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The Wisconsin Engineer

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"Applied Science is not something set off by itself and differing from pure science; so-called. Far from it. It is pure science, if you wish, pursued in the stimulating, nutrient atmosphere bred of the belief that all scientific knowledge returns to its possessor great good in proportion to the advantages which he, through it, brings to mankind."

(*D. C. Jackson, Wisconsin Engineer, May, 1903*)

CONTENTS

NOT THE RIGHT KIND

A tramp was walking along one of the London streets and was met by a brother hobo, who reproached him for his ragged trousers.

"Why, you ought to be ashamed of yourself," said he.

"But how am I to get a pair of trousers? They don't grow on trees."

"Why, go into the first house that looks like one that might have an extra pair of trousers in it and ask for an old pair."

(*Continued on p. v.*)

(*Continued from p. iv.*)

The ragged tramp took his friend's advice and, seeing a doctor's sign across the street, he went up the stoop and lifted the knocker. A lady answered the summons, and he asked her if the doctor whose name appeared on the door was in. She answered in the affirmative.

"Then," said he, "will you be kind enough to ask the doctor if he will give me an old pair of pants?"

She replied that she was afraid they would not do.

"Oh, I don't mind if they are very old," said the tramp.

But the lady answered: "That isn't it, my man. I am the doctor."

—*The Ladies Home Journal.*

The Wisconsin Engineer

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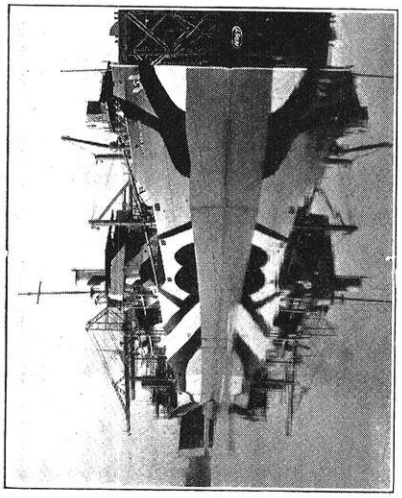
WISCONSIN SHIPBUILDING

By Richard S. McCaffery
Professor of Metallurgy



What Is It?

3500-Ton Carrier built by the Manitowoc Ship-building Company.

We all know that American shipbuilding eventually turned the tide of war when our new tonnage began to exceed the tonnage destroyed by Germany's submarines, and we are familiar with the wonderful stories of the shipbuilding done on the Atlantic Coast, the Pacific Coast, and the Gulf; but I wonder if it is realized that a very large portion of the tonnage that helped defeat Germany was built on the Great Lakes, and that about one-fifth of the Great Lakes tonnage was built in our own State of Wisconsin. It seems rather a flight of imagination to think of building ocean carriers in an inland state, but, as a matter of fact, if all the ocean tonnage delivered from Wisconsin shipyards last year were put in a single line, the bow of one vessel touching the stern of the next, the line would be two miles long. One concern alone, in the City of Manitowoc, delivered to the Emergency Fleet Corporation, during 1918, twelve ocean carriers of 3,500 tons dead weight each.

In addition to these vessels built at Manitowoc, fifteen vessels of between 3,100 tons and 4,200 tons were produced in the Su-

perior yards at the same time, and, besides these large steel ocean freight carriers, Wisconsin built cargo boats of wood. She built, in her own yards, submarine chasers and a great many of the smaller craft—tugs, patrol boats, etc.—so that, actually, Wisconsin's contribution to the war from its shipbuilding industries forms no small part of the total production of the United States. Not only did the Wisconsin yards produce the ships, but they turned out the work rapidly, and some of their launchings approach the record. As a matter of fact, while the record is not held by a Wisconsin yard, it is held by a yard in our neighbor state, Michigan, where the keel of the steamer *Crawl Keyes* was laid down on July 11, 1918, and the vessel was launched in the record breaking time of sixteen calendar days, or fourteen working days. On August the 13th the vessel was completed, and on the following day she was accepted and placed in commission. However, the Manitowoc Shipbuilding Company launched the 3,400 ton steel freighter *Corsicana* within twenty-eight calendar days after keel laying, which is amazingly rapid time.

When the government began its search for suitable ocean tonnage, the size of vessel that could be built on the lakes was fixed by the Welland Canal dimensions, which were 260 feet over-all length and 43 feet 6 inches beam. All the vessels contracted for by the government came within this requirement, with tonnage varying between 3,500 tons and 4,200 tons. Of course this limitation in length did not prevent sending to the Atlantic many of the older lake carriers, which were cut in two and carried through the Welland Canal in sections; but the newer tonnage was made so that it might proceed through the canal and thus avoid the delay of being put together again on the St. Lawrence River. It may be of interest in connection with the transportation of these vessels through the Welland Canal to know that a lake boat, the *Charles R. Van Hise*, could not be taken through the canal when cut in two because her beam was too great. On account of the urgent need of tonnage in the Atlantic, the *Van Hise* was cut in two, and each section was turned over on its side, and towed through the canal in a position 90 degrees from normal, her depth being less than her beam. The vessel was righted in the St. Lawrence, the two ends were put together again, and she proceeded to sea.

At the upper end of Lake Superior is the yard of the Superior Shipbuilding Company, a subsidiary of the American Shipbuilding Company. In 1917 this one concern laid down six keels and delivered five ships. In 1918, at this same plant, fifteen keels were laid, and ten ships delivered, and, as navigation opens this year, there are seven ships nearly ready for delivery. This company employs a force of men that averages 1,800 for the year, and at times has gone over 2,000. The plant includes five building ways for ships, one outfitting dock with capacity for two ships at once, and two dry docks, each large enough to handle anything afloat on the Lakes. When a ship is delivered by the Superior Shipbuilding Company, it is ready for a voyage over seas. It goes from the company docks under its own steam to the fuel dock, thence to the grain elevator to take on a load of grain,—perhaps for Europe. A salt-water crew comes to Superior and takes over the new ship. A Great Lakes pilot takes the ship to a point where the salt-water man knows the channels, and it proceeds on its ocean voyage. The hull, the engines, and every part of the ship, except the boiler, are manufactured in the yards at Superior. On none of its ship construction has it been behind schedule, and many times it has been far ahead.

The Globe Shipbuilding Company of Superior began the construction of its plant late in 1917, and the keels of two trawlers were then laid down. During the navigation season of 1918, the Globe plant delivered to the government the two trawlers and five cargo ships of 3,500 tons dead weight. This construction was in addition to the building and equipping of a shipbuilding plant which consists of five ways and three fitting out berths. During 1918 this concern laid twelve keels for cargo ships and two for trawlers, and, when navigation opens this year, it will have two ships ready to deliver and five on the ways. In January, 1918, they employed 500 men and in January this year, 1,500 men. The last ten ships placed with the Globe Company for construction are of the 4,200 ton type,—larger by 700 tons than those first built.

Whitney Brothers, of Superior, have a yard with six ways in all,—four for side launching and two for end launching. They have built, for the Emergency Fleet Corporation, steel sea-going tugs 150 feet in length to be used during the war as mine sweep-

ers, and at the present time have under construction, ten more, four of which will be ready for the opening of navigation this year. They employ, on the average, 900 men, and they limit their capacity to the smaller type of vessel, as they feel the market is more attractive and steady for this type of boat.

At Sturgeon Bay the Riebolt-Wolter Company built a wooden cargo steamer that is a marvel of the wooden shipbuilders' art; it is said that no proud clipper of the days long ago could boast of better workmanship than is revealed by an inspection of the *Sturgeon Bay*. She is 261 feet long, 42 feet beam, and has a depth of 26 feet, and a gross tonnage of 2381. The *Sturgeon Bay* was Wisconsin's first wood contribution to the new merchant marine and is pronounced to be one of the best examples of wooden ship construction ever launched in any waters.

At Green Bay the Northwest Engineering Company built, for the Emergency Fleet Corporation, some 100-ft. steel tugs, some 100-ft. wooden tugs, and one or two other types of small vessels.

The Manitowoc Shipbuilding Company at Manitowoc designs and builds steel ships, marine engines, and boilers. This company delivered twelve carriers of 3,500 tons dead weight tonnage each last year, delivered four the year before, and, this present year, will deliver twenty-four of these ships to the government. They design and construct vessels completely, including the building of the engines; when a ship leaves their plant it is ready for sea. They have six building ways and complete shop facilities. They have employed as many as 2,200 men, and it may be of interest to learn that they were compelled to erect a dormitory in which 305 men can sleep at one time. In their plant restaurant 650 men can be fed at once.

At Manitowoc, too, the Berger Boat Company built 110 ft. submarine chasers for the government, and, in addition, towing tugs for the Navy Department. At the present time they have under construction six 100-ft. towing tugs for the Emergency Fleet Corporation.

The Great Lakes Boat-Building Corporation, of Milwaukee, is another company that built 110-ft. submarine chasers. This class of boats attracted much attention. They did splendid work, and the Navy Department has authorized the statement that chasers were responsible for destroying 40 per cent of the

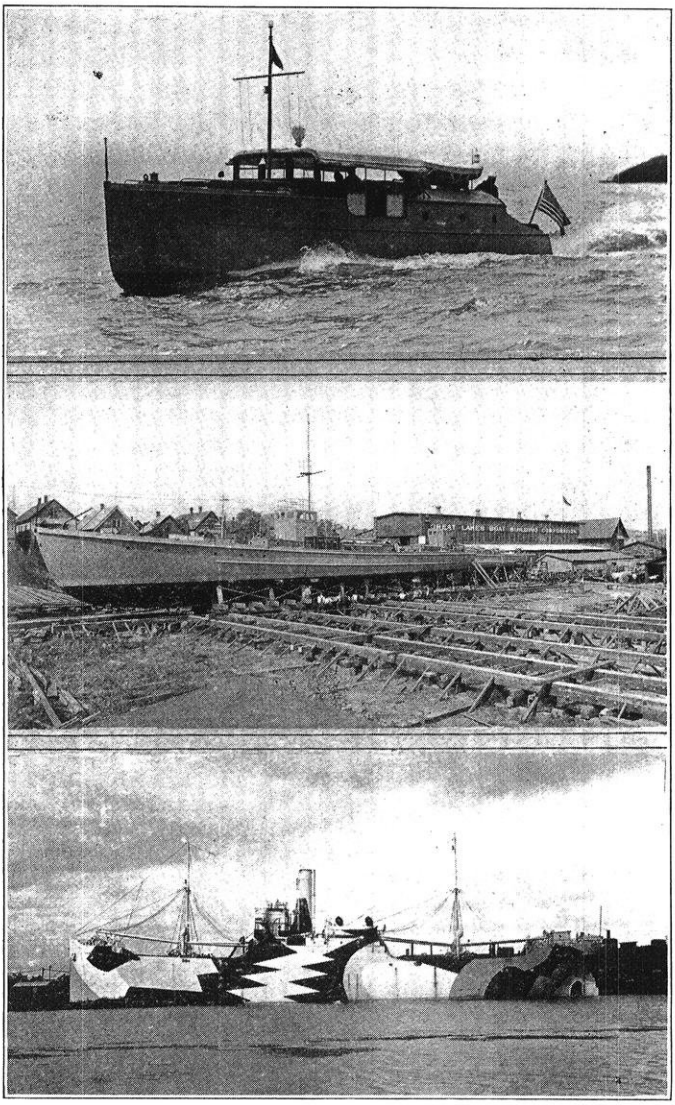


FIGURE 1.—*70-Ft. Patrol Cruiser*

FIGURE 2.—*110-Ft. Submarine Chaser on the ways of the Great Lakes Boat Building Corporation of Milwaukee*

FIGURE 3.—*"Lake Lesa," 3550-Tons, built at the Superior Plant of the American Ship Building Company*

German submarines that were put out of commission by the United States Navy. You may perhaps have read in the papers last fall of the gallant attack made by an American submarine chaser on an Austrian submarine in the Adriatic Sea, and been thrilled at the exploit, which terminated in the destruction of the submarine. This chaser was built in Milwaukee. In addition to the chasers, fast patrol cruisers were built that did effective work in policing the Detroit and the Ste. Marie Rivers. It may not be generally known that this patrol duty involved a considerable element of danger, but, as a matter of fact, there were several concerted efforts during the war to block these two rivers in order to stop the shipment of iron ore from Lake Superior to Lake Michigan and Lake Erie points. The Great Lakes Company also built harbor tugs for the Navy Department for use around the various naval bases.

This article, which is largely a compilation from letters, newspapers, and shipping journals, makes no pretense of completeness. It is quite possible that some of the state's activities in shipbuilding have been overlooked; but enough has been said to indicate that Wisconsin's shipbuilding industry has been developed to such a point that it was able to play a sturdy part in the big game of beating the Hun.

BOOK REVIEW

STEAM ENGINE TROUBLES, by H. Hamkens, 1919 edition, The Norman W. Henley Co., New York. $2.50. By PROFESSOR J. G. CALLAN.

A practical book reflecting long experience and keen observation. It contains many points of value to the operator and to the buyer of reciprocating steam engines.

UNOFFICIAL REPORT OF THE INSPECTION TRIP OF THE JUNIOR CIVILS

FRANK K. QUIMBY
Junior Civil

We met in the C. & N. W. station, in Chicago, on March 30—most of us rather pepless and travel-worn, but with a firm determination to do as little and get as much out of the trip as possible. Our boasts and threats were cut short by the approach of a familiar black derby whose owner marched us around the station and yards all morning, explaining the beauties and uses of the different buildings and pieces of apparatus. By noontime Walraven was acting as right guide, Fabian as unofficial interpreter, and Van as rear guard to keep the rank and file from straying.

At dinner time the party scattered, some eating at the station and some going to the Planters Hotel, which was our headquarters. The bunch going to the hotel lost their guide and walked down Madison St. nearly to the lake before finding that they were lost and applying to a friendly policeman for aid. Of course the meal was the most enjoyable part of the morning which fact was to be expected from hungry, unappreciative engineers.

In the afternoon we literally caught a Clark Street car for the Soo Terminal,—in fact, it never stopped for us to get on and the motor man didn't want to stop for us to get off; but Van expressed himself so vigorously that we were given a chance to "get off in a hurry." The most interesting thing about the Soo terminal was the office force. The boys didn't want to leave the fair stenogs even for the wine cellars, where there were 500,000 gallons of liquid refreshments stored for use between then and July 1. Of course no one thought to bring a drinking cup. One thing that made us think of Madison was an egg canning factory where eggs, said to be used at Lathrop among other places, are cracked, separated, put into cans, and frozen. Maybe this egg-sperience explains the absence of junior engineers from the Lathrop cafeteria. After a "round table" discussion around a wheel barrow, the party dispersed for supper and recreation. What some of the men did in the evening

still remains a secret, but all of the shows—good, bad, and indifferent—were well patronized.

Tuesday morning, after several hours sleep in warm rooms, we gathered in the hotel lobby and proceeded to the site of the famous Rush Street bridge. Here Miss Chicago is letting out her corset strings. We went over the work that is being done for the purpose of widening Michigan Boulevard. In excavating for the foundations several skeletons had just been found which were thought to be the remains of victims of the old Fort Dearborn massacre. Although we did not see the skeletons, we saw the historic spot. This inspection was rather short, so we spent the rest of the morning on our own hook in the large stores, the parks, and at the Art Institute.

After dinner we took the train for Buffington and there inspected the cement mills. Here again the boys became interested in the women in the plant who were repairing the cement sacks. Engineers can be interested in their work until a woman smiles, and then its all off. When we got back to Chicago we learned that it was election day. The evening was a repetition of the preceding evening, only longer and harder on account of the election in which, when occasion demanded, we could become much interested.

Promptly at five the next morning we were awakened by the telephone, and informed that we would have to hurry to get the six o'clock train to Gary. We "hurried" and caught the train,—that is all except one red-haired member who joined us at noon. The steel plant at Gary impressed us all, not only by its size and methods, but by its system and management.

We enjoyed it all until Mort told us that the men got from six to eight dollars a day in the mill, and, to rub it in, added that we, as engineers, wouldn't get that much for a long time.

We reached Chicago from Gary in time to catch an afternoon train for Madison, where we arrived at 9 p. m. with nothing to do but start school the next day and worry about writing a report on the "official" doings of the trip.

THE SENIOR MECHANICAL INSPECTION TRIP

WILLARD B. BELLACK
Senior Mechanical

The Senior Mechanical Engineers, under the supervision of Prof. Berggren, started the real business of the trip at the C., M. & St. P. shops at Milwaukee, on April 1. Here the class saw the repair of cars and locomotives, Ives secured a sample of the wool off the hydraulic ram in the cupola of the foundry, Berggren pointed out the engine with the tender behind, and one party got lost going around the round house.

Photo by C. E. Ives

SENIOR MECHANICALS AT BUFFINGTON

The important event of the day was the lunch at Allis Chalmers plant as guests of the company. After lunch we toured the plant. Here the fellows saw turbines actually running, and marine and Diesel engines under construction. Bayle didn't see much of the plant because he was trying to find out how they got the big marine engines out of the shop through the small door. In the forging room, we learned from Mantonya that the building was made four stories high in order that there might be plenty of drop for the drop forgings. But then, what can one expect from a poet?

The next day the power plants of the T. M. E. R. & L. were visited, and the party got all choked up with dust and dirt in finding out the principle of the powdered coal furnace. So Berg took us over to the Pabst brewery to rinse our throats, but,

due to the fact that it was election day and only the compressors and power house could be visited, the trip was a total failure. One investigator aroused enthusiasm when he announced the discovery of a leakage of beer from under the compressor, but upon careful examination it was found to be only oil.

In the afternoon the party started for the Falk Company. The doorman stopped Prof. Berggren and asked "Which one of de fellows is your boss?" We don't know and Berg didn't tell him. The Falk brothers met us and took us through the plant themselves. The trip was instructive and interesting, although Ives and his ever ready camera almost caused a misunderstanding. We felt *terribly* sorry that we didn't get through in time to go to the North side pumping station.

That night was election night and we will not try to account for the evening activities, although there surely must have been some judging from Schmidt's appearance in the morning.

The third day of the trip started with the Nash Motor Car Company at Kenosha. The company sent several seven passenger cars to the depot to meet us. The fellows promptly rode off in them, leaving Berggren to walk to the plant. The only disappointment at this place was the fact that they did not give us each a car when we left.

At the American Steel and Wire Company, in the afternoon, we found out how to make wire. The fence making machinery caused the greatest excitement, but it was finally fathomed and the party went on to Chicago for the night. Schmidt disgraced us at the depot, when Mantonya asked for a ticket, by reaching for the rail with his foot and saying, absent-mindedly, "Make mine the same."

The next day the class started at the International Harvester plant in Chicago. The twine plant was visited first, and, while a few of the fellows noticed how the twine was made, the greater number could tell you more about the fifteen hundred girls which the company employs. The guide showed us a "one piece shaft 400 feet long" and "handed us a good line" from start to finish. The reaper plant was hurried through, and an interesting discussion started on the reason for painting the machines with bright colors. Lunch was eaten in the company's dining

hall, at our own expense, and then the party started for the Fiske and Quarry St. power stations.

At the power stations we saw boilers and turbines, and boilers and turbines, and also some boilers and turbines. Warren created a sensation by telling the superintendent of the plant the type of turbine which was used, and, when the superintendent disagreed, proving that he was right.

The following day the first stop was at Buffington to see the Universal Cement Company's plant. The party was equipped with coats and caps to keep out the dust. To the bystander it must have looked like a raid of the Klu Klux Klan. Everything went nicely until we reached the place where the bags are filled and then an operator mistook Gallun's pants leg for a sack with the result that with a little water Gallun might have had a cement cast on his leg.

The party went on to Gary for dinner and in the afternoon saw a small part of the Steel Company's works. Several of the fellows had been here before and the guide had "to watch his step" because the fellows had heard a great deal about the plant from Prof. McCaffery and knew what things were for. The sulphur dioxide from the blast furnace nearly finished the party, but they finally got back to the fresh air. The fellows tried to carry off a good many things in each others pockets but when someone put a handful of iron chips down the neck of Ives "gob" suit it was time to go home.

The next day we looked over the power and heating plants for the La Salle Hotel and the Marshall Field Department Store, and took a ride over part of the tunnel system, which was enjoyed. By this time some of the fellows were so in the habit that they went through the power plant of the Boston store on their own hook although it was not on the official schedule.

The whole trip was very much of a success. Everyone learned a great deal about the commercial operation of the things which they had studied, and obtained a new view of the engineering work which is going on. Besides this the evenings were free for a good time, although the good time was not free. It was a trip worth while, and one which will never be forgotten by the fellows who took it.

THE RECOVERY OF NITRIC ACID FROM WASTES

DWIGHT F. BENTON
Sophomore Chemical

In munitions plants, where nitrocellulose, T N T, and T N X are made, there are always considerable amounts of waste acid left after the nitration of the charge. This waste acid contains sulphuric and nitric acids and also some organic matter. In order to separate the nitric from the sulphuric acid, some method of denitrification must be used. The installation that has been adopted for this purpose consists of buildings—called recovery houses—which contain from two to four denitrating towers, each about thirty-five feet high and five feet in diameter. The towers are built of acid-proof brick and are filled with quartz rock. The waste acid enters the denitrating tower at the top, and, as it passes downward, is separated into nitric and sulphuric acids by heat from steam which enters through a jet at the bottom. The sulphuric acids are drawn off at the bottom; the nitric gases pass on to water-cooled, glass condensers, where about 25 per cent of the gases are condensed. But not all of the acid is recovered at this point, for there are still large quantities of the lower oxides in the gases that pass the condenser.

In order to convert these oxides into real nitric acid, air is admitted into the system, preferably through one of the openings at the foot of the condenser pipe. This air oxidizes all of the nitric oxide to nitrogen peroxide, and it should be added in quantity sufficient for the complete oxidation of the oxides to nitric acid. The gases pass next to absorption towers, usually twelve in number, through which water is allowed to circulate. Most of the absorption takes place in the first tower, less in the second, and so on. The gas is caused to leave the system by means of a jet blower which should keep the whole system under slightly diminished pressure. The acid which is collected in the absorption towers and the condensers flows into blow-cases or storage tanks from which it is loaded into tank cars and sent to the concentrating house. Here it goes through practically the same operation again, only at a somewhat higher temperature, and is consequently made stronger.

The waste acid which flows into the denitrating towers comes from lead lined storage tanks which are about fifty feet above

the tops of the denitrating towers. The waste acid should not be run at a rate exceeding 1,100 lb. per hour, since the capacity of the absorption system is not designed to meet a greater flow. It is important that the flow of acid should be uniform. A regulator box has been designed which, when once properly calibrated, should enable one to judge very closely the rate of flow. It is of still greater use when the delivery of a fresh lot of acid to the storage tank causes a change of pressure at the faucet. The operator in charge of the house is at once enabled to bring the flow back to the previous rate.

The process of denitrification needs close attention. No more steam should be used than is necessary to effect complete denitration. When the denitration is not proceeding well the fact is indicated by the presence of brown fumes at the bottom of the denitrating tower, but as much as 6 per cent of the total nitric acid may escape with the sulphuric acid even though no brown fumes are visible. Small quantities may be detected by the appearance of brown fumes when a little cold water is poured into the sulphuric acid which surrounds the foot of the denitrating tower. In case the denitration is complete, only a white cloud of steam will be evolved. This test cannot easily be applied at night, since it is difficult to see brown fumes under the ordinary incandescent electric or oil lights. It is therefore important that the system be regulated accurately during the day, and that these same conditions be maintained as closely as possible after dark. Usually, unless there is careful supervision, the operator will run the plant too rapidly at night, and the yields during this period are almost invariably lower than they are during the day.

If too much steam is used in the denitrating tower it results in a dilution of the acid received from the condensers, and unnecessary heating of the apparatus; if carried further it also blackens the sulphuric acid at the foot of the tower. The steam jet at the bottom of the tower is turned upward so that the gases are not projected against the far side of the tower. If these jets have been in use for some time the lead is eaten away, and the denitration does not proceed as evenly as it should. The operator recognizes this condition by such symptoms as bumping, difficulty in securing complete denitration without an excessive amount of steam, or by the fact that denitration is not obtained

at all. In such cases the lead pipe is withdrawn and properly shaped before being put back into place.

The best results are obtained from the condensers when careful attention is paid to the covering, the asbestos lacing, and particularly to the packing around the tubes. The tube packing should be gone over every day and kept in the best possible condition. Plenty of water should be used for cooling.

The regulation of the amount of air entering the system is probably the most important operation in a recovery plant. In order to determine whether there is a deficiency or an excess of air, a simple test has been devised. A glass sampling tube that has two stop cocks and to which a rubber hose about one inch long is attached, is completely filled with water. The free end of the rubber tube is introduced through an opening in the earthenware gas pipe where the test is to be made. Both cocks are then opened, and, as water flows out, the gas is drawn into the tube. When the sampling tube is about two-thirds full of gas the cocks are closed, and the sampling tube is removed to a point where there is good light. Upon shaking, the brown fumes disappear. One of the cocks is opened and air is allowed to enter. If the brown color reappears there was a deficiency of air in the gas sample; if the tube remains clear there was an excess of air. Under ordinary conditions this test should be applied at two points, namely, in the connecting pipe where the gas enters the first tower, and where it enters the second tower. Except when air tests are being made, the holes where the tube is applied should be stopped with asbestos.

The method which is pursued in putting a plant in condition is as follows: All visible openings through which air might be drawn are closed. Tower joints and connecting pipe joints are made as tight as possible. All cracks are closed with asbestos wicking, or in case they are too small they are plastered with coal tar and asbestos paper. The Hart condenser packing is good for this purpose. The tops of towers are especially looked after, and care is taken that no air is allowed to enter with the water. After this is done and the system has been running for some time, the steam at the blower jet is entirely cut off while the jet is still running. The brown fumes then appear at certain places which have so far escaped detection. The operation of stopping leaks is repeated until it appears that the system is

entirely tight. When this stage has been reached, barely enough steam is turned into the blower jet to remove the brown fumes which appear at the top of the denitrating tower, and then, after a wait about twenty minutes, an air test is made at the point where the gas enters the first absorption tower. If this test shows that there is an excess of air it is clear that all of the cracks have not been stopped, and the work is carried on as before until a deficiency of air is indicated. When this occurs, tests are made at several points through the whole of the system, and if the deficiency of air persists to the last tower it is fair to assume that the system is under control. However, if air is found, say, between the fourth and the fifth towers, it is clear that there are leaks in the fourth which should be attended to. The principle to work upon is to exclude all air, except at the point where it is intended that air should be admitted, and as much attention should be given to the danger of air leaking in as is generally accorded to the danger of the nitric gases leaking out.

After the system has been shown to be under control, the openings at the bottom of the condensers are opened and air is admitted in gradually increasing quantity. Each time the size of the opening in the asbestos stoppers is made larger, the diminished pressure throughout the system will be altered, so that it is probable that brown fumes will begin to appear at the top of the denitrating tower. The steam at the blower jet is therefore slightly increased so that it will just remove the fumes.

While this process of admitting more and more air is being carried on, tests for excess of air are made between the first and the second tower, sufficient time—usually about 15 to 20 minutes—being given after each change of air supply before the test is made. This process is continued gradually until an excess of air is indicated at the point above mentioned.

It is now quite certain that the system is in fair working order; but, in order to make this absolutely sure, further tests are made, without altering the air supply, at the point between the condenser and the first tower. If the above described process for regulating the air has been carried out gradually, it will, in all probability be found that there is a small deficiency of oxygen before the first tower and an excess of oxygen after the first tower,—a condition that is perfectly satisfactory. The

reason for this difference is that there are a few leaks which are difficult to exclude from the first tower, on account of the hard service to which it is subjected.

The simultaneous manipulation of the air opening and the steam at the blower jet will be found to give easy regulation of the air. It is to be noted particularly that, when the air test indicates an excess of air, there is no way of knowing how much of an excess there is. The system, under ordinary conditions, should therefore be operated so that an extremely slight deficiency of air is shown before the first tower, as mentioned above. Too great an excess of air is just as detrimental as a deficiency, if not more so. It has been shown by experiment that, if a very large excess of air is present, the yield cannot ordinarily be brought above 75 per cent.

It frequently happens that pieces of asbestos packing fall into the pipes and clog the suction. These obstructions may be located by the use of small U-tubes (manometers) partially filled with water, which may be located before each tower. Any great difference between two adjacent manometers will indicate that the obstruction is between those two points.

In starting a plant, the blower jet should be started first; then, in succession, the water on the towers and condensers, the steam in the denitrating tower (very moderately), and, finally, a slow stream of waste acid. The steam and the waste acid should be increased slowly in order that the apparatus may not be subjected to too great a strain by sudden heating. In fact, it is well to start the steam in the denitrating tower slowly before the rest of the system is started. If this is done, the tile pipes, the condenser, and the denitrating tower will be found to last considerably longer. In shutting down a plant, the process is the reverse of starting.

It is important that the amount of air admitted to the system should be as nearly as possible the exact amount necessary for the complete oxidation of the lower oxides. It is evident that the more dilute the gas the less chance there is for absorption. For each volume of oxygen admitted there are four volumes of nitrogen, and the presence of this inert gas is disadvantageous. The nitrogen peroxide is quite concentrated in the first tower, less in the second, and, toward the end of the set, the gas is so dilute that there is slight chance for absorption.

If there are any leaks in the towers the trouble from nitrogen will be all the greater, and it is obvious that the most efficient method is the one which will absorb as much of the gas as possible in the very first part of the system. The first tower is therefore the critical one, and every effort should be made to have the conditions in it ideal.

There are times (if the amount of organic matter in the acid is high) when the amount of air needed in the nitric recovery system is relatively large. In such cases it is evident that it is not possible to obtain the highest yields. Such conditions are first indicated by the fading of the color in the condenser. Air tests should be made immediately, and the regulation of air should be adjusted with care. It will be found that a great deal of air will be needed, and that the strength of the acid in the first tower will diminish. The acid from the other towers will slightly increase in strength, but the total product will show a falling off. It is also quite probable that when such conditions prevail the process of denitration will offer some difficulty. In some cases it is necessary to add a small stream of water to the waste acid as it enters the tower. This will be found to facilitate the operation without materially weakening the sulphuric acid.

The regulation of the strength of the nitric acid is best accomplished by arranging the drip from the towers so that each one may be collected and tested. In case 27-degree Be. acid is made, the first tower should deliver acid of about 29 to 29.5 degrees, and the last tower should deliver acid of about 15 to 20 degrees; the other towers will grade between the two. The condenser should deliver acid at least 30 degrees Be.; if it is less than this it indicates that too much steam is being used on the denitrating tower. Further, if this excessive amount of steam is necessary to effect complete denitration, there is, in all probability, some difficulty in the denitrating tower itself, such as an improperly arranged steam jet.

In closing it may be well to state that, while the process has been brought to a fairly satisfactory point, it is not fully perfected. For example, the operators often find it difficult to repair joints because of fumes. Improvements are still possible and experiments are still being made for the purpose of overcoming defects in the system and improving the control of the process.

AERO NOTES

ROAD RULES FOR THE AIR: Going joy-riding in that new aerial flivver? Then don't forget your navigation license, your pilots certificate, or your route book; and *don't* use anything but fine sand or water for ballast. These are but a few of the things covered by the *"Regulations for Aerial Navigation"* proposed by the Interministerial Commission of Civil Aeronautics. For full information see AUTOMOTIVE INDUSTRIES for April 10th.

THE SUPER-CHARGER: Have you heard about the new super-charger? No. We are not referring to the butcher, the baker, or any other promoter of the high cost of living. The super-charger is a device for maintaining constant pressure at the carburetors of aero engines at all altitudes. You know that, as an airplane rises and the air pressure decreases, less air is drawn into the engine cylinders, and the power developed decreases proportionally. To overcome this difficulty, engineers have turned to the idea of compressing the air sent to the carburetor so as to maintain, as nearly as possible, the ground-level pressure at all altitudes. The engine will then be able to give its full power regardless of its height above the ground.

Those interested will find a rather complete discussion in an article by L. V. Spencer, published in the AERIAL AGE for April 14.

THE AERIAL DERBY: The Aerial Age announces that the first aerial port in the world is to be established at Atlantic City; that the Pulitzers have offered $35,000 in prizes and trophies to be awarded to the winner of the "Aerial Derby" that is to be held in connection with the one month aeronautical convention and exhibition to be held at Atlantic City; and that Miss Marion Cassidy, the first Canadian woman to fly, will pilot a machine to this convention. Judging from her picture she will not be the least of the attractions.

A NEW BOOK: *Practical Flying,* by Major W. G. McMinnies, R. A. F., has just been placed on our "new book" shelf. It tells all about the business from the physical requirements of the prospective flyer to how to do a "cartwheel," an "Immelman turn," or the "falling leaf."

THE ITALIAN CLAIMS TO FIUME

The discord in the Peace Symphony caused by the attempts of the Italian saxophonists to play "Italia Ueber Fiume" while President Wilson was rendering his flute solo, "Every Little Atom Has a Determination All Its Own," was the subject of discussion among the junior and senior civil engineers who are enrolled in the course in ENGINEERING ENGLISH. Opinion in regard to the justice of the Italian claims to Fiume and the Dalmatian Coast is divided; but the balance is against Italy. Below we print the best presentation of each side.

The Controversy

The disagreement between Italy and Jugo-Slovakia has arisen out of the conflicting claims of these countries to the city of Fiume and other territory along the Dalmatian coast. Jugo-Slovakia bases her claim on the fact that the majority of the inhabitants are Jugo-Slavs. Italy, ignoring this claim, asserts that, inasmuch as the territory was originally Italian and that since the customs, civilization, and commerce of the people are essentially Italian, is should revert to Italy.

The occupation of Fiume by an entire division of Italian troops and the withdrawal of the Italian delegates to the peace conference, together with the practically unanimous vote of confidence of the Italian Parliament to the present ministry, may be taken to indicate that Italy proposes to take a firm stand on the matter. President Wilson is equally insistent that the territory shall be given to the Jugo-Slavs, so that the situation at present seems very discouraging for the future success of the League of Nations.

R. O. B.

For Italy

Before the middle of the past century, the various Italian states were not united to form a single nation. Some of them, among which are Dalmatia and the district in which Fiume is located, were conquered by Austria and incorporated into the Austrian Empire. These conquered states have tried to break away from the Austrian rule many times, especially during the time that Italy was being made into the nation that she is today.

The statesmen of the present Italian nation have always desired to take these provinces from Austria and unite all the Italian people under one government. In addition, they have always feared the disruption of the Austrian Empire because a powerful Jugo-Slav nation would surely follow. The "lost" Italian provinces have become settled to a considerable extent with Jugo-Slavs. Defeat for Germany and Austria, which seemed very probable in 1915, would mean the dismemberment of the Austrian Empire. Italy realized that if she were not at the peace conference, she would have no voice in the settlement of the questions before the conference, and the "lost" provinces would surely become a part of the much feared new nation of Jugo-Slavs. The allies also understood the situation. Italy was promised the "lost" provinces in a secret treaty made in London in 1915,—then Italy entered the war.

Italy now demands her reward. R. A. H.

Dalmatia, the Curzolarian Islands, and Istria form what is known as the natural boundary of Italy on the east of the Adriatic. Without them the whole Italian coast, which is low and flat, lies exposed to invasion. The Romans recognized this when they made them the boundaries of their land. It is interesting to know that Dalmatia furnished Rome four of her emperors. The population of Fiume today is 51 per cent Italian, and, in spite of having belonged to Austria for centuries, it has preserved its wholly Italian Character. The only desire of Fiume is to be a part of Italy. Dalmatia, also, is Latin in heart and civilization. H. A. B.

Against Italy

Italian statesmen have left the Peace Conference determined that they will take Fiume and fight for it. President Wilson's uncompromising stand upon his fourteen principles has led to the first open break in the ranks of the Allies. Italy's grounds for claim of Fiume and Dalmatia are three: Historic, political, and economic.

The historic claims date back to the time when Venetia included the lands on the eastern side of the Adriatic. This, how-

ever, was some two hundred years ago; long before the kingdom of Italy was formed, and hence can have little weight now.

The political claim is based upon the treaty of London (1915), —the agreement under which Italy entered the war. The United States was not a signer to this treaty and is not required to abide by it. President Wilson has been able to make France and England realize the injustice that would be done thru its enforcement.

Italy's economic claims are based upon neither rhyme nor reason, but on fears magnified by the propaganda of the imperialistic press. Italy has little or no natural resources, and the valuable resources of Dalmatia are a tempting morsel hung before the eyes of the people now wild with delight because of peace with victory, and thrilled with the imperialistic notions of a nation that hungers for colonial possessions.

The Slavs' economic claims to Fiume and Dalmatia are just and should be recognized. Without the port of Fiume the Slavs will be cut off from the commercial world, and will become dependent upon Italy or forced, through economic reasons, to join the Central Powers. While the Italians are in the majority in the city of Fiume, all the back land is inhabited by the Slavs. Without Fiume the Slav nation can not exist. It is not just that Italy take Fiume and Dalmatia, the very heart of the Slav nation, merely to satisfy her own selfish imperialistic ambitions.

F. K.

Fiume was not to be given to Italy by the secret treaty made at the time of Italy's entrance into the war and known as the London treaty. Under that treaty, Fiume was to go to Croatia, which is now a part of Jugo-Slovakia. That is where President Wilson wishes it to go, and Premiers Lloyd-George and Clemenceau agree with him that to give Fiume to Italy would be unjust to the new republics east of the Adriatic, which need Fiume as a port.

C. A. W.

One reason why Italy is so determined to have the territory in dispute is that Dalmatia contains coal fields that would be of great value to Italy.

P. W.

THE SECOND ENGINEERS

Writing in the Saturday Evening Post of March 8, under the title, *The Last Man,* George Pattullo pays high tribute to the work of the engineers in war. Upon its face, his story is fiction, but, taken in connection with the citation of the Second Engineers for heroic work done on the last night of the war, it seems probable that Pattullo had the work of that unit in mind when he wrote the story, from which we quote:

At nightfall on November tenth Farwell received orders to cross the river. The battalion was to establish a foothold on the other side; a battalion from the division on their right would assist in the operation.

"Well," he said wearily, "this settles it. We're gone—finis!"

They set out at nine o'clock. The night was black, with fog and a penetrating drizzle.

This portion of France consists of high wooded hills and deep ravines, and ridges with precipitous slopes. The doughboys made their way toward the river. The air quivered to the belching of the German batteries; it seemed as though the enemy were trying to shoot away all the ammunition they had in a last desperate effort to stem the pursuit.

Farwell's company had to thread a ravine. Just as they approached its mouth the boches opened a terrific bombardment.

"Gas!" came a warning cry; and they donned their masks.

Stumbling and groping, they went forward through the drenched draw. Men dropped, with clatter of rifle and accoutrements, and were left where they fell. The line moved on.

And suddenly they were out of the ravine and sliding down a steep embankment. At the foot of this ran the river, wide and deep and swift. Shells were bursting on the bank and in the stream, sending geysers of water high in air. Far up the opposite slopes flares and rockets illumined the night.

The doughboys found some men lying flat on the ground. These were engineers, left as guides to direct them to the bridge through the impenetrable dark. When dawn broke they were still there, their poor, torn bodies mutely pointing the way. Even in death they helped the infantry!

Two pontoon bridges had been thrown across by the engineers

early in the evening. How it was accomplished only the engineers can tell! They worked under a hurricane of fire from artillery and machine guns. Once a shell cut a bridge in two; they swung the ends together and went on with their work. Men fell dead every minute; others slid off into the current and were swept downstream. Still they did not pause or falter. A high-explosive shell blew a group to shreds; another bunch took their places. There, in the terrible dark, they labored fiercely against time. Neither death nor current could stop them. They laid two bridges, about a couple of hundred yards apart and then placed guides for the doughboys.

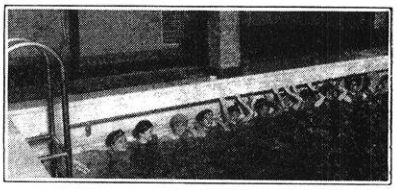
Nothing finer has been achieved in this war. Nor has the American Army any soldiers more gallant than the engineers.

From the Engineering News-Record of March 20 we take the following:

For conspicuous gallantry in action on the last night of the war, the Second Engineers were cited in the orders of Maj.-Gen. J. A. Lejeune, commanding the second division. The citation reads as follows:

1. On the night of November 10, heroic deeds were done by heroic men. In the face of heavy artillery and withering machine-gun fire, the Second Engineers threw two foot-bridges across the Meuse, and the first and second battalions of the Fifth Marines crossed resolutely and unflinchingly to the east bank and carried out their mission.

2. In the last battle of the war, as in all others in which this division has participated, it enforced its will on the enemy.



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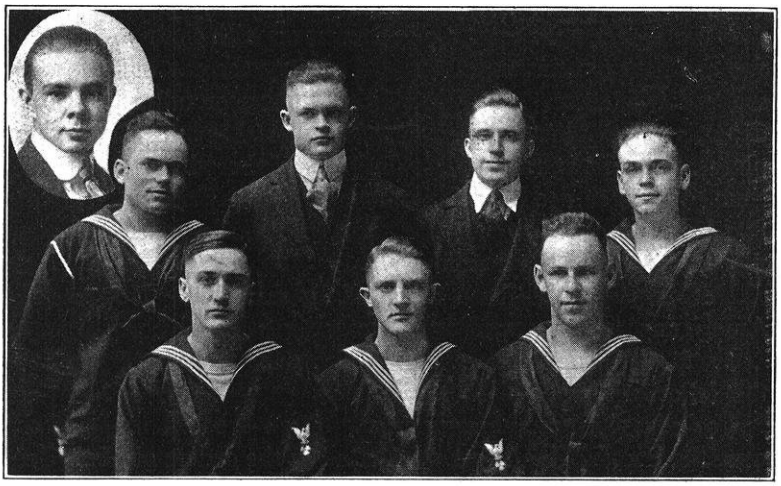

M. B. GODDARD
P. J. FABIAN W. A. KATES E. W. SCHMIDT G. B. WARREN (*Editor*)
H. W. KURTZ F. L. FISBECK (*Manager*) W. B. BELLACK

THE WAR TIME STAFF

GLENN B. WARREN
Editor

The photograph which is reproduced at the top of this page, does not show all of the men who have done their bit to make the war time ENGINEER a real success; but it does show the group of fellows who swung things during the first quarter of the present year when the swinging was hardest. They are the men who kept the ENGINEER going under conditions that caused the suspension of nearly every college journal in the country. The engineering course has the reputation of being a stiff one that can keep any man busy; these lads not only pursued their studies successfully, but they found time and energy to produce this journal every month. It isn't a very big journal perhaps, but there is a surprising

amount of work connected with it, and the members of a staff so small as this have plenty to do. We lose five of these men this spring—Schmidt, Warren, Kurtz, Fisbeck and Bellack are seniors—and their places will be hard to fill. The whole College is indebted to them for the interesting and pleasing manner in which they have performed their task.

The editor, GLENN WARREN, shared with the manager, Finley Fisbeck, the brunt of the work. Each in his sphere was a classy performer. We paid our respects to Fisbeck last month and now we are moved to say a word about the editor. We have promised not to indulge in fulsome and embarrassing praise, and must, therefore, curb the stream of eloquence which might otherwise flow. We will simply state that the WISCONSIN ENGINEER has had no better editor within the memory of the writer. Some of the underclassmen who feel that they have "no time" for what we call outside activities, may be encouraged and stimulated if they know that Warren, besides making Tau Beta Pi and Pi Tau Sigma and editing the ENGINEER, has also found time for athletics, forensics, and politics. He is a member of the University gym team, of the Philomathian Joint Debate team, and of the Student Senate. During the first quarter of this year, when we were swamped with S. A. T. C. freshmen, he was requisitioned to teach math and was so successful that he continued the work during the remainder of the year. L. F. V.

DID YOU VOTE?

Announcement was made that on Tuesday, April fifteenth, the sophomore, junior, and senior men of the University would be given opportunity to vote on nine amendments to the constitution of the Student Senate. The issues up for consideration were important; the regulation of student affairs was concerned. The polling places were announced in the Cardinal and the Engineering Building was included in the list. On Tuesday we looked in vain for a poll in our hall, and finally decided the voting had been postponed. On Wednesday we learned that the nine amendments were carried! Seventy votes were cast! Great guns! who voted, and where? H. G.

A NEW WALK PLEASE

Perhaps more engineers would take electives in the P. E. P. building if there were a more convenient way of getting there. Traffic conditions, on the single plank walk that leads to this building from Main Hall, are execrable. They could be greatly improved by putting in a first-class concrete walk with a uniform grade and with steps at regular intervals. As conditions now exist, the journey to P. E. P. has all the disagreeable flavor of waiting in a line at a cafeteria. D. H. S.

HAVE A HEART

Not long ago, a student submitted a report so put together with clips and paper fasteners that it had to be opened with prayer and a can-opener. Quite often written work is submitted that is almost invisible, particularly under electric light. The pencil may have been too hard, or the color of the ink used may not make a good combination with the color of the paper. Occasionally a paper is so untidy that it seems to have no beginning and no end. A student who turns in a report, or other written exercise, that, for any reason, is hard to read or inspect, imposes upon the long-suffering instructor, and trifles with his own grades. An engineer, in practice, who does the same thing, takes a long chance with his job. But if so be, a man does not care for his grades at school, or for his professional advancement, he should, at least, have a heart for the unfortunate individual who must inspect what he submits; he should arrange his work so that it can be gone over without undue strain on either patience or eyesight.

AND THEN THERE IS ANOTHER THING

"I just missed out on that,—a little too late." Promptness is a habit which is well worth cultivating, and the time to start is right now. A late lab report now means only a little annoyance to the instructor, or a few points off the grade. But how about the late report after school days. ? Most likely it will mean a lost con-

tract for the company and a lost position for the man, besides a loss of friends to whom to turn for a recommendation. One late report in the after days means more than a whole course of late reports now. W. A. K.

TO THE SENIORS

In a few weeks you will be leaving this school for jobs in many different places. You will be going out to apply your technical training to real engineering problems. When you go, carry with you a realization of your debt to the State and to the University that have given you your training. Some men go to college as to a cafeteria; they buy what they want for a nominal price, and think that they have paid in full. But they have not. The worth of what a man learns in this institution is many times what he pays for it. Probably you will never be called upon to pay the debt you owe your alma mater in coin of the realm; but that is not what she desires. Rather would she have you justify her gifts by becoming a loyal Wisconsin alumnus, by maintaining your interest in the institution, and by reflecting credit upon her in every way. We wish you all success and happiness in your new work. C. A. W.

YOUR CREDIT IS GOOD

Before you leave school for good, enroll yourself as a permanent subscriber to the WISCONSIN ENGINEER. Your credit is good if you haven't the necessary dollar to spare just now. We want to see you "get the habit" and keep in touch with the school and with your friends. You surely want the ENGINEER. See the man at the desk, or drop around to room 220 and fill out a subscription blank before you leave.

ENGINEERING EXPANSION

Two events, indicative of our expanding interest in the rest of the world, have just occurred. First, our Librarian, Prof. Volk, has laid upon our desk, No. 1 of Vol 1 of INGENIERIA INTERNACIONAL, an engineering journal, published in the Span-

ish language and designed to meet the needs of Spanish speaking engineers in all parts of the world. This new magazine, a monthly, has just been launched by the McGraw-Hill Company of New York. In size and make-up it is similar to the other McGraw-Hill publications, and it carries a heavy load of American advertising. We probably exhibit our provincial attitude thereby; but, nevertheless, the idea of an American company publishing an engineering journal in a foreign language arouses our interest.

And closely following the new magazine, came the second event,—a request from a bridge and iron company that we put them in touch with one or two civil engineering graduates who speak the Spanish language. The company plans to have the men spend a year or more at its plant and then go into South America as business representatives. There is already a fair sprinkling of American engineers throughout the Latin-American countries, but they are largely free lances. Apparently a real invasion is impending.

HELIUM

One of the most far reaching scientific achievements of the war has been the development of a method of manufacturing helium upon a commercial scale. It has been known for a long time that helium, a non-inflammable gas, has ninety-three per cent of the lifting power of hydrogen, but it was never before available for airship inflation. Now that methods have been devised for extracting this gas from the natural gas of Texas and Oklahoma, the rigid dirigible balloon, carrying hundreds of passengers and travelling upon through trade routes at the rate of eighty miles an hour, is beginning to open possibilities of travel and trade connections all over the world that were never before dreamed of. The swift and convenient methods of communication and trade between the United States and her sister republics in South America, which would be established by the proposed air lines, would, without a doubt, improve our commercial relations with that continent to such an extent as to make possible tremendous future development there, and make an era of prosperity here such as we have never witnessed before.

G. B. W.

ALUMNI NOTES

By ETHAN W. SCHMIDT

Of course you are coming back to the REUNION.

This is the year for the fours and nines.

The '04 crowd expects to be on the job with bells, as usual, and the event is pre-ordained to be a success.

Professors Bill Kinne, Ray Owen (maybe), and Van Hagan will be a '04 reception committee. Some class to that committee!

Come ye back to Mandalay, ye flying fishes.

By the way. Have you filled out the subscription blank for next year? If you received one with this issue it means that your subscription has expired. We'd love to have you call again.

Every day is Visitor's Day this spring and we are having a whale of a time welcoming the returning warriors and hearing the story of how we licked the Hun. April 10 was brightened by a visit from BILL RYAN and GENE GRANT. Ryan was stationed at Camp Jackson where he was nominally a lieutenant of artillery. He managed to have himself assigned to building roads and digging drainage ditches and so escaped regular formations of all kinds except mess.

GRANT, who was Ensign in the Navy, was on his way to Topeka, Kansas, where he will be with the Surface Water Division of the Water Resources Branch of the U. S. Geological Survey. He may be addressed at 25 Federal Building. Grant brought word that "SWEDE" FILTZER married a Miss Haessler, of Madison, about a year ago, and that he is now in the Water Power Department of the U. S. G. S. at Washington, D. C.

LT. W. W. CARGILL, c '16, of the U. S. Navy, and stationed at the Navy Yard at Seattle, visited Madison for several days during April.

ARTHUR B. FOESTE, e '17, who has been at Camp Grant as heating engineer, stopped at Madison, April 24, on his way to New York, where he will be with the H. L. Doherty Co.

W. F. GETTLEMAN, c '14, visited us on April 30. He has recently returned from France where he served as 2nd Lieut. with the 316th Engineers, 91st Div. He was in the reserve at St. Mihiel and at the front in the Argonne.

RALPH W. MUCKLESTON, g '09, spent a few hours visiting friends on the campus April 10th. Wisconsin men remember him as one of our foot ball stars. He enlisted in the Canadian Expeditionary Forces in 1915 and arrived in France early in 1916, where he saw much active service, being wounded in the battle of the Somme. Muckleston was in the Red Cross ambulance service attached to the Engineers. His unit was recently demobilized and on receiving his discharge he came back to his home at Waukesha. He has not yet made any definite plans for the future but is considering going to the Peace River country with a view to taking a homestead there.

HAROLD MEAD, 1st Lieut. and Operations Officer of the 329th Field Artillery, and Assistant Operation Officer of the 160th Brigade, was in Madison on Easter Sunday to visit his parents, Prof. and Mrs. Mead. After a long period of training, his unit got into the Argonne battle on November 1.

LT. LOUIS F. NELSON, c '16, has just been discharged from the Field Artillery. During his time in France he was Regimental Intelligence and Information Officer and he was also in charge of reconnaisance and orientation. He participated in three big offensives, beginning with the drive at Chateau Thierry. Later he was with the army of occupation in charge of control over 40 German villages. He visited Madison April 29.

CAPT. R. J. ROARK also dropped in on us on April 29. He has just returned from France, where he was an instructor in the Field Artillery.

CAPT. R. M. SMITH, c '13, of Madison, returned from overseas early in April. He was commissioned in the Field Artillery, at the second Fort Sheridan training camp. He served through two offensives in France.

J. H. WASSON, c '12, called 'round on April 11, and gossiped a while. He has been Major in command of the 2nd Bn., 216th Engineers, 16th Div., located at Camp Humphrey. He was released Dec. 4, and is now a Senior Civil Engineer with the I. C. C., engaged on valuation work. He may be addressed in care of the I. C. C., Room 914, 910 So. Michigan Ave., Chicago. He was married last June to Lucy Hubble of Madison. Among other items of news, he told of meeting AUGUST H. LESCHKE in training at Camp Humphrey last October.

CORP. A. F. BODENSTEIN, ex '18, is with Co. D, 25th Engineers, in construction work for the first army. He is now stationed at Brest, and expects to be kept there for some time.

CAPT. BERNARD C. BRENNAN, c '05, of the Engineers Corps, has returned from France and resumed his old position as City Engineer of Kenosha.

An announcement has been received of the birth of a son, James Blanchard, to Mr. and Mrs. ARTHUR W. CRUMP, on April 16, 1919. The family is now at the Prospect House, Niagara Falls, N. Y. where Mr. Crump is engaged in the valuation of the water power rights of the Niagara Power Co.

ERWIN DAMES, junior civil, 1916, whose home address is 650 Wellington Ave., Chicago, Ill., is a 2nd Lieutenant in Company A, 311th Engineers, stationed near Bordeaux, France. He is expected home soon.

WILFRED EVANS, c '17, has been released from military service and is now with the district manager of the Truscon Steel Co. at El Paso, Texas.

HERBERT C. FISHER, c '13, is with the I. C. C. on valuation work, as Assistant Field Engineer in charge of a field party. He is stationed at Omaha at present.

PAUL C. GILLETTE, C. E. '18, is engaged in hydraulic engineering in connection with coal mines in Pennsylvania. His address is 601 Y. M. C. A., Allentown, Pa.

EDWIN F. GOULD, c '17, who went to France in July, 1918, with the 85th Div. as 1st Lieut. in the 310th Trench Mortar Co. recently visited the College. He was married in June, 1918, to Miss Alma Robinson, Wis. '18.

STEPHEN G. GOULD, c '17, a Captain with the 12th Cavalry, located on the Mexican border.

ARTHUR W. GOWER, e '17, is Captain in the C. A. C. and is still in France. He has been stationed near the Swiss frontier engaged in some experiments in "High Burst Ranging." He helped to install the equipment and also did some instructing.

CAPT. EDWIN W. GRIMMER, c '14, is with the 35th Infantry at the Infantry School of Arms, Columbus, Ga.

CORP. JOHN W. HARRIS, c '18, has recently returned from France where he served with the field artillery. He is with the Wisconsin Railroad Commission.

CAPT. ARLY L. HEDRICK, C. E. '18, died at Brest, France.

H. H. HUNNER, g '09, is superintendent of the Onahman Iron Company at Ironton, Minn.

LIEUT. W. H. LANGE, ex '18, was with a company of Engineers in France. Since November he has been directing the repair of roads in the damaged zone. Recently he visited England and Scotland while on a furlough. "Bill" expects to return in time to enroll next fall.

W. S. JOHNSON, c '17, has returned from France where he has been since last August with the 69th C. A. C. He is Master Gunner on the non-com staff.

KEITH S. McHUGH, ch '17, is with the Commercial Engineering Department of the American Telephone and Telegraph Co., at New York.

GEORGE C. MERRELL, c '10, who enlisted with the Canadian Engineers, is reported to have died of wounds after several months of illness.

WALTER S. NATHAN, c '18, former member of the staff of the WISCONSIN ENGINEER, has been on the inactive list of the Naval Reserve since January 17. At present he is with the Cutler-Hammer Co., working on a development which the company is undertaking. His home address is 602 Frederick Ave., Milwaukee. He writes, "My ENGINEER comes regularly and I am always glad to get it. The 'gad columns'—Campus Notes and Alumni Notes—are always read with avidity, for it seems mighty good to know about the other fellow. A year ago I was on that job."

CAPT. E. C. NOYES, c '13, has a new daughter, Mary Jeanne, born Jan. 11.

WARREN OAKEY, c '17, has been discharged from the C. A. C. and is now with the Wisconsin Railroad Commission.

LIEUT. CARL R. OESTREICH has been released from service at Camp Dodge and has returned to his home in Milwaukee.

EDWIN SCHMIDT, m '18, 2nd Lieut. in Artillery, has been released from duty and is doing research work on Thomas meters for the Cutler-Hammer Co., of Milwaukee.

LAWRENCE F. SEYBOLD, e '18, Civilian Inspector for the Navy, is on duty at the Allis-Chalmers plant at Milwaukee, inspecting turbines.

FREDERICK S. H. SMITH, c '12, C. E. '16, is Captain of Engineers, located at Camp Humphreys, Va.

W. K. WALTHERS, e '16, has moved to 415 Ninth St., Wilmette, Ill. His office address will be 545 Webster Building, 327 So. La Salle St., Chicago.

HAROLD K. WELD, g '05, who is with the Standard Underground Cable Company, has removed his headquarters from Pittsburgh to Room 1548 Conway Building, Chicago.

LIEUT. H. F. MIELENZ, c '17, C. A. C., was a visitor on April 4. He is still stationed at Ft. Williams but expects to be released soon.

CAMPUS NOTES

By WILLARD B. BELLACK

Glory be to the fellow who installed bubblers in our halls! Now we step out for a little drink between classes.

The vociferations toward the Law joint have been unusually mild of late. Remember, brother plumbers, we weren't raised on Castoria.

We noticed that the Engineers were well organized in all departments of the class rush. The upperclass roughnecks, as cops, were back of Chief "Moose" Hanson, in squad formation, and were in all the big encounters. The rush was a success, and we were glad to have it with us after the long delay. The cops had a good time anyway, and they got free billies out of it, so why not have a rush oftener?

Moose Hanson

"MOOSE," by the way, has an ambition. We all have for that matter; but his is different. Not satisfied with editing large chunks of the Liberty Badger, being a Senator, and being Captain of the track team, he still reaches out. He wants to become personally acquainted with every senior—man and woman—before Commencement. In view of the strenuous life he leads it would be only fair to call a class meeting and give him a chance to realize his ambition quickly.

Some sophs still have tendencies left from their frosh year. We heard one the other day ask about the losses in iron due to hysterics.

The following records were made by freshman engineers during the past quarter:

Bruce, R. H.	53 points
Baker, J. S.	48 points
Chase, L. E.	47 points
Weiss, C. L., Jr.	46 points
Trueblood, W. D.	45 points
Morris, C. W., Jr.	44 points
Nolte, F. W.	43 points
Traub, W. G.	43 points

With spring and the wearing of the green have come two honorary class societies, the frosh Order of the Busted Knuckle and the soph Order of the Battered Jaw.

At the meeting of the C. E. Society on Thursday, May 1, WM. RHEINGANS spoke on "Advertising," and R. M. SMITH told of his highway work. The society is planning some new stunts for a spring outing.

Four and one-half hours of Union Vodvil! Without intimating any thing in particular, we wish to state that it reminds us of the story of the waiter and the eggs. You know,—the one where the waiter approaches the patron with a conciliatory air and says, "Boss, you done ordered aigs, didn't you?" "Yes sir. Eggs is what I want; nice fresh eggs." "Well heah dey are, Boss. But dey aint very fresh; so I brung you four 'stead of two."

MR. R. A. HEFFERNEN, a junior civil, who returned to school last quarter, recently received a commission as captain in the reserve. Mr. Heffernen wears two gold stripes for his services as a first lieutenant in the artillery.

How the modest little dry battery helped to down the Hun was explained by Mr. W. B. SCHULTE, ch '10, of the Burgess Laboratories of Madison, in an address given in the auditorium of the Chemical Engineering Building on the evening of April 22, before the Chemical Engineering Society.

THE HIGH COST OF GRADUATING

By BILL MANTONYA

Dear Folks at Home:
I thought I'd write
And say you'd see me soon.
If things go on just as they should
I'll graduate this June.

The study outlook seems to be
Just as it ought to be,
But where the money's coming from
Is what is worrying me.

We took our Senior trip last month
Or just the one before.
That set us back some fifty bones.
Perhaps a little more.

And then we heard the little song
To "Chime in on the chimes."
We heard our duty calling us
And eased them forty dimes.

Jack Childs, in China, has got to eat.
We sent him several beans.
A man can't live in China
With no money in his jeans.

Our picture in the BADGER.—
This was worth another three.
The price for this is higher
That it ever used to be.

When we want to own a BADGER
That presents another fix.
Just take and add another three
Which makes the total six.

And when commencement rolls around
We walk around the town,
We wear not masculine attire
But rent a cap and gown.

Before we go we ought to leave.
As you can plainly see.
Some little thing, at ten per man.
For our fraternity.

I've told you, family, how things stand.
I've put it to you fair.
I gaze into my pocket book
And find its full of air.

And so until I hear from you
I hardly will sit still.
Just send an extra ninety-five,
I am
As always.
Bill.

P. S. you know that suit I bought.
The one, when home, I wore.
I got the bill for that to-day.
An even forty-four.

Who is the fresh that clamps its green sky-piece into the coat locker in U. H. before that 9-o'clock literary session? It must be careful or someone will steal the favorite lid.

A son was born to Prof. and Mrs. J. W. WATSON on March 22.

SGT. Wm. F. MOEHLMAN, who was a sophomore last year, returned from Camp Shelby, Miss., on April 24. He was in the service since August of last year, and was doing construction work in camp. Moehlman lives in Madison; he will resume his studies in the fall.

We may soon see Tin Lizzies with pin feathers romping up and down the campus. Why? The first meeting of the future AERO CLUB of the University of Wisconsin was held on April 16th, and about 25 aviators and wouldbe aviators responded.

For Sale: Miserable launch in miserable condition. Apply 223 E. B.—J. G. C.

Will Trade: Miserable motorcycle for launch or what you have besides a Peerless. Apply W. G. M. 221 E. B.

FAVORITE STORIES—PROF. CALLAN'S

Once upon a time there was a prodigal son who went away and worked with some engineers in a construction camp where the favorite occupation was to tell such horrible stories at meal time that the other fellows would turn pale and go away and leave more to eat for the story-teller, and finally he went back home to his father and his folks were glad to see him and prepared a big feast, and when they sat down the prodigal son started right in to eat without waiting for grace, so his father reproved him, saying, "My son, it is the custom for us to say a few words before we begin to eat;" but the son, instead of slowing down, kept right on going through the viands even as he answered, "That's all right; go right ahead; you can't make me sick."

(Editor's Note: In the next issue we will offer Prof. Berggren's Tale of the Traveler who did not like Tongue.)

How green the frosh are growing! One of those blessed creatures of the emerald hue was sent after a 1/100 ohm resistance. Returning with the required copper, he warbled, "Say, I am glad you didn't want me to get a whole ohm."

ARTHUR F. PETERSON, 1st Lieut. in the 30th Field Artillery just returned from France. He was commissioned at Camp Custer, Michigan, last summer, and arrived in France on November 9, just a bit too late to get into actual fighting. Pete was a junior when he went to camp two years ago. He expects to finish his course in mining next year.

Gene Grant, who was assigned to the transport, Orizaba, vouches for the story of a returning negro trooper, who, in the throes of sea-sickness, knelt on the heaving deck and raised the following supplication: "Oh Lawd, I pray you, please call dis yere sea to 'tenshun."

Every Thursday afternoon there comes a wailing from the junior C. Es. who are taking their lab. course in concrete. If you should meet such an afflicted engineer and ask the cause of his moaning, he may, if there are no co-eds about, exhibit a pair of sore and dirty hands which were once his pride and joy. Alas and alack! They are now worn off at the finger tips and the nails have lost their lustre from kneading cement. "The —— of it is," he will confide sadly, "I have to have them manicured every time I call on that home-ec girl of mine; and, worse than that, if she ever learns about the training I'm getting, I'll be kneading dough all my married life."

A rusty marine motor, from the bottom of Lake Mendota, is causing members of the class in Shop 7 to cuss fluently. We ask to know: What will they say when that Peerless is turned over to them?

Well, so long. See you later.

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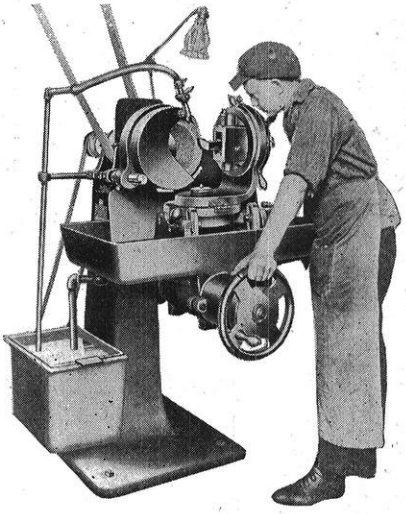
Economical Tool Grinding



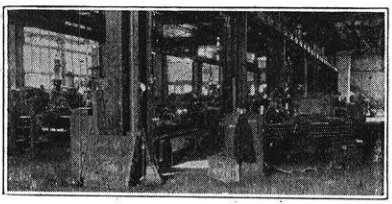
With a Gisholt Universal Tool Grinder in his plant, the manufacturer is assured of correctly ground tools for his turret lathes, engine lathes, boring mills, planers, slotters and shapers.

The manufacturer obtains many advantages among which are increased machine production, as correctly ground tools cut faster, better and last longer.

Another factor in getting increased machine production is that it makes it so simple to get sharp tools that there is no excuse for workmen to use dull ones.

These are only two of the eleven advantages obtained by using the Gisholt Universal Tool Grinder and keeping tool post tools in a conveniently located tool room, as listed on page 10 of the grinder catalog.

Send for your copy.



A Glimpse of the Northern Works

"Here we have the Engine Lathe and Turret Lathe Department of the Northern Works of the Gisholt Machine Co. at Madison, Wisconsin. The Turret Lathes are shown in the background. These machines are mostly motor driven and are served with an over-head electric traveling crane which makes the handling of heavy work very simple."

Gisholt Machine Company

Madison, Wisconsin

EASTERN OFFICE:
30 Church St., New York, N. Y.

WORKS:
Madison, Wis., and Warren, Pa.