types,—battleships, cruisers, submarines, torpedo boats, etc. Moreover, five years ago the Institute established a course in aeronautical engineering, a course laid out on somewhat similar lines to the course in Naval Architecture just referred to. Until shortly before the war the instruction given in

aircraft design was in charge of Lieutenant Hunsaker, U. S. N., who was detailed here for this service by the secretary of the navy. After graduating from this Institute, Lieutenant Hunsaker was sent abroad to study the methods of aircraft design employed in the principal centers in Europe, and on his return an aerodynamical laboratory was built and equipped and the work of instruction begun. This work has gone on steadily ever since, although it was unfortunately affected by Lieutenant Hunsaker's withdrawal to assume very responsible duties in connection with the design of aircraft for the navy. Not only has the Institute trained men to design aircraft; it has also, since the outbreak of war, been active in training men for other branches of the aviation service. Early in the summer a Navy Aviation School was established here at the request of the secretary of the navy, this being the only school of its kind in the country. Almost the whole of the Walker Memorial was placed at the disposal of the Navy Department for this purpose and there are now over four hundred men in the school. This school consists of two parts, the larger designed for the instruction of pilots and the other for inspectors of aircraft and their motors, the whole school being under the command of Lieutenant McKitterick, U. S. N., with Professor Peabody as president of the Academic Board and Mr. Harrison W. Smith, formerly of our Faculty, as Dean of the school. In the school for pilots men arrive in groups every week or two and stay here for ten weeks. They are not taught to fly, instruction in this art being given later in a different school. The function of the ground school is to train men in fundamental matters such as military discipline and a knowledge of the machines that they are to use, with special reference to the motors and the guns. In addition to drill, guns, and motors, the curriculum includes such things as rigging, signaling (including radio work), navigation, meteorology, and photography, all the courses being of a most practical kind and designed to train men as rapidly as possible in matters of fundamental importance in the art that they are to practice.

As I have been speaking of the services of this Institute to the navy, it may not be out of place here to direct your attention to some of the things that it has been doing for the benefit of the Merchant Marine. It is generally recognized that one of the greatest contributions that this country can make to the success of the war is to build ships and put them on the high seas as rapidly as

possible. There has been consequently an enormous stimulus to the shipbuilding industry and a quite phenomenal demand for men trained to deal with various phases of the shipping problem. As the Institute has for a great many years maintained a School of Naval Architecture, it has done much to prepare men for usefulness in the present emergency. The demand for men, however, greatly exceeded the supply, and to aid in making good the deficiency the Institute, immediately after the country's entry into the war, instituted an intensive course in Naval Architecture designed to train men who had had considerable experience in allied fields for service in this one. All the men who took this intensive course almost immediately entered into service, and there is so much evidence that these courses are helping to meet a real need that they are to be continued as long as there seems a demand for them. As so many ships are being built, it is necessary to provide for a proper supply of officers, and here, too, the Institute, through members of its Faculty and alumni body, has been actively helping. Mr. Henry Howard, an alumnus of the Institute and until recently a member of its Corporation, has been appointed Director of Recruiting Service of the United States Shipping Board, and following his suggestions the Board has provided for the training in large numbers of two groups of officers, engineers and deck officers. It was recognized, of course, that no training of a few weeks' or months' duration could suffice to make men competent for the responsible positions that they would occupy as captains, mates, or engineers and that a considerable amount of practical experience was absolutely essential. In the case of deck officers certain minimum qualifications, depending on practical experience, such, for example, as two years' experience in the deck department of an ocean steamer, or one year's experience as mate of such a steamer, are required before entering the navigation schools that have been set up to meet the present emergency. About thirty of these schools have been established at various points around our coasts and on the Great Lakes, one of these schools being at the Institute and the general oversight of them all being entrusted to Professor Burton, of our Department of Civil Engineering. In the schools for training engineer officers, that is, the first, second, third, or fourth engineer of an ocean-going steamer, similar rules have been laid down. Men before entering the schools must have had certain practical experience;

for example, six months' service as chief or assistant engineer on a vessel, or one year's service as stationary engineer in full charge of a plant of not less than 1000 horse power; and in all cases, before a license is granted, six months' service at sea is required either before entering or after finishing the course. Eight of these schools for engineer officers have been established at different parts of the country, one of them being at the Institute, and all of them being supervised by Professor Miller of our Department of Mechanical Engineering.

I have spoken of service to the navy and to the Merchant Marine, but I need hardly say that similar services are being performed for the army. Here, too, the work of the Institute goes back many years, indeed to the very beginning, a certain amount of military training having always been incorporated in the curriculum. For many years this training, in so far as it is compulsory, has been confined to the freshman class, but war conditions have brought about a change and the Faculty has made military service compulsory for both freshmen and sophomores. As normally there are about five hundred students in each of these classes, this involves the training of a large number of men. This training is brief, being confined to three hours per week and being concerned only with matters that are of fundamental importance in the training of any soldier, whatever his rank. The military exercises at the Institute are not, however, confined within these limits. Under the stimulating guidance of Major Cole, U. S. A., several hundreds of men of the junior and senior years have enrolled themselves voluntarily in what is known as "the advanced battalion." These men are undergoing training in matters that are regarded by the military authorities as of special importance for those who are to be officers. In addition to this two separate units of the Reserve Officers Training Corps, namely Coast Artillery and Signal Service, have been established, and arrangements are in progress for the establishment of two other units, Ordnance and Engineer Corps. This is a matter not only of present but of very considerable prospective importance, as it will doubtless persist after the war and form an excellent means of preparing men for any emergency that may hereafter arise. Another direct service to the army has been performed, in coöperation with the Signal Corps, in maintaining a school of Military Aeronautics here. Very shortly after the war broke out the government decided to

establish ground schools of military aeronautics—eight schools in different parts of the country, this Institute being the center for the Northeastern Department. The School of Military Aeronautics is at present under the command of Major Sneed, U. S. A., and Professor Breed, of our Department of Civil Engineering, is chairman of its Academic Board. The course is of eight weeks' duration, instead of ten, as in the case of the Navy School, but except for the difference in time the curricula of the two schools are very similar. There are at present between three and four hundred men in the School for Military Aeronautics, all of them being housed in the portion of our buildings normally devoted to the use of the Department of Civil Engineering. The establishment of the various military schools has made a serious drain upon our resources, particularly in the matter of instructors, and has taxed our space to the utmost. Indeed, it has been necessary to erect a number of buildings of a temporary character to provide space for the extra equipment needed in these schools. This bare outline of the military activities of the Institute can convey no adequate impression of the effect of the war on the work that is being carried on here. Much has been accomplished, and happily accomplished without noise or fluster, but there is doubtless much more to be done, and this is certainly no time for self-satisfaction and far less for self-glorification. It is already apparent that the war is to bring changes in our regular curriculum that are likely to be permanent, and its most important influence up to the present has been its effect on the spirit of students and Faculty alike, an intensifying of the desire for service and a quickening of the impulse to disregard small things and concentrate on matters of larger moment. Particularly is this noticeable in the readiness to consider old problems anew, to rely less on tradition, and thus to maintain an openmindedness that should bring about far-reaching reforms.

Coöperation

One of the encouraging signs of the times that has had a marked influence upon the Institute in recent years is the movement towards coöperation. Three matters of large importance that will doubtless affect the development of the spirit of coöperation have happened within the year. One of these has been the successful putting into effect of the scheme of coöperation between the Insti-

tute and certain industries that was involved in the establishment of the School of Chemical Engineering Practice. This plan called for the maintenance by the Institute of a professor to direct its educational work at five different stations, namely (1) the Eastern Manufacturing Company in Bangor, Maine; (2) the New England Gas and Coke Company at Everett, Mass.; (3) the Carborundum Company at Niagara Falls, New York; (4) the American Synthetic Color Company, at Stamford, Conn.; (5) the Atlas Portland Cement Company, at Allentown, Pa. This coöperative effort went forward most happily until war conditions made it necessary to postpone its operation. The experiment, while it lasted, was singularly successful, and scarcely any of the minor difficulties that had been expected were actually encountered. For example, some anxiety had been felt that the presence of our students in the factories would cause jealousy amongst the superintendents, foremen, or other employees, but as a matter of fact, the men in the factories at all times quickly assumed a most friendly attitude towards the students and proved most helpful. From an educational point of view, the plan was most successful. All the officers of the various companies concerned coöperated at every point in the most gratifying way, and each of the companies expressed its readiness to take up the work again when the change in war conditions makes this practicable. The reasons for the temporary discontinuance of this important enterprise are easily explained. The director of the school, Professor Walker, on whose capacity and tact the success of the whole undertaking was largely dependent, has felt constrained to accept the important position in the national service to which I have referred earlier in this report. Most of his assistants have also gone into the national service, and there has been such an unusual demand for well-trained chemists, both in the service of the government and in the industries, that practically all the students in the school received offers that they could not properly refuse.

While this coöperative effort has been temporarily abandoned, another plan, similar in some of its aspects, has been adopted during the year and is now being followed. This is in the field of electrical engineering and involves an intimate coöperation between the Institute and the General Electric Company. The fundamental idea here is not new, involving indeed the really very old expedient of an alternation of experiences in a school and an