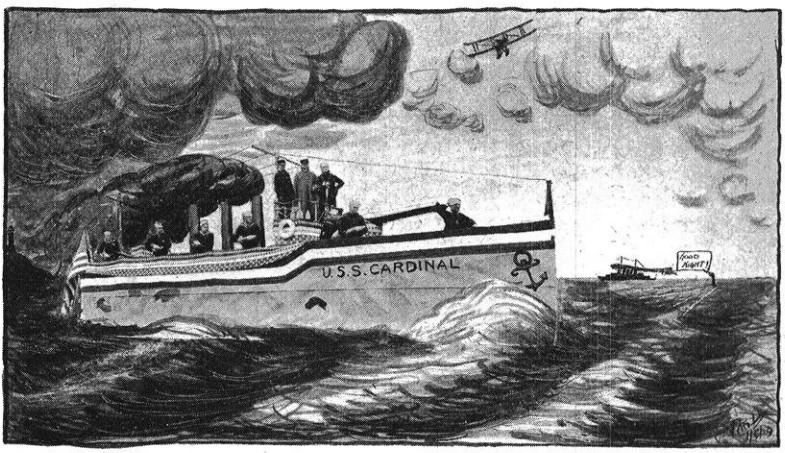
The Wisconsin engineer. Vol. 23, No. 4 January 1919

Madison, Wisconsin: Wisconsin Engineering Journal Association, [s.d.]

https://digital.library.wisc.edu/1711.dl/7P3DBZ6M5SIJV8I

The Wisconsin Engineer

VOL. XXIII JANUARY, 1919 NO. 4



HEP! HEP! HEP!

Sir: It has come into my thought, now and then, that some little reference, casually, to the Student's Army Training Corps—we who inspire the (formerly) still air of (erstwhile) delightful studies speak of this institution, among ourselves, of course, as the S. A. T. C.—might, perchance, tip a barb for your Quiver of Quizzicality. D. m. n. n. b., but here are the data: feathers, at least, for a slender shaft. The Dean of Vestals in a neighboring shrine of the s. c. h. l., an amiable Blue Stocking, and well meaning, albeit untutored in gauging the preferences of red-corpuscled leatherneckdom, summoned to tea 'neath her virginal

(*Continuel on page ii*)

Volume 23 Founded 1890 Number 4

The Wisconsin Engineer

$1.00 a Year 15c a Copy

Subscriptions, payable before February 1, $1.00 a year in United States, Porto Rico, Hawaii, the Philippines, Cuba, or Mexico; $1.25 in Canada; and $1.50 in other countries. Any article printed herein may be reprinted provided due credit is given. Entered as second class matter Sept. 26, 1910, at the post office at Madison, Wis., under the Act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in section 1103, Act of October 3, 1917, authorized October 21, 1918.

Published monthly from October to May, inclusive by
THE WISCONSIN ENGINEERING JOURNAL ASSOCIATION,
306a Engineering Building, Madison, Wisconsin
Telephone University 177

HEP! HEP! HEP!

(*Continued from front cover*)

v. and f. t. each Sabbath eve a handful of selects from the local unit, Chironed by their lieutenant. "M" and "N" companies faced their baptism of oolong like veterans of Chateau Thierry, but the rookies of "P" Co. kameraded to a man. In perplexity the lieut. sought his captain. "What'll I do?" sezzee. "She wants fifteen o' them guys to chow. I got six due fer two in th' bull pen, an' four a. w. l., but whernblazes'll I git th' rest?" "Easy," says Cap., a resourceful son of the Gadhelic blood. "Order rifle inspection and detail the first five dirty guns." And by greatleonardwood he did! And hepped 'em all over to Princess Ida for a social hour. Have a slice of lemon? P. D. S.

(*Line-o'-type*—Chicago Tribune)

CONTENTS

The Wisconsin Engineer

VOL. XXIII JANUARY, 1919 NO. 4

WISCONSIN MEN IN ANTI-SUBMARINE WORK

EARLE M. TERRY
Associate Professor of Physics, Wisconsin

I have been asked by the Editor if, now that the war is over, it is possible for me to give a description of the "Wisconsin Instrument" which has been developed for submarine detection. The German submarines now all lie at anchor in allied harbors and the probabilities are that the peace conference will settle the questions concerning naval warfare of the future in such a manner that the civilized world will never again be subjected to a menace similar to that inflicted by the German navy in the recent war. Nevertheless, the problems of submarine signaling and of harbor and coast defense offer a large field of application for the devices which have been developed for under-water listening, and it is therefore impossible, until certain questions of priority and patent right have been established, to give any description of instruments. However, I thought that a brief description of the organization of the anti-submarine work and the part played by Wisconsin men in this field may be of interest to readers of the ENGINEER.

Immediately after the entrance of the United States into the War, a list of fourteen problems was submitted to the various universities of the country as being in need of immediate solution, and among them was that of submarine detection. The staff of the Physics Department immediately dropped all peace-time research and began the study of some of these problems. Work had not proceeded far when Professor C. E. Mendenhall was appointed a member of the Committee of the National Research Council and left the university to take up his duties in Washington. One of the first acts of this committee was the appointment of a number of sub-committees to take direct charge

of the various lines of war research, and among them was the Submarine Committee which consisted of Professors Ernest Merritt of Cornell, George W. Pierce of Harvard, and Max Mason of the University of Wisconsin. This committee immediately held a number of meetings in Washington and at the submarine base at New London, Connecticut, and quickly organized the work. They had available reports of the investigations that had been carried on by the English, French, and Italian experiment stations, so that the problem was not entirely new when undertaken here.

Among the devices that had been employed abroad and had met with some success was a particular one developed by the French. After studying this instrument somewhat in detail, it occurred to Professor Mason that certain improvements and changes in principle would make it much more adaptable to installation on anti-submarine craft and would increase its range and directive properties, and the problem of this new development was assigned to the Wisconsin group. Professor Mason returned to Madison and together with Professors Roebuck and Terry began the construction of this new type of instrument. The services of Messrs. Louis Slichter and Don Hay were secured. Mr. L. S. Hanks contributed the use of his launch and Mr. Tom Brittingham volunteered as skipper.

Before the instrument was completed however, the press of business that the Submarine Committee was called upon to do necessitated Professor Mason's departure for New London. During the early part of the summer the first instrument was completed and tried out in Lake Mendota. The results were so encouraging that two other instruments of improved design were constructed and taken to the submarine base at New London, the latter part of July, by Messrs. Roebuck, Terry, Slichter, and Hay. Funds for defraying the expenses incidental to the work during the summer of 1917 were furnished by the university War Committee, and were raised largely by volunteer subscription. In this connection, there should be mentioned particularly the services of Professor C. S. Slichter who fathered the work from the beginning and to whose active and stimulating interest and counsel its early success is in no small measure due.

The work was continued there with the cooperation of the

Navy Department although no formal connection was established. The Navy had purchased the "Thetis," which had formerly been the pleasure yacht of a railroad magnate, and turned it over, with a competent crew, to the committee for experimental purposes. No laboratories or shops were at that time available and all mechanical work had to be carried out on board this boat. The Navy shortly afterward provided a small portable house to be used as a shop and detailed a machinist to assist with the work. The machinist had no machines with which to work and was therefore of little service. Besides the Wisconsin group and the other members of the Submarine Committee, there were working at the station a number of men from other institutions among whom may be mentioned Professors Bumstead and Zelleny of Yale, Wilson of Rice Institute, and Busch of Tufts, and the use of the Thetis had to be shared with them. In spite of these difficulties, however, the two instruments were installed upon the Thetis and given many service tests. A large amount of research was also carried out in connection with the problems of under-water listening, and by the end of the summer an instrument of entirely new design was completed which proved far superior to those constructed at Madison.

With the opening of the school year, Professors Roebuck and Terry returned to the university and, with other members of the staff, continued research upon some of the problems that had developed in the course of the work during the summer. Shortly after this time the Navy formally took over the work that had thus been started and the United States Naval Experimental Station was established. For this purpose it leased a factory building in New London, installed shop equipment and machinery, and assigned a sufficient number of enlisted men to carry on the mechanical work. Mr. W. L. Dabney was called to New London to take charge of the shop. Messrs. Slichter and Hay enlisted in the Navy and obtained commissions as Ensigns. Professor Roebuck returned to New London about Christmas time and was later followed by Dr. Frank Gray.

From this time on the work proceeded at a very much increased rate, and the development of the Station was very rapid. In fact when the writer returned to New London early last June to continue his work for the summer, he was amazed at the rapid

growth which had occurred since his last visit at Christmas time. Instead of occupying the upper floor of the original factory building, the Station now filled the entire building and three other large structures which had been put up. Instead of one hundred men employed, there were now over one thousand. The shops had been more than quadrupled in size and barracks built to accommodate the enlisted men. Instead of one experimental boat, four were now available, all of them equipped with the latest type of radio telephone. A dry-dock of size sufficient to accommodate the largest chasers had been built and it was now possible to place a boat in a dry-dock in a few hours, install any type of detecting device, and put her back in the water quickly. A large experimental tank had been built in which preliminary experiments in the development of new devices could be carried out before they had reached a stage sufficient to warrant being tried from a boat.

The organization was most complete. It included departments of research, design, production, installation, test, etc., as well as purchasing and accounting departments. The Navy had spared no pains or expense to obtain the services of competent men for the various departments. For example, it had gone to the General Electric, Westinghouse, and Western Electric companies and obtained from them some of their most able men. The result was that every department was thoroughly efficient and well coordinated with the other departments and work was put through with all the dispatch found in any of the best organized industrial companies. The Station was directed by the general committee which consisted of the heads of the various departments and naval representatives. Bi-weekly meetings were held. The mid-week meetings were devoted to general routine matters, but the Sunday meetings, which sometimes lasted the greater portion of the day, were attended not only by the local men but by numerous representatives from coordinated committees. For example, at these meetings there were representatives from the Experimental Station at Nahante which was maintained by the General Electric Co., Western Electric Co., and Submarine Signal Company, also representatives from the Navy yards at Boston, New York, Norfolk and other places at which submarine installations were being made. The Govern-

ments of Great Britain, France, and Italy maintained representatives at New London who presented at these meetings reports from their Governments regarding submarine work in their respective countries, and it frequently happened that special representatives from abroad were present who gave reports on particular lines of activity.

As stated at the outset, it is not at this time permissible to describe any particular type of apparatus that was developed; but suffice it to say that the field was thoroughly covered. No devices or ideas giving even the remotest probability of success were overlooked. The devices developed and studied represented nearly every branch of physics: acoustics, electricity, magnetism and optics. Devices were developed suitable for use on boats standing still, and others for boats running at normal speeds. There were devices for use on dirigibles, aeroplanes, and submarines; special forms for chasers, patrols, and transports; also others for harbor and coast defense.

At the time of signing the Armistice, the Wisconsin instrument, I think it is fair to say, had probably reached a better state of perfection than any of the other instruments. This it should also be said was due not to the fact that the Wisconsin men worked any harder or possessed any greater ability than the others—for I have never been connected with an enterprise in which more ability was represented or in which greater interest and devotion to work was shown than was to be found in this group at New London—but to the fact that the principle upon which it operates is perhaps simpler than is the case in many of the others. Three types of this instrument were developed; one, a long range instrument for use on boats standing still; second, an instrument for use on boats underway, particularly patrols and transports; and, third, one for deep sea installation for use in harbor and coast defense. No one outside of the naval authorities knows to just what extent these devices were installed on the various types of craft. However, it is known that all of the submarine chasers which were furnished to the French Government as well as all the recent chasers built for our own Government, are equipped with this device. We also know that many of the transports, including the German boats interned in this country, and taken over by the Government, were provided

with them. To just what extent the anti-submarine devices contributed in solving the submarine menace is also unknown and cannot be determined until the final accounting has been made; but during the summer, reports repeatedly came from abroad that the American instruments were among the most effective in locating hostile submarines. This was particularly true in the southern waters and the Mediterranean, where the listening conditions seemed to be unusually favorable.

Professor Mason went abroad early in June for the purpose of installing instruments on English patrols, and of studying their operation under actual war conditions. He was joined later in the summer by Ensign Slichter and other men from the New London Station. We might conclude by relating an incident which he has reported. Three patrol boats were somewhere on the North Sea, seeking German submarines. One was heard and all three rushed to the spot. They dropped depth charges, then hurried away and listened. The submarine was again heard running apparently at full speed and the boats immediately rushed once more to the spot and dropped depth charges. Again they hurried away and listened. This time all was quiet for a few minutes when the listeners heard a revolver shot from the direction in which the submarine was last detected. This was followed in quick succession by twenty-one more shots and thus ended the career of another of Germany's submarines with her entire crew.

PHONING THE AVIATOR

The day before Christmas, a successful test was made of long distance radio telephony. A naval aviator in flight, with his engines thundering, was able not only to hear, but also to recognize, the voice of an officer 100 miles away. Previous tests had failed when the distance exceeded 2 miles, except, of course, when the engines were stilled.

THE ENGINEER IN ADMINISTRATIVE FIELDS*

LAWRENCE P. WORKS
Senior Electrical

In order that the reader may not be deceived as to the nature of this essay I will state, at the outset, that by administration is meant the management of affairs either public, corporate, or private.

Perhaps the most logical point to consider first, is the need for the engineer in administration. To what professions do the members of public utilities and railway commissions belong? There are, of course, some engineers connected with them because their expert services are essential, but usually with them restricted to advisory duties, while the one really receiving credit for what is accomplished is not an engineer. It is true that the public positions are often not so remunerative as positions with private firms; but, men of other professions consider the financial deficiency to be offset by the honor which the position confers. Are we to assume that the engineer is less public spirited and less desirous than other men for distinction conferred in a position of public service and trust? Is the spirit of service lacking in the engineer? I believe that both of these questions may be answered in the negative. Perhaps, after having taken laboratory courses for four years and having had to calculate efficiencies in each experiment, the idea of public inefficiency is abhorent, hence he declines to become associated with it. It is entirely possible, however, that in this very respect the engineer will be most useful. The railway and utilities commissions are the outstanding examples of positions that should be filled by engineers. The exact services to be rendered by public utilities, the cost and conditions under which they are rendered are perfectly familiar to the engineer, therefore who can be better qualified to fill these positions?

For the reason for his absence, I believe, we must examine his attitude toward these positions, and the attitude of the public toward the engineer. The public realizes his value as a tech-

*This essay was presented to TAU BETA PI in accordance with the initiation requirements of 1918.

nical advisor, but does not regard him as one whose opinion has weight in non-technical matters. This public attitude would be of little consequence were it not corroborated by the engineers' own similar attitude toward himself.

In order to investigate the engineers attitude toward administration we need go back to his college days, and to the suitability of his college curriculum for developing administrative ability. Glance at an engineering college announcement; nearly all of the required courses are either highly technical or simply stepping stones to the study of those which are. The electives are very limited, and again, are largely technical. In addition he is encouraged to subscribe for a technical paper, and keep up to date in his own particular line. If he has plenty of time to read, besides doing his regular academic work, then the technical paper is all well and good; but if he has not, then his spare time would be much better spent on a study of industrial and political history, political and social science, economics, labor problems, principles of banking, and kindred subjects which will tend to give him a broader outlook.

In addition to the increase in knowledge derived from such study, the intellectual training may easily be made of even greater value. In the classroom the engineer devotes his time to the study of absolute truth; the problems are clearly stated, and the principles to be applied are evident. In the problems of administration there are often conflicting elements, and the weight to be given each depends entirely upon good judgment. After weighing the several elements, the proper method of solution is still to be found. The principles involved in the problems in practice are not stated with anything like the clearness of the problems of the classroom, and inasmuch as they are not, the classroom problems have unfitted the engineer to solve the problems of practice.

Specialization becomes most obnoxious when it results in the curtailment of the study of English, especially English composition. Every engineer should, by continual care and practice, cultivate the ability to express himself in writing and orally in clear, concise, correct English. There is nothing which is more essential to the attainment of a more than mediocre success in administration.

Not the least important step toward an administrative position is the proper selection of associates. If one expects to attain prominence he must make the acquaintance of those who have the power to help him. The engineer should participate in public affairs, not only to discharge his political and social duties, but also because of the development and breadth of view which will come to him.

Now that we have considered the probable reasons why engineers do not hold the high administrative positions, it will be well to consider what will be the probable results when they do. To draw on fiction for an example which is, tho fiction, fairly typical, recalls the position of Mr. Holmes as engineer and Mr. Burke as manager of the Greenfield Co. in "The Winning of Barbara Worth." When the flood threatened, the engineer knew something of the forces with which he was working and appreciated the physical danger fully; the manager saw only the financial side. As a result a great engineering project was temporarily lost.

Generally speaking then, with engineers managing, we may expect to have things done at a somewhat greater first cost for material, but with a stability which far more than makes up for the increase in initial investment. We may reasonably expect then to have fewer foolhardy projects undertaken at public expense. On the other hand improvements, the need for which has always been evident to the engineer, will be undertaken in a more enterprising manner. The work of the army engineers in the war has shown what the engineers are capable of in administrative fields. In war work, where the engineers were of necessity given full control of their procedure, they have solved the most difficult problems with ingenuity and expediency.

THE ACID BESSEMER PROCESS

RICHARD S. MCCAFFERY
Professor of Metallurgy, Wisconsin

Bessemer's patent of 1855 marked the beginning of the great modern steel production processes of the world. The use of the Bessemer Process spread fairly rapidly in the large steel producing countries, and for a great number of years most of the structural steel and railway rails were made in this way. In 1878 the Thomas Gilchrist patents were taken out and the Basic Bessemer Process developed on the Continent and in England, but the United States continued to employ Acid Bessemer, on account of the favorable situation here with respect to low phosphorus iron ores. With the increase in phosphorus contents of the ores, the Basic Open Hearth Process largely displaced Acid Bessemer in the United States, but more recently, within the past ten years, the Duplex,—a combination of Acid Bessemer and Basic Open Hearth,—offered such advantages that interest has been very much reawakened in the possibilities of the Acid Bessemer Process itself. Many Duplex plants have been built recently, employing larger converters than were attempted in the past, and, as a result, new problems of great technical importance have arisen.

Present American practice with large Acid Bessemer converters is about as follows: The iron, which has been taken from blast furnaces in the molten condition and then poured into a mixer, is drawn, as required by the converters, from this mixer into a transfer ladle, and poured into the down-turned converter, which has a capacity of about 25 tons. The air blast is now admitted, the converter turned up, and the elimination of the silicon, manganese, and carbon is rapidly carried on. The blast pressure usually employed varies between 20 and 25 pounds per square inch at the converter, and if it be necessary during the blow to cool the converter contents, arrangements are made for the addition of scrap steel, or, in plants where scrap steel can more advantageously be sent to the open hearths, provision is made to cool the converter by blowing in steam with the air. The time of the blow depends on the amount of impurities eliminated, the design of the converter bottom, and the blast pres-

sure; but generally, with a 25 ton vessel, it is between 10 and 15 minutes. When the contents of the converter have reached the desired carbon, or when soft blown, the converter is turned down, the blast cut off, and the vessel contents poured into a ladle.

Recently the writer had the good fortune to witness a great many Bessemer blows, and to take samples and temperatures at various stages of the blow with the object of determining if the reaction whereby the manganese in the pig is eliminated as oxide is a reversible reaction, and, if reversible, a possible method of keeping manganese in the blown metal, and also for the purpose of determining means of preventing "spitting" which takes place during the latter part of the Bessemer blow with certain irons, which "spitting" is very objectionable and largely increases production costs on account of the necessity of regular clean-ups, to gather together the slag and metal ejected from the converter.

To determine the reversibility of the manganese oxidation reaction, a series of samples were taken of the mixer metal, the converter contents at the end of the silicon blow (say, in four minutes from the start), in the middle of the carbon blow (say, in eight minutes from the start), and of the soft blown metal. Slag samples were taken at the same time, and the temperature of the metal was observed by means of a Scimatco pyrometer. In certain of these tests residual manganese was obtained, but not generally, while in some of the tests, when a temperature of 1830° C. was obtained by the blown metal, the manganese was entirely oxidized.

In regard to the "spitting," it had been observed that this was worse with a low silicon, high manganese pig,—say, about 1 per cent silicon and with $1\frac{3}{4}$ to 2 per cent manganese; and also that it was much worse the higher the temperature at which the converter was operated. After a study of all the data obtained was made, the following explanation seemed to account for all the difficulties, and suggested improvements in the practice. In the following discussion phosphorus is not considered, as it is not eliminated in the Acid Bessemer Process, and sulphur is neglected, as its effect on the heat balance is so small as to be negligible compared with the silicon manganese and carbon. The silicon and carbon of the iron form respectively silicides and carbides of iron and manganese. In the converter the carbides

of iron and manganese may burn to form, in greater part, carbon dioxide if the temperature is low, and to form carbon monoxide, in greater part, if the temperature is high. The net heats of combustion in the converter of these carbides and silicides is figured below:

Substance	Formula	Oxidation Product	Calories per gram atom of metal
Silicide of Iron --------	FeSi	Fe_3O_4 & SiO_2	245
Carbide of Manganese--	MnC_2	$MnO–CO_2$	171
Silicide of Manganese--	Mn_2Si_2	$MnO–SiO_2$	135
Carbide of Iron---------	Fe_3C	Fe_3O_4 CO_2	98
Carbide of Iron---------	Fe_3C	Fe_3O_4 CO	75
Carbide of Manganese--	MnC_2	MnO CO	35

They are arranged with the greatest heat of combustion first,—in other words the arrangement is in the order that oxidation occurs, the silicide of iron burning first and carbide of manganese, when the carbon burns to carbon monoxide, remaining until last. It is assumed that the iron burns to magnetic oxide, as that reaction liberates most heat.

With this thermal data, the cycle of the Acid Bessemer blow will be considered. The iron silicide first burns, forming magnetic oxide of iron and silica, and, as a result of the high combustion heat, the temperature of the converter rises. If the bath is not at too high a temperature now, the manganese carbide burns, the carbon becoming carbon dioxide. In this discussion I assume that iron silicide burns completely first, then the manganese carbide begins. This, however, is not the real condition. I believe all the reactions take place at the same time to a greater or lesser extent,—only at one time some one reaction is taking place more rapidly than it does at other times,—that it is predominating at some time over the other reactions; and when I say that one reaction takes place and then another reaction follows it, I mean it in this general way: That some one reaction is predominating at one particular time. The oxidation of the manganese carbide, at the lower temperature which we have assumed in the converter, produces manganese oxide and carbon dioxide, and the oxide of manganese, along with the magnetic oxide of iron, forms with the silica, previously produced, an iron manganese silicate slag. The temperature is rising right along now, and the iron carbide burns, and for this discussion it is immaterial whether the carbon of the iron carbide burns to carbon

dioxide or to carbon monoxide. When the carbon of the iron carbide is burned out, and as the manganese carbide has been previously burned, the Acid Bessemer procees is then completed, the vessel is turned down and poured, and we have what might be called a normal blow, the temperature of the blown metal being between 1600 and 1650° C., and no trouble of any kind has been experienced.

With this normal blow, now contrast what takes place if the temperature of the converter is raised and the blown metal is excessively hot. We start in with this second blow and first burn, as before, the silicide of iron to magnetic oxide of iron and silica. The temperature of the mixer metal may have been higher or more silicon may have been in the pig; but, as a result, after the silicon of the iron has been burned, on account of the high temperature, the silicide of manganese now burns and the manganese carbide remains in the molten metal. This manganese carbide now begins to cause trouble. It is a very active reducing agent, and it begins to reduce the silicon in the silica to metallic silicon and to reduce the magnetic oxide of iron to ferrous oxide, both of which results are detrimental, because the slag is made more basic, first by the reduction of the silica, and secondly, because the magnetic oxide may form with ferrous oxide or manganese oxide, a certain amount of ferrite slag. This possibility of ferrite formation is prevented by the reduction of the magnetic oxide to ferrous oxide. The net result of this increase of basisity of the slag is to render it more infusible, which again, results in the "spitting" phenomenon. This continues until all the manganese carbide has been eliminated by reducing silica and magnetic oxide. The iron carbide now oxidizes and the manganese carbide continues to reduce silicon until the manganese carbide is itself completely burned. Then, with the elimination of the carbon of the iron carbide, the blow is finished and the vessel turned down.

The answer can now be made to various questions proposed in the beginning of this paper as follows:

Is the reaction $2\,Mn + O_2 = 2\,MnO$ a reversible reaction at the temperatures possible in a Bessemer converter? It is not, because many blows were finished at 1820° C., or 200° C. above the normal temperature, and in these blows the manganese was completely oxidized. Then how about certain blows in which

residual manganese was formed? In these blows, the silicon in the pig was always high, and silicon was always residual with the manganese, the explanation being that the early and middle parts of the blow were carried on at a high temperature, causing the manganese carbide to stay behind in the metal and reduce silica. In these latter blows the drop of the flame is not so clear and certain as in normal blows and when the iron carbide is completely burned the flame appears to drop somewhat and the converter is turned over. However, there is always sufficient carbon remaining in these blows to combine with the manganese, and the manganese in the blown metal is not residual from the reversibility of the oxidation reaction but from the presence of some manganese carbide, while the residual silicon in them results from the reduction of silica by the reaction of some of this manganese carbide.

The "spitting" can be cut down or entirely eliminated by temperature control during the blow, and, to secure this regulation, the steam line into the converters experimented with was increased in size because scrap was not available to add to the hot charge to lower its temperature. By steaming during the silicon blow and thus keeping the temperature down the manganese carbide is burnt out early, its detrimental reducing action is prevented and the "spitting" stopped. During the experimental work, under certain conditions, it was observed that the converter temperature rose rapidly during the carbon blow, which of course it should not do. This indicated the possibility that the carbon monoxide in the converter was being burned in the vessel to carbon dioxide, a result not desired, as it made the temperature higher, necessitating the use of steam or scrap, either of which increased the cost; and in addition more power was used in the blowing engines to furnish oxygen to burn the carbon monoxide in the vessel when the carbon monoxide might just as well have been discharged into the atmosphere and there burned.

With these considerations in mind, a new converter bottom was designed, increasing the number of tuyeres and changing their distribution, and a test was made of the new bottom in comparison with the old. On account of the difficulty of installing air measuring apparatus, the blowing engines, which had been previously indicated under various operating condi-

tions both on the steam and air ends, were used as an air meter. Two consecutive pours from the mixer were blown so as to obtain, as nearly as possible, the same quality of metal; and these ladles were separately blown by the same blowing engine, with only the one engine on the blast main. Both charges were blown soft. The result follows:

TABLE II

	Old style bottom	*New style bottom*
No. tuyeres ⅝"	23	35
Wt. mixer metal	47,000 lbs.	50,000 lbs.
Blast pressure at engine	28 lbs. per sq. in.	22 lbs. per sq. in.
Total engine revolutions per blow	589	443
Time of blow	14′–0″	10′–20″
Comparison of time	100%	69%
Comparison of power used	100%	60%

This test indicated the cause of certain of the troubles. As a result of the high air pressure employed with the old converter bottoms, large amounts of air were blown through the molten bath without oxidizing the impurities but, instead, burning the carbon monoxide in the vessel to carbon dioxide. In this case, as shown by the test, the time of blow is actually shortened, by reducing the blast pressure, equal to an increase in converter capacity of 45 per cent, with an actual saving in blowing power for the increased capacity.

Aside from this very obvious advantage, however, the reduction of the converter temperature and the control of the oxidation of the manganese carbide, with the elimination of "spitting," are other advantages of the greater number of tuyeres and reduction of blast pressure with the new style of bottom.

Some of the temperatures obtained for certain Bessemer blows seemed so high that great care was taken to make certain that they were correct. Two observers with separate instruments could obtain checks on the temperature within 10° C. easily, and usually were within 5° C. The instruments were standardized twice a day, and as the instruments gave normal readings for the normal blows there is no reason to believe that the high temperatures obtained for certain blows were incorrect.

At first glance it might appear that a comparatively old process like Acid Bessemer does not offer many possibilities for research, but, after close study of the process, the need for and possibility of research becomes very apparent.

FINANCING A CITY PLAN*

R. H. GARLING, Commerce '16

Before taking up the methods of financing a city plan it is best to explain what is meant by the term city plan. The charter of the city of New York describes the city plan as a permanent map "showing the parks, streets, bridges and tunnels, and approaches to bridges and tunnels as heretofore laid out, adopted, and established pursuant to law, and the maps and profiles included in or accompanying the same showing the grades of such streets duly fixed, adopted, and established." But it is claimed that this definition is too minute as to details and really ignores the city as a whole, not only as it is, but as it will be. Nelson P. Lewis, chief engineer of the Board of Estimates and Apportionment in New York, gives us the following definition: "The real city plan is a general system of arterial streets and transportation lines by which the different sections of the existing and the future city will be connected with each other and with centers of population outside of the city limits; parks and open spaces and other resorts for recreation and amusement; the existing water front development and the space needed for its future increase; the existing public and semi public buildings and sites for those which may be included in the future."

There are three requirements for city planning; first, a scientific plan; second, financial resources; and third, an organization for its promotion. In almost every case where a city has a plan it is the result of the activity of some commercial or civic organization. Commercial Clubs and Boards of Commerce are especially strong factors in the promotion of the city plan. Probably the reason for this is that at the very outset adequate funds must be had for technical advice and for the conduct of the preliminary work to the end that public interest may be stirred. It is essential that the advice of an expert be secured before the preparation the city plan is attempted. Such advice may seem expensive on the face of it, yet it is a most profitable investment. Very seldom are cities willing to appropriate the funds necessary for the preliminary studies, probably because

*A paper prepared for the course in City Planning.

of a fear on the part of politicians that the censure of the community would be incurred if they invaded new and untried fields. But after the plan has been drawn up by the Commercial Club, or a similar organization, the next step is to arouse the sentiment of the public in favor of the plan and to secure recognition of the plan by the city authorities. The Chicago plan affords a splendid example of the work of the commercial organizations. The present Chicago Plan Commission was established by the Commercial Club of that city, but only after years of continual promotion. The sum of $130,000 was spent for promotion and for technical work, and $90,000 of this $130,000 was paid by the Commercial Club, the balance being appropriated by the city in yearly installments. But more than that,—prior to the appointment of the commission the Club had spent $100,000 for the creation of the plan and the publication of a report for presentation to the city.

It is very difficult to secure the funds for the preliminary work involved in the replanning of a city. There may be no doubt as to the ultimate value to the city, but the problem of securing the necessary capital and the proper distribution of the burdens and the benefits derived therefrom require careful and competent financing. Cities like London, Berlin, and Paris have spent millions of dollars on improvements, but they are able to do it only by placing an additional burden upon the taxpayers. The theory upon which most plans are financed is that those benefited should bear the cost. This is certainly just and proper. In city planning the benefited are the property owners and the whole body of citizens, not only of this generation but of others to come. If we base our financing upon the theory that those benefited should bear the cost we may carry it out in any of several ways. First, by means of assessment upon the property owners, or those that are immediately benefited by the erection of a building or the improvement in the street, or whatever the case might be. Second, the whole body of citizens might be benefited and an increased tax might be the proper financing. Third, not only the present generation but others to come may receive the benefit, which would justify the issuance of long time bonds. It is very necessary that land speculators are deprived of advantage and that no unjust burdens are laid upon the taxpayers.

The apportionment of the assessment depends mainly upon the nature of the improvements. Such improvements as are purely local in character may properly be assessed against the abutting property owner, while those of a more general character should be generally assessed. A few illustrations will make clear the distinction between local and general benefit. In the case of a residential street, whose prime purpose is to give light, air, and access to the developments located on the street, the benefit is local and the burden of the expense should be borne by abutting property owners. Small parks also are strictly local benefits and their cost can be placed in the district in which they are located. But the opening of a new street into an undeveloped territory may be of a more general nature and the cost can be more widely distributed. In the case of a new boulevard, the city, or all the people, should bear the expense, with a possible provision that abutting property owners shall pay more than those located in a distant part of the city. It is apparent that the relative local or general benefit can not be determined by the cost of the improvement. An expenditure of $1,000,000 in one part of the city may be more local in its benefits than an expenditure of $50,000 in another part. There can be no fixed rule as to the distribution of the expense. Such distribution can be determined only after a careful investigation, and in order to have an unbiased distribution a permanent body should control the assessment. This body ought to be large so that the entire personnel need not be changed at one time.

Excess condemnation has recently been employed in the financing of the city plan. Under this scheme the city not only condemns and purchases the land for the improvement, whether for a highway or a public building, but also the land adjacent to it which would be affected by the improvement and which will increase in value. After the improvements have been made or the building erected, the land is sold by the city whenever it can be done to best advantage; or the city possibly may hold the land for a long time until it has greatly increased in value This matter of excess condemnation is especially valuable when land is desired for the erection of schools or the creation of parks. The city may secure the land a long time in advance of

its utilization and hence more cheaply than would be the case if purchase were delayed until the city became built up. But excess condemnation as a means of paying for improvements has serious objections. The enhancement in real estate values after the improvements are made is seldom more than half the cost of the improvement, and furthermore there is the interest on the bonds and the loss of taxes that would have been paid if the land were held by private owners. In order to obtain the full cost of the improvement from the increased value of the land, the city would have to improve the property and hold it over a term of years until the full value of the improvement was realized, for the immediate enhancement of land values does not represent the full benefit of the improvement. Also a large improvement is likely to demand the marketing of bonds far beyond the city's borrowing power, although if the property is productive the borrowing limit should be raised to include it.

The method of assessing property owners directly has advantages over the excess condemnation method, particularly when all property benefited is assessed, even though it be at a considerable distance from the location of the improvement. Instead of having to sell their property and repurchase it, as in the excess condemnation plan, the property owners pay the sum directly to the city. But there are also objections to the direct assessment method. The assessments must be arbitrarily fixed and may in some cases prove unfair. It also puts upon the people a burden that must be met immediately; the amount must be paid at once and can not be extended over a convenient period of time.

This brings us to the method of financing by the sale of bonds. The city may issue either short term bonds of from one to ten years, or long term bonds of from ten to ninety nine years. An illustration of the cost of short and long term bonds will bring out the advantages of both. Assume that a city must make improvements amounting to $50,000,000, and suppose that the city is to borrow this sum on short time notes with the understanding that one tenth of this amount would be included in the budget annually for ten years and that the corresponding notes shall then be retired? The aggregate outlay would amount to $61,000,000 which includes principal and interest. But

$50,000,000 issued in four and one-half percent 50 year bonds would bring the total cost up to $134,663,750. Under the first method we have to pay annually $6,100,000 for a period of ten years, while under the latter $2,693,275 would have to be met annually for a period of fifty years. The difference would mean a saving of $73,663,750 to the city. According to these figures the safest course would be to have the present generation stand as much of the burden as reasonably could be expected.

Theoretically the terms of the bonds should correspond as closely as possible to the life of the improvement or whatever the city may be financing. Taxpayers are often times made to pay interest and sinking fund charges for a thing which they can not possibly enjoy. Fifty years bonds may be issued to pay for improvements which will be quite inadequate fifty years hence. Therefore before a city can definitely decide upon the terms of its bonds a city plan is necessary. In the case of outlying parks, we who secure them, should pay the minimum, as fifty years hence these parks, now suburban and somewhat of a luxury, will be indispensable to their urban dwellers. We should be able to issue bonds for such parks with a sinking fund charge very small today and graded to a very large sum fifty years hence. But in paving bonds—fifteen year bonds—the present charge should be heavy and the charge fifteen years hence should be light. We who have the pavement at its finest should bear the greatest expense. In the case of stone or concrete bridges the amortization charges ought to be kept at one figure throughout the term of years that the bond runs. Public buildings deserve a diminishing charge. Bonds issued to provide funds for the acquisition of real estate upon which public buildings are to be built, deserve an increasing amortization charge. It is the problem of the plan commission or the city authorities to consider every other improvement—if financed by the issue of bonds—in the same way. This all goes back more or less to the theory that those benefited should bear the cost.

Financing is by no means an easy matter. Often the law limits the borrowing power of the various cities. The following is an extract of the law of the State of Illinois. "No municipal corporation shall become indebted for any purpose to an amount

exceeding 5% of the value of the taxable property, as ascertained by the last assessment; and that at or before incurring such debt the municipality shall provide for the collection of a direct annual tax sufficient to pay interest and to discharge the principal within twenty years from time the debt was incurred." The city of Chicago must comply with this statute when financing its city plan. In 1908 the assessed valuation of the property was $477,190,399. The total indebtedness could be only $23,859,520, which is by no means great enough to carry out the adopted plans.

The cost of carrying out a city plan is by no means prohibitive if the city abides by the fundamental principal that the costs should be distributed according to the benefits derived. There are several general rules: (1) where there is local benefit there should always be local assessment: (2) the entire city should bear no expense unless the improvement is in some degree of metropolitan importance and benefit: (3) assessments should not be confined to the cost of acquiring streets, but should extend to any improvements which will increase the value of the neighboring property, and should be apportioned as nearly as possible according to the benefits derived: (4) the determination of a policy and its application to each case should be entrusted to a permanent technical bureau or to a board composed of men especially qualified, whose terms of office should so overlap as to insure continuity of policy and purpose.

American cities are bound to grow during the coming years, yet few of them have plans prepared. Such work can now be done at a very small expense, exceedingly small in comparison to the benefits derived later. A city plan is a city's best investment, not only because it saves expense, but also because of the incentive to grow that the plan creates.

A STUDY OF ENGINEERING EDUCATION, BY C. R. MANN

F. E. TURNEAURE
Dean of The College of Engineering

Several years ago the Society for the Promotion of Engineering Education invited six national engineering societies to cooperate with it, through a joint committee, in making a thorough study of the condition of engineering education in this country. These societies promptly appointed committees for this purpose, but the task was found to require so much time and energy on the part of the investigators that the Carnegie Foundation for the Advancement of Teaching was asked to assist, with the result that this organization offered to bear the expense of a detailed study by a paid investigator. Professor C. R. Mann, Professor of Physics at The University of Chicago, was appointed to undertake this work, and his report covering the results of a two-year investigation has recently been presented.

This report, consisting of about 110 quarto pages, is a very valuable and comprehensive study of engineering education. The subject is considered in three parts: (1) present conditions, (2) general problems of engineering education, and (3) suggested solutions. In prosecuting his study, Professor Mann made use of criticisms and suggestions from the practicing engineer as well as the engineering teacher. An effort was made to get at the fundamental questions involved. The abilities required of a successful engineer were studied in part through a very interesting questionnaire sent out to all members of the six engineering societies co-operating in the investigation. These questionnaires attempted to secure the judgment of practicing engineers on the traits of character and qualifications most valuable in the young engineer. The results of this inquiry emphasize in a very striking degree the relatively great importance of high character and native ability in the engineering profession as compared to mere technical knowledge. This is doubtless true in all professions, and is not a surprising result when its real significance is considered. It would appear to emphasize the relative importance of inspiring teaching as compared to details of curriculum.

Professor Mann's study of present conditions includes an interesting description of the development of early engineering schools in the United States and the evolution of the present curriculum. Interesting data are also given of student progress and elimination before graduation. The average standing for each of the four years is given for a considerable group of students from eighteen engineering schools. Almost all show the same general variation that exists in this college among the different years, the sophomore average being almost invariably below the freshman average, and the senior average being higher than that of either the sophomore or junior year.

Professor Mann's statistics of elimination are somewhat misleading, as he determines the percentage of elimination throughout the four years on the basic of those who finish their course four years after entrance, without respect to reasons which may have forced students to discontinue their course or to interrupt it to secure one or two years' practical experience.

The most important part of the report, covering the problems of engineering education and suggested solutions, contains much valuable material. After analyzing, as far as practicable, the qualifications required in the engineer, an effort is made to apply this information to the school problem. Professor Mann believes that admission requirements can be so applied as to avoid the elimination of so many students early in the course who are unable to carry the work. It is doubtless true that if engineering schools were free to apply their own admission standards there would be less mortality among the students, but under conditions existing in state universities it would be impossible to carry out such a plan, and it is a question whether much would be gained by it. Some poor students would unquestionably be eliminated, but some good engineering material would also doubtless be eliminated with the poor material.

The principal suggestions made in the report under the head of suggested solutions are the following:

1. Reduction of the number of credit hours required per week, with more thorough work in each study.

2. More concrete practical applications early in the course, with the idea that the practical engineering problem may, to a certain extent, be presented to the student first and in the solution

of this practical problem the elements of the theory discovered and learned.

3. Co-operative industrial work either in term time or in vacations, under an arrangement by which the school authorities will have some supervision over the work of the student.

4. Careful determination of the "core of common material," such as mathematics, chemistry, physics, mechanics, English, etc., required of all engineering students, with closer correlation between the different kinds of studies in this "common core." The sciences should be taught in intimate connection with engineering application, and the humanities should be presented so that their relations with the work of the professional engineer will be perceived.

5. A more general study of values and costs, particularly in the latter part of the course, and in this suggestion Professor Mann is to be taken in the broad sense. It is not only whether or not a particular project is profitable from the standpoint of dollars and cents, but more broadly what is its value and cost to the community and to humanity generally. Human values and costs are to be considered, and in this connection the study of economics, labor problems, sociology, and history are important.

The report is exceedingly interesting and valuable, and should be thoroughly studied by all engineering educators. The general impression one gets in reading the report is that the writer has too much faith in the possibility of reaching a definite and exact solution of the problem of the content of the engineering course, and gives too little weight to the results which have been reached through many years of study and experience on the part of engineering teachers. However, that may be, the report is the result of a very sincere effort to analyze the problem of engineering education and to present suggestions leading to real improvement, and all engineering teachers should welcome the results obtained from this study.

IN MEMORIUM—ASHER ESAIAS KELTY

ASHER E. KELTY

While flying over the enemy lines on September 26, Lieut. Asher Esaias Kelty, m '17, made the supreme sacrifice. He and his observer were brought down and instantly killed by anti-aircraft fire.

The following letter was written to his mother by a fellow flyer:

91st Aero Squadron.
Cm. E. T. France,
Sept. 27, 1918.

My Dear Mrs. Kelty:

The notification of your son's death will give you no idea of our great loss, nor will it tell you how he died and what he had done in the squadron. Your heart should be filled with pride to have been the mother of such a worthy son.

Yesterday morning, while flying over the enemy lines, his machine was struck directly by an anti-aircraft shell. The boche could never get him in a fight, for he was such an excellent pilot and the master of every situation. But this time he did not have a chance to defend himself. We feel certain that he never knew what hit him.

Asher's record with the squadron had always been one of steady, untiring service. He was a hard worker, and although he did not say much, he always came back with the results.

Everybody loved him and admired him. The whole squadron feels his loss deeply and joins with me in expressing our heartfelt sympathy.

Sincerely,

KINGMAN DOUGLASS.

Lieut. Kelty, at the time of his death, was second in command of his squadron, and had been recommended for a captaincy

Since his death the following communication from the war department has been received awarding him the D. S. C.:

"The Commander-in-Chief, in the name of the President, has awarded the Distinguished Service Cross to the following for acts of extraordinary heroism, set forth after their names:

"First Lieutenant Asher E. Kelty (deceased), Air Service, 91st Aero Squadron. For extraordinary heroism in action at Crépion, France (11 miles due north of Verdun), on the 26th of September, 1918. In the course of a photographic mission, Lt. Kelty with his observer, was obliged to penetrate a heavy enemy anti-aircraft barrage, realizing that obtaining the location of the artillery objectives was of the greatest importanc. When a shell struck his machine, his observer was instantly killed, and his machine so badly wrecked that it plunged to the earth, thereby causing his death."

At the University, Kelty was prominent in activities, and was a member of a number of organizations. Among them the Theta Xi fraternity, the Pi Tau Sigma honorary mechanical fraternity, and the student section of the A. S. M. E., of which he was president in his senior year.

Lieut. Kelty's death is deeply mourned by all of us, but mingled with our grief at his loss, is a feeling of pride in the man and his achievements. He was one of us,—a Wisconsin man. Forceful and resourceful, but withal, cleancut and modest, he leaves a memory that will be an inspiration in the college for all time.

EDITORIAL

OUR NEW PRESIDENT

PRESIDENT E. A. BIRGE

Edward A. Birge, Dean of the College of Letters and Science, on December 17 was appointed President of the University. The students, faculty, and alumni of the College of Engineering will approve the choice most heartily, confident that, in the hands of this able administrator, the affairs of the great institution they cherish will go on as gloriously as in the past. The new president will have the energetic support of all engineers.

BUSINESS AND POLITICS

How much does the average engineering student know about the great business and political problems of the day? How much does the average engineer know about these problems after he has been out of school ten years? Very little. Yet it is precisely this knowledge, coupled with the technical knowledge and training of his profession, which enabled the real, big engineers to make the place and position for themselves which they have made in the past. Not only that, but to the engineer who is to take his place in the great affairs of this nation in the future, this knowledge is going to be of even greater value.

Can you tell your friend why the value of Liberty Bonds on the stock market today is not 100, but considerably less? Can you give an intelligent opinion as to what the government should do in regard to the railroads? Could you tell your employer whether the price of steel is going to rise or fall during the next year, and why? Could you advise your firm whether or not to ship their goods by rail or by motor truck over a ten mile haul? Could you tell how much or how little control over business the government should, or intends to, exercise after the war? Could you outline the problems that are going to arise in the relations of labor and capital during the reconstruction peroid, and how they might be solved? The probabilities are that very few engineers could answer these and similar questions, and yet a knowledge of these things is just as essential to engineering success as is a knowledge of mechanics, calculus, or thermodynamics.

You cannot find text books on these things, nor can you take courses in the University that will enable you to answer all of them; but the current magazines will supply you with information upon which answers to all of them can be based, and you will find, in the Engineering library, a large number of magazines dealing in part or entirely with the business and commercial side of engineering. Become familiar with them—read the articles, and think about them. At the main library will be found a large number of magazines dealing with the political and commercial problems of the hour, and every engineer should make it a point to read some of them. Broaden your vision, read outside of your own narrow field. It has been said that a man cannot be great until he "knows something about everything, and everything about something." Know everything about your own profession, but learn something about all of the other important subjects.

G. B. W.

DISCIPLINE VS. NAGGING

Your professional advancement is apt to depend in a large measure upon your ability to organize and handle men. You should be interested in the subject of discipline. Our recent military experiences have revealed to us various conceptions of

discipline that are worthy of serious consideration. At one extreme is the man who tries to curry popularity by being an "easy boss." At the other is the martinet, with no bowels of compassion, who, if he wore skirts instead of pants, would be classed as a common scold. He is never satisfied; he is erratic and what pleases him one day is taboo the next; he plays favorites; he makes dire threats that his men know he will not carry out; and always and forever he uses his tongue as a lash. The tongue may be a flaming sword under the influence of a just wrath; it is a coward's dagger when it is used to wound and torment some helpless victim. Discipline is essential where men must book together toward a common end. Without it there would be chaos. But nagging is not discipline. L. F. V.

OUTSIDE ACTIVITIES

With the passing of the S. A. T. C. the normal "outside activities" of the University life will be resumed. You new men, perhaps, do not yet appreciate just what this means, but ask any old grad and the probabilities are that he will tell you that outside activities contribute more than fifty per cent of the things of value which he obtained from college. Therefore, it behooves every man here to see that, in his four years, he devotes a reasonable amount of time to these things.

A word of warning, however, might not go amiss. Do not jump right into any activity that presents itself; but pick and choose wisely, weighing your own abilities, preferences, and possibilities. Then, when you have made your choice, plunge in and put your whole soul back of the thing. The amount which you will get out of it depends entirely upon what you put in.

Do not confine your outside activities to the Engineering College. The engineer can get far more real training and broadening from activities outside of his own immediate field. Don't be a grind. Study hard, but efficiently, and then devote the rest of your time to other things, things in which you will be rendering a real service to your University, and to your fellow students. G. B. W.

ALUMNI NOTES

BY ETHAN W. SCHMIDT

The ENGINEER invites you to send in pictures of engineering structures which you have designed or built. We will be glad to print those that will make good cuts provided that they do not come so fast as to swamp us. We believe that they will interest your friends and classmates and that they will furnish a certain amount of inspiration to the men now in training for the profession.

The CHRISTMAS MAIL brought news from the old timers. WILLIS R. WHITBY, one of that famous '04 class, sends word that, after many years in the game, he has quit railroading and is now in the hardware, furniture, and undertaking business in Estevan, Saskatchewan. WILLIAM H. FOWLER, C. E. '16, says he is now able to resume his duties after being disabled for a long time as the result of an automobile accident. His address is 246 Meyran Ave., Pittsburgh. LT. TOM CASEY, c '17, 329 Field Artillery, writes from France: "I was stationed at Camp Custer. Here I spent just a year in helping train the National Army. Last August the regiment arrived in France only to start further training. Finally, after this training and also after much marching through France with its necessary billeting, the regiment arrived at the 'Front' ten days before hostilities ceased. Now the regiment is resting and waiting to go home." That's almost as bad as training all spring for the 100 yards which is all over in ten seconds; not so Tom?

LIEUT. and Mrs. WILLIAM BALDERSTON, who have been making their home at Camp Meade, Baltimore, Md., where Lieutenant Balderston has been stationed, have returned to Madison, and will make their home in the Eleanor apartments.

MR. FRANCIS E. BASH, Ch. '16, is with the research department of the Leeds and Northrup Co. at Philadelphia.

Judge Augustus Hand of the southern district of New York has handed down a decision in favor of the Burgess Battery company, which recently sued the Novo Manufacturing company for infringement of patents on flashlights. The Burges patents covering means of preventing accidental short circuiting are sustained.

H. A. CAMLIN is with the Bates and Rogers company on a government job at Harrisburg, Pa. His address is University Club.

BERNARD M. CONATY, c '18, is with the Supply Section, Materiel Branch of Military Aeronautics, located at 4½ Missouri Ave., Washington, D. C.

LIEUT. W. J. CAMLIN, has been discharged from the Engineer Corps. He expects to be with the State Highway Commission.

A. B. FOESTE, e '17, is at Camp Grant as heating engineer in the Utilities Department, of the Construction Division.

A. F. FREDRICKSEN, m '18, now a Warrant Officer in Naval Aviation (engineer-machinist), is stationed at Detroit.

PAUL C. GILLETTE, who was recently commissioned 2nd Lieut. in the Engineer Corps, spent Christmas in Madison. He has been discharged into the Reserve.

ENSIGN EUGENE L. GRANT, c '17, visited friends on the Campus Monday, Nov. 11th.

JOHN F. GROSS, m '16, is 2nd Lieut. in a recruit company in the 2nd. Rct. Battalion at Camp Forrest, Ga. In forwarding his subscription he writes: "You may enter my name as a permanent subscriber to the ENGINEER, forwarding a bill each year without any formality. I find that the ENGINEER is one of the greatest aids in keeping in touch with the alumni aside from the many interesting articles published in each number." Such expressions of interest from the older Wisconsin Engineers make us more anxious than ever to deserve them. Thanks, John.

ELMER T. HOWSON has been made secretary of the Committee on Development of the American Society of Civil Engineers.

CARL W. JEHLE, ch '17, who is an ordnance inspector for the U. S. Navy, may be addressed: Care Superior Steel Castings Co., Benton Harbor, Mich.

FRANK A. KENNEDY, g '06, spent a day in Madison on December 4. He is now with a mining company at Duluth. He had some interesting experiences during the recent forest fires in that district when 1,800 lives were lost in two or three hours.

HERMANN E. KRANZ, e '14, Electrical Engineer for the Briggs & Stratton Co. of Milwaukee, is making some investigations on refrigeration.

ART KRIPPNER, e '04, now western manager of the Ironton Engine Company with headquarters at Denver, was a visitor on December 9. He held a '04 reunion with his classmates Professors Kinne and Van Hagan.

F. M. McCULLOUGH, c '03, has been made head of the department of civil engineering at the Carnegie Institute, Pittsburgh.

LIEUT. PATON McGILVARY of the flying service returned to Madison early in December after service on the Italian front where he took active part in the final drive against the Austrians.

WALTER S. NATHAN, c '18, has been Commissioned Ensign for Engineering Duties, after a course at Stevens Institute and a trip across the pond. His overseas report, which was 153 pages long and contained numerous sketches, was taken back to England by the Royal Commission as a type of reciprocator report prepared at the Hoboken School.

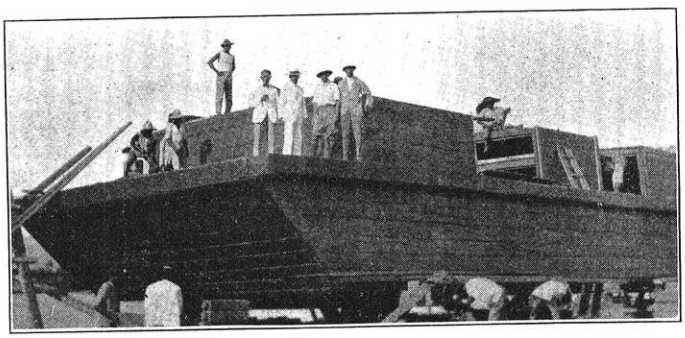
Word reaches us that ISADOR W. MENDELSOHN, c '17, has married and settled at Grand Forks, N. D.

LIEUT. PAUL T. NORTON, e '17, who is in the aviation section of the signal corps, visited the campus Dec. 23d. After receiving his commission, Lieutenant Norton was assigned to Camp Dick, Dallas, Texas, as an instructor. A few months ago he went over seas and was stationed in England at the time of the signing of the armistice.

LIEUT. CARL OESTREICH of the Q. M. department was in Madison December 10. There is a chance that he may be sent across the water for service as interpreter in the occupied territory.

CAPT. RAY OWEN sent a card from Chaumont where he has been located for a year. He is now in occupied territory. Rumor states that a certain town in Luxemburg prepared a grand reception for the American army. When the "army" arrived it consisted only of a lieutenant colonel and Capt. Owen.

TEOFILO REYES, c '15, under date of Nov. 17, writes an interesting letter from the Philippines: "I have the pleasure to tell you that since



TEOFILO REYES AND HIS SCOW

last June I have been here in Lingayen, in one of the northern provinces, making wooden scows of 150-Ton capacity for a shipping company of Manila. To do this I have asked for one year's leave of absence from Government service, effective June 3rd of this year. The contract price for these scows is P8,000.00 for every scow. I am inclosing herewith the picture of the first one we have built. Of the men standing on deck the one on the right is myself, and the one wearing a white suit is my partner.

I believe every one of you there is happy on account of the ending of the War made possible by the participation of the United States in it. On account of that event we are also rejoicing here in the Philippines,—and with more reason perhaps, because we believe we shall be greatly benefited by the results of the War, one of the principles for which it was fought being the granting of more autonomous rule to small nations.

In about a week there will sail for the U. S. a Philippine commission of 25 Filipinos formed by our Legislature to work for the granting of more self-government to the Filipinos."

RAY PALMER, President of the New York & Queens Electric Light & Power Company, was given temporary leave of absence in September to accept an appointment as Executive Assistant to Lieut. Col. H. S. Crocker, who has complete charge of the construction of the $40,000,000 Army Supply Base on a South Brooklyn waterfront. This vast undertaking involves the construction of four million square feet of reinforced concrete buildings, twenty-eight miles of railroad tracks, and several large piers for ocean going liners. Mr. Palmer is a member of the Board of Directors, and Chairman of the War Industries Committee of the Chamber.

CAPT. JACK STAACK, c '04, has a new daughter, Elizabeth Roberts Staack, born October 9.

KAN SU was a visitor in Madison during the holidays. He is now vice-president of the Chinese Students' Alliance. He expects to return to China within a year and take up engineering work in his own province.

MAGNUS SWENSON has been called to Europe as an aide to Herbert Hoover, who is now Food Director for the entire world. The appointment of Mr. Swenson is not surprising as he made a fine record as an able and fearless food administrator in Wisconsin.

LIEUT. H. H. VEERHUSEN, C. E. '12, of Madison, has returned from France. He was sent to France last May in organization work for the Ordnance department, and returned as a general staff courier aboard the Leviathan.

LIEUT. REX VERNON, has been discharged from the Engineer Corps and is now with the Wisconsin State Geological Survey with headquarters at Madison.

LIEUT. WARREN WEAVER, who has been stationed at Washington, and at Langley Field, Va., in experimental research work on airplane instruments, has returned to Madison. For the rest of the school year he will instruct in mathematics at the University.

WILLARD L. WILDER, e '18, has left the Forest Products Laboratory and is now in the Meter and Testing Department of the Milwaukee Electric Railway and Light Co.

KENNETH F. WHITCOMB was commissioned Ensign early in November after completing his course in naval aviation. He was stationed at Rockaway for some time and went out on many convoys for 75 miles or so.

RALPH WYATT, e '17, has just been promoted to a 1st Lieut. in Coast Artillery Corps, with A. E. F. in France.

CAMPUS NOTES

By WILLARD B. BELLACK

Happy New Year!

Have you Flu?

The S. A. T. C. is defunct and the old order has returned. It was a great life while it lasted, but enough was sufficient.

Looks as if we got into the civies just in time. With all these "Looies" drifting back to school, and the temperature going below par, we would have frozen our hands the first day trying to salute our alleged superiors.

Senior,—(to Lieutenant, recently returned from artillery camp)—What size shells do you shoot?"

Lieutenant—"It depends on the size of the gun."

Room 309 is once more worthy of the Engineering Building. For a time it looked like a bright section of Little Italy, on washday. Navy attire was hung up to dry in every available place.

The Law Shop is being dusted and the cobwebs are coming down. It is rumored that a student is coming back this quarter or next. Hope he gets here with the warm weather. It sure will be great to hear the old, "Well, well, well——" with the old time pep.

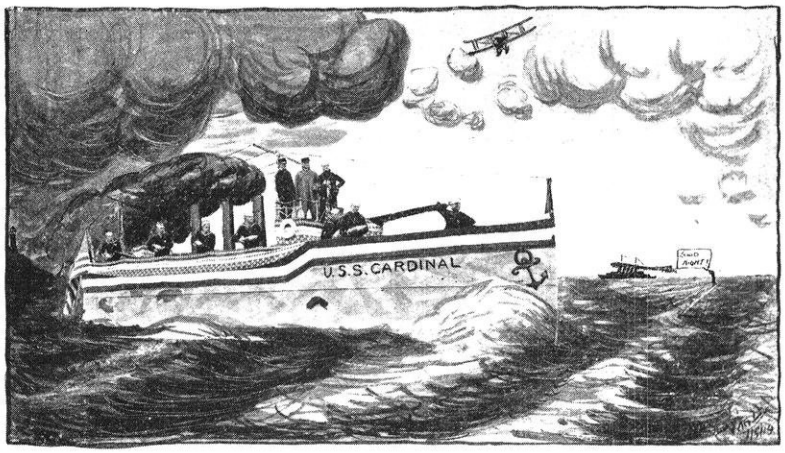
Prof. Wolff struck the right note when he said, "Having had the S. A. T. C. we should now be immune."

Prof. Callan learned something from the S. A. T. C. He is now running his home on the K. P. plan.

PEP AND PUNCH

The "punch" is only a matter of mental muscle. Anybody can produce the "pep" who chooses to ginger himself into the mood. But it takes those fine, long, gray fibres to give birth to an idea, and he who can come across with one now and then is the only man who is really worth his chloride of sodium. —*Cantwell's Impressions.*

Hoist the periscope Rollo, and we'll look around. B-r-r-r. Dawgone the cold weather and the clinic. The scenery is all covered up with gumshoes. Ay de mi! Um-m-m. Turn her down hill a bit. Tha's good. Hold it. Well, I'll be switched! Look what's returning. All those foxy overcoats and shiny puttees. Did you ever see so many cooties,—I mean lieuties—in one bunch? No wonder the war is over so soon and we can smile. And speaking of smiles, did you ever take cognizance



U. S. S. CARDNAL

Designed and built by Bellack and Mantonya, Naval Architects, for the Armistice Day Celebration

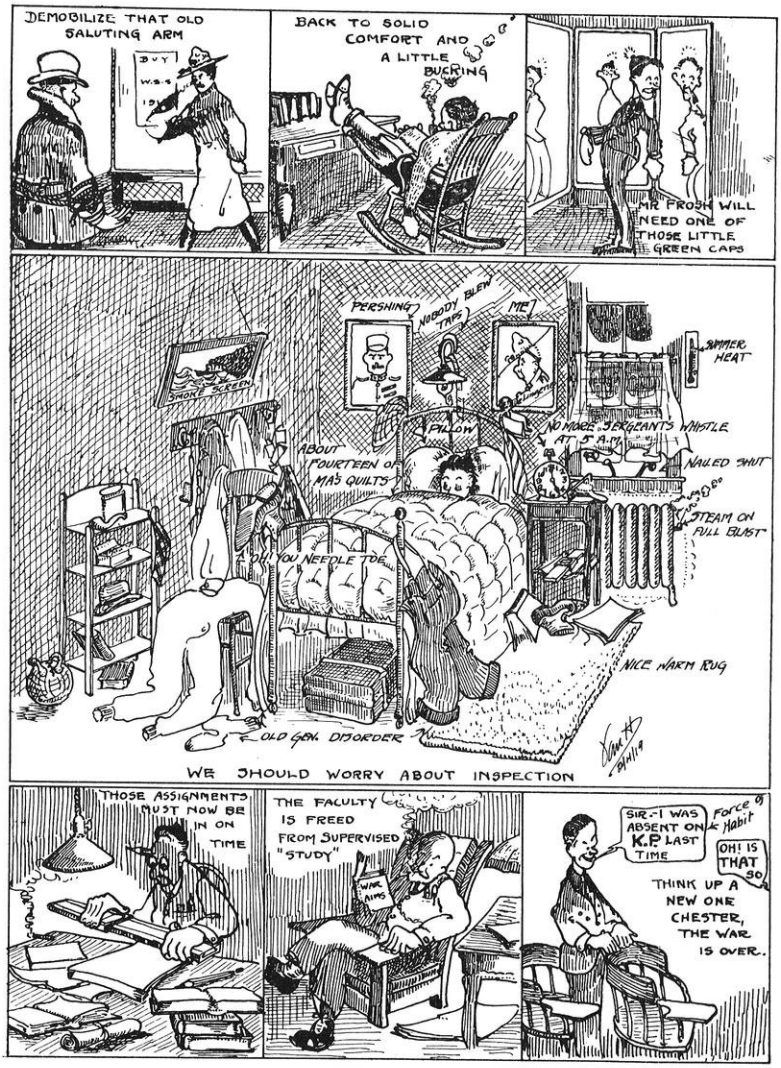
of that Shuster smile? Oh, Boy! And that Shuster wink! Say, if the co-edwards knew about that wink there'd be more of 'em in E. E. than there is in Lenny's class in city planning. Hey there,—quick,—man the torpedo tube. There's Moose Hanson on the port bow, low in the water with a cargo of contraband sweets, and a skirt in convoy. Spurlos versenkt for him if he doesn't split fifty-fifty.

About 250 freshmen are back out of 730 that registered the first quarter. The upper classes are filling up again with men who were away to camp. They are coming so fast that a com-

SEPTEMBER EVE

There was a young miss of St. Paul
Who wore leaves to a fancy dress ball.
She didn't remember
The month was September
Until the leaves started to fall.

(*Line-o'-type*—Chicago Tribune)



AS YOU WERE!

Zigzaggers.—"A police court isn't all grim and sordid," remarked Judge White the other day. "Sometimes something really funny happens. Not so very long ago a chauffeur was brought in after having run down a man.

"Did you know that if you struck this pedestrian he would be seriously injured?" I asked.

"Yes, sir," replied the chauffeur.

"Then why didn't you zigzag your car and miss him?"

"He was zigzagging himself and outguessed me, your honor," was the answer.—*Pittsburg Sun.*

plete list is impossible; however we note the following handsome men of prominence:

LIEUT. WALTER L. ALBERS, junior electrical, army flyer.

CARL J. ANDERSEN, sophomore electrical, returned from Camp Taylor.

M. W. BAGEMIHL, senior mechanical.

LIEUT. R. E. BEHRENS, senior civil, commissioned 2nd Lieut. in Field Artillery, Dec. 18th, at Camp Taylor.

LIEUT. D. J. BLATTNER, senior electrical.

C. W. BURGESS, senior mechanical, who has been in the Naval Aviation service.

LIEUT. CARL H. COLLINS, senior electrical.

R. A. FRANK, junior mechanical, has returned from overseas.

G. G. FRATER, junior civil, stationed at Jackson Barracks, New Orleans, in C. A. C.

FRANCIS H. HIESTAND, junior civil from O. T. C. at Fort Monroe.

P. D. HOLMES, senior chemical, returned from O. T. C. at Camp Taylor.

LIEUT. F. KARGER, junior civil, C. A. R. C.

LIEUT. GEORGE C. LYMAN, sophmore electrical.

O. H. MARSHALL has just returned from West Point, and reentered as a senior mechanical engineer.

LIEUT. E. J. MUELLER, senior mechanical.

FRANK K. QUIMBY, junior civil, stationed at Camp Nicholls, in C. A. C.

PHILLIP D. REED, sophmore electrical, returned from Fort Monroe.

LIEUT. W. J. RHEINGANS, junior civil, C. A. R. C.

WILL R. STEELE, junior civil, returned from O. T. C. at Camp Taylor.

C. A. WIEPKING, junior civil, returned from O. T. C. at Camp Taylor.

LIEUT. E. B. WILLIAMS, senior mechanical.

LIEUT. C. H. ZARSE, junior chemical, C. A. R. C.

PROF. G. L. LARSON, was recently made consulting engineer for the University.

PROF. J. G. CALLAN, has been appointed consulting mechanical engineer for the Chemical Warfare Division, of the War Department.

PROF. L. S. SMITH spoke December 17, before a meeting called by the City Plan Committee to consider Madison's future growth. The committee is composed of representatives of the common council, labor organizations, the county board, the Park and Pleasure Drive Association, the East End Citizens

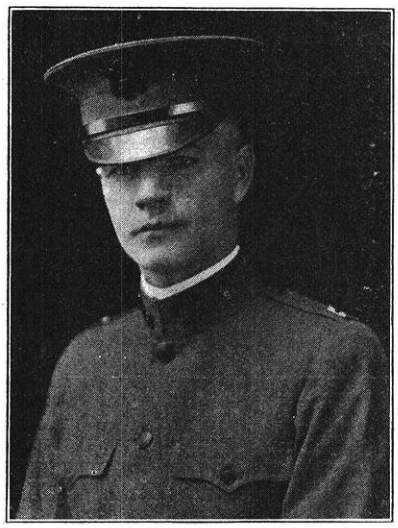
THAT UNIQUE AMERICAN ARMY

HARRY (just "out")—"Listen, Bill! Sounds like ole Fritz comin' over in the mud—Squish, squash, Squish, squash."

BILL—"That's orl right—that's only the Americans farther up a-chewin' their gum-rations." —*London Opinion.*

Association, and the Association of Commerce. Prof. Smith explained the possibilities of growth, gave estimates of population, and discussed the problems of industrial development, transportation, and zoning, using lantern slides to illustrate his points.

DEAN TURNEAURE represented the University at a joint meeting of the British Educational Mission to the United States and the Society for the Promotion of Engineering Education, held at the Massachusetts Institute of Technology, December 6 and 7.



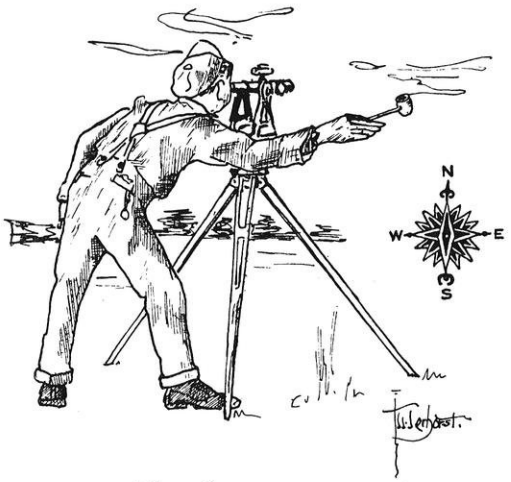
CAPT. C. I. CORP

CAPT. CHARLES I. CORP was discharged from the army in time to eat Christmas dinner with his family in Madison. He will take up his duties as associate professor of hydraulics. Capt. Corp was attached to Headquarters of the 16th Sanitary Train, stationed at Camp Kearny, Calif. He was sanitary officer for that camp and, during his stay there, he also made a number of trips to other camps in the vicinity for the purpose of investigating their condition in regard to sanitation.

The Engineering Society of Wisconsin will hold its Eleventh Annual Convention in this building on February 21 and 22. The meetings will be open to students and it is hoped that many will be able to attend. The meetings on the 22nd. are especially recommended. Among the speakers will be State Highway Engineer Hirst, Railroad Commissioner Allen, and John W. Alvord of Chicago.

No matter how much you may think you know about study, there is probably something for you to learn. *How to Study* is the title of a pamphlet by Prof. George F. Swain, of the Massachusetts Institute of Technology, which has just been received by the library. It will be found upon the reserve shelf, and is well worth half an hour of any student's time.

The November issue of the National Engineer contains an article on *Proper Draft Regulation* by Prof. G. L. Larson of the Steam and Gas Department.



The Engineer

ALL THE DIFFERENCE

Colonel (to abashed clerk)—You blithering idiot! Instead of addressing this letter to 'The Intelligence Officer' you've written 'Intelligent Officer.' There's no such person in the army!

—*Passing Show, London.*