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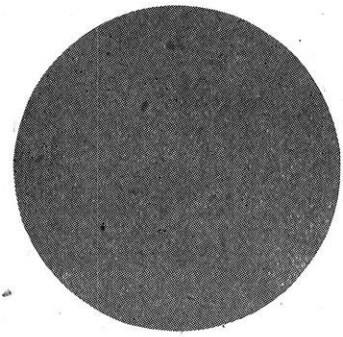
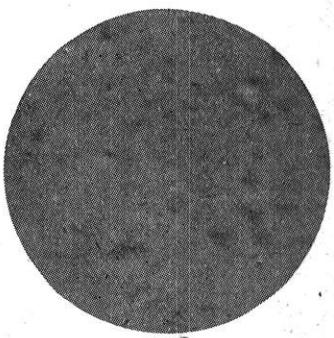
The Wisconsin Engineer

VOL. XXIII MARCH, 1919 NO. 6



A drop of fresh oil as seen thru the microscope. Note the unbroken smoothness. Photographed by Crowder & Klapka.



A drop of oil from crank case as seen thru the microscope. Note the punctures. Photographed by Crowder & Klapka.

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A SAVANT'S VACATION

A highbrow friend of ours who has a chair in the faculty of a great university, who is a world's expert on experimental physics, and whose opinion on physical forces is the last word, admitted the other day in a personal conversation that sometimes he wearied of it all.

"I want a rest," he said; "I don't want to be anybody much for a while."

"Well," we said, "if you had your wish, what'd you rather be for a while?"

After careful thought he replied:

"I'd like to be a dog so I could chase a cat up a tree and bite a tramp."

—*Richmond Times-Dispatch.*

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POOR OLD EUCLID

The following are taken from a series on "Euclid in the Army" in a British hospital publication:

"All regimental sergeant majors are equal to anything, but the side of any three sergeant majors, taken together, is less than that of any three brigadier generals taken at random."

"A major has the shortest temper between two meals."

"I understand the text, all right," said P. Gruen Frosh, after the class was dismissed, "but the professor's explanation of it puzzles me a good deal."

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THE PROFIT SHARING PLAN OF THE BAKER MANUFACTURING COMPANY*

JOHN S. BAKER, ex-'90
President, Baker Manufacturing Company

The young men and ladies before me will be, perhaps, in the course of a few years employers and directors of laboring men. At Evansville we have been making an experiment for the past twenty years which I think will be of service to you, and, not only to you, but to the people under you. Because I believed this, I accepted the invitation to come and tell you what we have been doing. I can do no better than to begin and tell you the story from the beginning.

The industry was founded by my father, A. S. Baker. When he was about eleven years old his mother died, and he was bound out by his father to another farmer, but didn't like the place. In a year or two he ran away and learned the blacksmith trade. The Civil War broke out, and he enlisted and served in the Iron Brigade. After the war he returned to Evansville, and started a blacksmith shop. It was about the year 1871 that he conceived the idea of a rotary steam engine, and he went to Milwaukee and had one built. The engine would run, and looked as though it might be a good thing. A company, consisting of six men, was formed to build this engine. Each of them put in a thousand dollars a piece and they bought an old building, several machine tools, and built a couple of engines. They were not able to get the engines tight enough to use steam expansively, however, and were forced to abandon it. In order to utilize their shop they decided to build farm pumps, and in about a year they started to build a windmill.

*An address delivered at a joint meeting of the engineering societies of the college, February 27, 1919.

The first two years were losing years, and they had to put in more money. At the end of about three years they had put in $12,500, and they were undecided as to whether or not they should go on. They decided at last to continue. Up to this time the management had been divided more or less; the books were kept by a firm which ran a general store, and two other men, who ran a hardware store, did all the buying. They finally placed the management in my father's hands, and, told him to make a success of it if he could, but he was instructed not to run any more in debt. He was successful, and the business began to grow. By 1879 they had $20,000 capital, and in 1893 they incorporated for a hundred thousand, half paid up. They drew nothing out of the business until 1892, and then they declared their first 6 per cent dividend.

The year 1893—the year of the panic—was a hard year. They didn't pay their dividend, nor did they do so the next year. It was difficult to make collections, money was scarce and orders were few, shops all about them were cutting prices, and common labor at that time received a dollar a day. They decided that they would have to cut wages, so they called their men together and told them that they couldn't keep on unless they reduced wages. They tried to explain to them that it was necessary. In order to show the men that they were square, they offered to consider the matter of profit sharing; but the men weren't interested. It made them angry. They didn't care anything about sharing profits with a concern that had no profits to share. Things ran on a few years more and there began to be profits. The year 1897 was prosperous enough so that they declared an extra 10 per cent dividend. At the annual meeting each year the matter of profit sharing was suggested by the stockholders, and, in 1897, the president came out in favor of it and said, "The Bakers have made the concern the success it is, and if it is their judgment that we should share profits, we are willing to do as they wish." Through his influence it was agreed that profit sharing should be established. At this time there were $208,000 in assets. They decided to incorporate for $300,000, of which $200,000 was to be preferred, fully paid, and the other $100,000, common, to be issued as earned. They decided that, out of the $8,000 assets that wasn't to be represented by preferred stock, they would give each employee 10 per cent in addition to

his wages for the past year. Anything that was left they would declare as an extra preferred dividend. The men were called together, and they were told that they were to receive a cash bonus of 10 per cent of their past year's wages. They were very much surprised and pleased. One fellow, however, refused to come to the meeting and he told several others to stay away. He said, "They are going to cut wages again." Not only were the men told that they were to have this cash bonus, but also that in the future they would receive each year a share of the profits. They were told that a 5 per cent dividend on the preferred stock was to be paid,—which would be $10,000 and that their share would be to that of the preferred stock as their wages were to the preferred dividends. If their wages were $30,000, then they would receive three-fourths of the profits, and the preferred stock would receive the other one-fourth. An annual inventory was to be taken each year, and the gain was to be called the profit;—whatever amount one year's inventory was larger than the preceding year's would be called the profit. Ten per cent of this amount was to be set aside for a sinking fund, and the other 90 per cent was to be divided. Of the amount divided, 15 per cent was to be paid in cash and the other 85 per cent in common stock, which would draw 5 per cent dividend. Under this arrangement there would be at least a hundred dollars back of every share of common stock; it wouldn't be water. They went through the first year and at the end of the year the profits were sufficient to increase both the employes' wages and the dividend on the preferred stock by 60 per cent.

The profit sharing plan has been continued ever since that time. The ratio of profits to the wages and dividends has varied from 28 per cent in 1904 to 120 per cent in 1906. The average for 20 years has been 80 per cent. Both in 1917 and 1918, it was 100 per cent.

About six years ago an effort was made to stop the profit sharing. By that time, several of the old preferred stockholders had died, and the stock had gone to their heirs, and a large amount of the stock that had been sold by the men had gone to outsiders and their heirs. These outsiders felt that they were not getting as much of the profits as they would like to have, so they went to several of the men and tried to interest them in stopping profit

sharing. They offered them 20 per cent additional wage if they would agree to it, and argued that if profit sharing were stopped for a few years the common stock, which was down to $65 a share, would go back to par.

They did their best, but failed, and profit sharing continued; but we decided that we should revise our by-laws somewhat, and we did. Up to this time each man had the stock in his own name. He could do what he pleased with it; he could sell it to whomever he pleased, and at whatever price he saw fit. By revising the by-laws we fixed it so that we did not pay out the certificates to the men, but we kept them on deposit.

Furthermore, before a man could become an employee of the company, he had to contract to sell all the stock issued to him back to the company in case he desired to sell at all. In case he should quit the employ of the company, or go to work for a competitor, the company by the new by-laws could force the sale. The price was to be the market price, and the market was the average of the last hundred shares sold where the price was definitely known. The men thus had something to do with fixing the market. After figuring up the amounts of stock which were due each of the men, it was not possible to come out with even shares, since each share was worth a hundred dollars. Usually a man would be entitled to several shares plus a fraction. So we combined these fractional shares into whole shares, called stub shares, and sold them at the annual meeting. All owners of stubs could bid on these shares, and the man who bid the highest would get what he bid for, the man who bid next highest would get what he had bid for, and so on until all the shares were sold. At first the market for these stub shares was about 65 and only a few would bid for the shares, while at the annual meeting which was held about two weeks ago there were only three or four fellows who succeeded in getting more than one share, and the market at that time had climbed to 80.

I have already stated that the average amount added to the men's wages out of profits for the past 20 years has been equal to 80 per cent of the wage—you may perhaps wonder how the business could stand it. I was attending a meeting of windmill manufacturers in Chicago some years ago and met two members of a firm who employed double the number of people that we did.

These two fellows called me to one side and wanted to know if a certain newspaper article that had described this plan was correct, and, when I told them it was, they said they didn't see how we did it because they couldn't do it.—that they didn't earn enough extra over their dividends to be able to do it. That 80 per cent is, however, somewhat misleading. In the first place our men have to work 4500 hours before they are eligible to share in the profits and we probably pay this "remaining wage," as we call it, to about 80 per cent of the men. Had we paid it to all of the men it would reduce the percentage to about 64 per cent instead of 80 per cent. Then we base these remaining wages on what they would earn at the day rate, and a large number of them work piece work, and the piece work rate is higher than the day rate. If we were to pay it upon the earnings they actually make, it would cut this 64 per cent down to about 60 per cent. Then there is another thing that comes in: We pay our common stock 5 per cent, and if we had to go into the competitive market to get money, we would have to pay between 6 and 7 per cent. If you would make allowance for the fact that we are not paying common as much as the competitive market, we would probably cut the amount down to about 50 per cent. Then there is another thing that comes in: We have been buying stock, from the men, and we have bought it at less than par,—at the market price. It has averaged from 65 to 80, and when we buy stock at less than par (generally we buy at 75), there is a profit in that transaction of 25 per cent, since we have destroyed a hundred dollars of liabilities, and have used in doing that, seventy-five dollars of assets. This would cut it still further, and yet I can say that if we had fulfilled all the conditions that other firms have to fulfill, we could still have given at least 40 per cent, that is,—we could have added at least 40 per cent to the wages of all our employes.

I will try to explain where that 40 per cent comes from and perhaps a few homely comparisons will help make the matter clear. You have heard perhaps that a rented house requires more repairs than a house in which the owner himself lives. I have also heard that a hired girl is often a poor housekeeper, but that after she married and had a home of her own, she became a thrifty housekeeper. This I think explains a part of it.

Then there is another thing that I will mention. Quite a good many years ago we wanted to start a galvanizing plant, we found a fellow who was an expert galvanizer, and made a contract with him. The conditions of the contract were that he was to work for us at galvanizing for three years, and that we were to pay him a certain price per ton. We were to furnish the building, and he was to furnish the labor and materials. At the end of three years we bought him out. We told his men that we would employ them at the same wage that he had paid them; but that if they could decrease the cost of galvanizing, we would divide the saving with them. The result was that they were able to galvanize with less material and less labor than they had done before because they were themselves interested financially. They did better than they had done when only the boss was interested in the financial gain, and I think these things go a long ways in explaining where this 40 per cent comes from. It is from increased production. It is something that would not exist without this incentive. It is something that the ordinary competitor can not pay. He could pay it if he would adopt the same methods that we have, but until he does adopt something of this kind, he and his labor will have to be contented with the wage that they receive,—the competitive wage.

Some of you may suspect that we have done this by not giving a just return to the preferred stock. I looked it up a month or so ago. I took the preferred stocks offered generally here in the west and averaged what they earned on the market price. I found that the average was 6.8 per cent. Now at Evansville we have paid our preferred stock on the average, 5 per cent in cash and 4 per cent in common stock, and the common stock has more than hundred dollars of actual value back of every share.

There is another thing that might be worth mentioning. A preferred stock which has a large amount of assets back of it in reference to the amount of preferred outstanding, usually sells above par, and the more the assets back of the stock the higher above par it sells. For instance, Deere & Company, who manufacture plows and farm machinery, have practically all preferred stock, drawing a 7 per cent dividend, and it sells on the market for about 95 at the present time. Take the case of the United States Steel Corporation, which has perhaps double or more as

much assets as they have preferred outstanding. Its preferred also bears 7 per cent dividends and sells above par so that it nets the investor about 6 per cent. When we started this business there were no assets in addition to the preferred stock; but now we have come to a place where there are eight dollars of assets for every dollar of preferred outstanding; so you see we have made the preferred much more secure than it was originally, besides paying more than the average dividend.

Then the question comes as to whether we have paid our labor a small weekly wage in order that we might give them a large amount of stock at the end of the year. At different times I have made investigations along this line. I will mention two of them. The United States Department of Commerce published, in Bulletin No. 57, some statistics that give the average wage of agricultural implement manufacturers. In the year 1905, the average was $503; our company that year paid an average of $561. The average output was $2,486 per man, while ours was $3,400 per man, or nearly $1,000 more. I am not sure that the comparison there is exactly right. In computing our output per man we didn't include the traveling men. Perhaps we should have done this. It we had done that it would have made our output per man smaller. In Bulletin No. 75, of the same year, the same department gave the average wage of all the agricultural implement firms in the United States as $539 compared with our $561 for the same year.

Some interesting figures came into my hands a few days ago. Every corporation in this state in making returns to the Wisconsin Tax Commissioner for the income tax is required to report the wages paid in the year 1918, to all employees receiving more than $700. I took the figures for our company and classified them by occupation. These figures are something like this: The average for foreman is $2,215—(I should have said that these figures include the remaining wages or profits as well as the weekly wage)—foremen $2,215, the highest foreman $2,655; General $2,020, on an average, and the highest $2,508; Machinists received an average of $1,945, and the highest one $2,515; Molders $1,795, the highest one $2,683; Woodworkers $1,619 and $2,028; Painters $1,484 and $1,649; Core Makers $1,438 and $1,758; Chippers $1,375 and $1,781; Machine Tenders $1,316 and $1,912; and Laborers $1,198 and $1,717.

These "remaining wages" that we are paying sometimes separate us from some good men. It is natural for men to want to run their own business, and to be proprietors. We have given men capital and quite a good many of our men have sold out and gone into business for themselves,—principally farming. We have a number of farmers around Evansville who got their first capital with which to buy land by working for us. About two years ago I was coming down from Lake Superior, and stopped off between trains to visit a friend at Chetek. As they were taking me to the train they pointed out five different farmers on the road who had been our employees, and who had been able to make their first payment on their farms from the sale of our stock.

If the directors of any concern would figure what they had earned, say for a five year period and then go to their men and tell them that they would draw out of the business each year the average amount that they had earned during the past five years, and that any amounts which the men would earn in addition to this would be paid to them, it is my judgment that they could get the men's faith in the enterprise, and that they would be surprised by the great increase in efficiency and earning capacity of the business.

Perhaps some of you may be asking if that isn't Socialism, and I suppose, according to the dictionary definition it is, but as I have met Socialists, and talked with them, it seems to me that it is something quite different from what most of them seem to have in their mind. As I have talked with these fellows it has seemed to me that they conceived capital as an endless reservoir of foodstuffs and clothing, which would supply all needs, without the necessity for work, if only they could get control of it, and I think that is quite a natural idea, especially for some people. But in reality capital is not an endless reservoir of living necessaries. It is true that it is a sort of reservoir or accummulation of things; it represents about five years production. If everybody could do without consuming anything for five years and go on producing at the same rate as they are now producing, then in five years they would accummulate about the same amount of capital as exists in the United States today. Capital though is largely farms, railroads, manufactured goods, stores, and houses. Very little capital is food supply. If we

should all stop working some of the food supply would be exhausted in a week, and I think that if we could arrange it so that all quit work, and the different fellows start again as their particular things were exhausted, practically in three months time every fellow would have to be on the job. So you see capital is not an endless reservoir of supplies and it is not so essential to the welfare of mankind as the stream of production. The man who wants to benefit his fellow man and make his burdens lighter, wants to concern himself with the stream of production. The invention of the telephone for example has made it possible to increase the stream of production.

There are several ways in which men can acquire capital. Among these are robbery, swindling, and by uncontrolled manipulation. I think that all will agree that it is desirable to pass laws to prevent the acquisition of capital in these ways.

There is another and a legitimate way to acquire capital, and it is the way most capital is acquired. That is by going out in the open market and buying materials and labor at the market price, putting them through your institutions, and then going out and selling the product on the market, at the market price. Whatever you can save in your institution, and in your processes is yours, and it is right that it should be yours. The more you can save, the better, and the more society gains by it. This is the way in which wealth comes to most men. In a certain sense it is an election that we hold to decide how much men shall get for their services.

The last way of acquiring capital is by inheritance, and I think that this way is somewhat questionable. If I wanted to do anything along the way of legislation in order to divert capital from those who now own it, it would be simply to go heavier on inheritance taxes.

In conclusion, I would say to you young people: When you come to employ labor, so remunerate your employes that they will automatically receive an increased wage for increased production. I would also recommend that you use your efforts to try to keep capital and labor associating continually together; make them one if you can,—it is all the better. If you separate the two completely you have an unstable condition, and a social organization which is liable to collapse as Russia has collapsed.

TRAINING OFFICERS FOR THE NAVAL AUXILIARY

GREGOR S. AFFLECK, ch '18
Ensign, Engineering Bureau, U. S. N. R. F.

The purpose of the United States Navy Engineering School was to train engineering officers for auxiliary service in the Navy. The school was open to men between the ages of twenty and forty who met the physical requirements for line officers in the Navy, who were of officer-like character and thorough ability, and who had completed an engineering course at certain recognized technical schools and universities or possessed an equivalent education.

Properly qualified applicants were enrolled in the Naval Reserve Force, and, on being assigned to the U. S. Navy Steam Engineering School, were rated as Chief Machinist's Mates and drew the pay of that rating,—$83 a month plus allowance for subsistence, dependents, and uniforms.

The course was designed to meet war conditions, and was intended to be in perpetual operation, one class graduating and another class entering each week. With the signing of the armistice, and the present favorable international situation, it is planned to discontinue the school, and the course is being so arranged that the last class will graduate sometime before the first of July, 1919.

The course consists of six months training, and is divided as follows:

One month at the Naval Training Camp, Pelham Bay Park, New York.

Six weeks of technical training at the United States Navy Steam Engineering School, located at the Stevens Institute of Technology, Hoboken, New Jersey.

Two months of practical training on board ships in the New York harbor, and in shops in the vicinity of New York, and an overseas cruise.

One months finishing course of instruction work at the United States Navy Steam Engineering School, Hoboken, New Jersey. Upon the completion of this course, the graduate is commissioned an Ensign in the United States

Naval Reserve Force (pay $1,700 per annum, plus allowance for sea duty and dependents).

The first month of the course consists of a period of training at Pelham Bay Park which is located on Rodmans Neck, a cape which juts out into that section of Long Island Sound known as Eastchester Bay. The work consists of a study of United States Navy regulations, infantry drill, boat drill, a general reading course in marine engineering which is preparatory to the next period, and semaphore signaling. The men are kept busy from 5:30 a. m. until 9:30 p. m. every day except Saturday and Sunday. Liberty to go ashore is granted from Saturday at 1:00 p. m. until Monday at 8:00 a. m., to those whose application to duty warrants such consideration. This first month gives the student his first insight into what cleanliness, orderliness, and obedience in the Navy really mean. All work is graded upon a scale of 4.0 with a passing grade of 2.5.

The second period of the course, consists of technical training at the United States Navy Steam Engineering School, Hoboken, New Jersey, and is divided into four sections of ten days each as follows:

Section one consists of a study of the different types of boilers and the features of construction which determine the types of vessels upon which they are to be used.

Section two covers the different types of propulsion machinery and includes a study of reciprocating marine engines, marine turbines of both impulse and reaction types, electrical machinery, and reduction gears of the mechanical, electric and hydraulic types.

The third section is devoted to a study of the auxilliary machinery found aboard ship. Auxiliaries include all pumps, condensers, evaporators, distillers, refrigerating machinery, electrical machinery, blower engines, fans, and also all topside auxiliaries such as anchor engines, steering engines, deck and cargo winches, and all department steam lines.

The fourth section takes up a study of all machinery aboard ship. This includes methods of firing and care of fires, the care and overhaul of boilers, overhaul and repair of reciprocators and turbines, and the inspection, care and overhaul of all auxiliary machinery. Time is also devoted to the study of the United

States naval regulations that apply to safety precautions and duties of the Engineer Officer. The purpose of the work of this section is to prepare the men to understand better the work of the applied course which immediately follows it.

The applied course consists of about two months training in the actual operation of marine machinery. The first ten days are devoted to trips to nearby shops and shipyards. The class spends some time at the Babcock and Wilcox boiler factory at Bayonne, New Jersey, where the students observe every stage in the manufacture of water-tube boilers of the White-Forster and B. & W. types. A few days are spent at the shipyards of the Staten Island Shipbuilding Company where the class observes every stage in the manufacture of Scotch firetube boilers. Further time is spent at the Worthington pump works at Harrison, New Jersey, where the class has an opportunity to see pumps manufactured, and also to assemble and disassemble the different types.

After completing the work in the boiler shops, the men are assigned to various tugs, ferries, and Sound steamers around the harbor. They have an assignment for each day which includes the actual operation of the machinery both in the engine and fire rooms, and sketching the arrangement of machinery and pipe lines. Each man keeps a personal log and notebook of all work asked for, and all work done.

If the student survives this far, he is assigned to a ship for an overseas cruise as a Junior Engineer. He is then made a Warrant Machinist (pay $98.00 per month with allowances for subsistance, dependents, and uniforms). This cruise may take from five weeks to three months depending upon the type of ship and upon the length of the trip. Each student keeps a notebook in which he writes up a regular assignment for each day. This cruise gives the student a chance to become acquainted with ocean-going ships, and also affords an opportunity to visit foreign lands. Most of the ships have been going to France and England, but many go to South America, Italy and the West Indies. The types of ships vary from small freighters of three thousand tons to large troop transports such as the U. S. S. Leviathan.

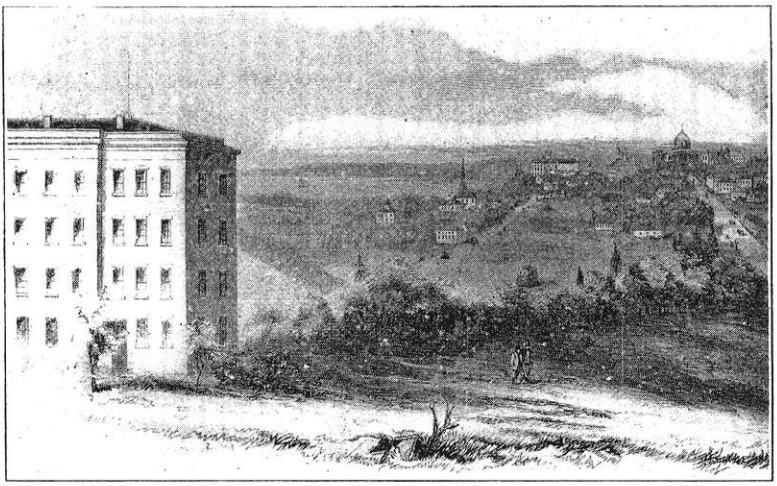
After returning to the school, the student spends one week in the engine shops and turbine shops of the Vulcan iron works at

Jersey City, New Jersey, and the De Levergne Machine Company in New York City. This offers an opportunity to inspect reciprocators and turbines during the process of building. The last two weeks of the course are spent in the classroom, and the time is devoted to the study of operation and repairs and to a discussion of work or events that occurred during the period when the different men were aboard ship. The work for each week is covered by a thorough three and one-half hour examination. Upon the successful completion of the course outlined, the graduates are commissioned as Ensigns in the United States Naval Reserve Force.

The course was planned by Lieutenant Commander Pryon and Lieutenant H. L. Seward, under the direction of Lieutenant Commander O. B. Wills. The idea of operating the school continuously and turning out graduates at short intervals, as fast as they could be absorbed by the service was a new one; nothing of the kind had ever been attempted before. It has been highly successful, however, and has resulted in the training of the maximum number of men with the minimum of plant and teaching staff.

THE NEW MEXICO

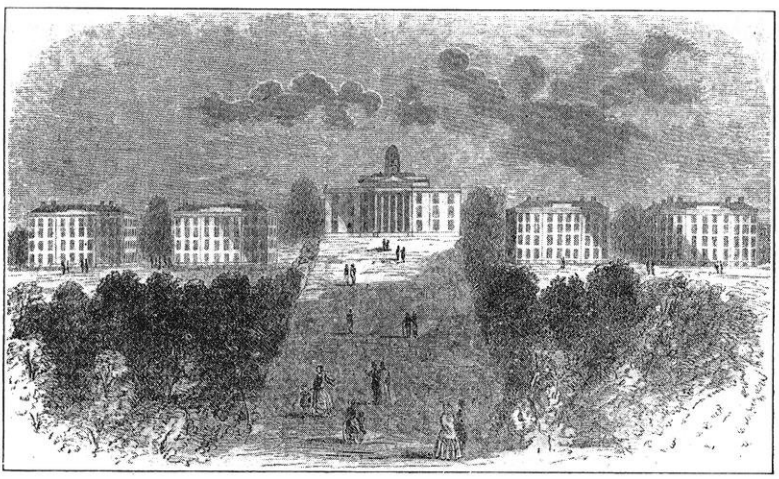
The launching of the United States superdreadnought, New Mexico, marks the beginning of a new era in marine engineering. The ship is the first of its kind to be equipped with electrical driving machinery. The step is the result of a desire to replace reciprocating engines now in use, with steam turbines. The electrical control of the propellers enables the use of the turbine at speeds which are efficient, thermally, but which could not be used formerly because of the necessary reduction mechanism. The greater flexibility of operation has already been demonstrated, and the success of turbo-generator sets as prime movers in naval vessels is practically assured.—*H. Glaettli.*



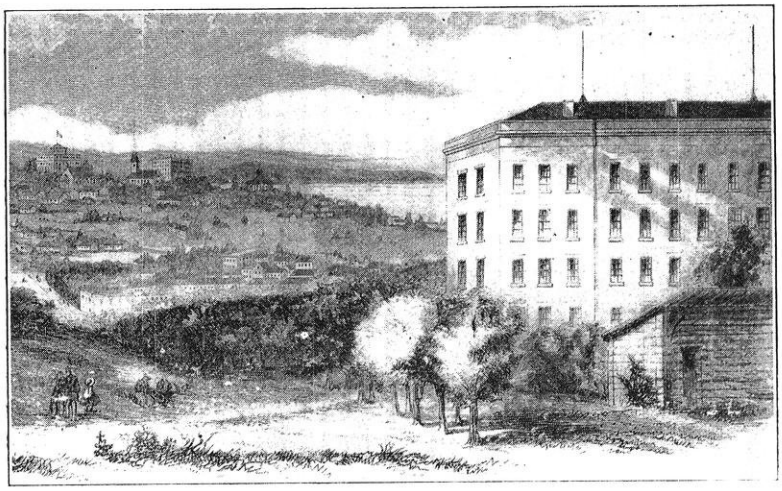
MADISON FROM UNIVERSITY HALL FROM A

FOUNDATION DAY

A new feature—a tradition, if you like—was added to our university life when the students and faculty gathered in the gymnasium, on Feb. 5, for the first FOUNDATION DAY convocation. The students took the initiative in the affair and



THE UPPER CAMPUS, 1851



SKETCH BY FRANZ HOLZAPFEL OF MILWAUKEE, 1858

carried out their plans well. Lulu Saul, '19, Milton C. Bormann, '21, and Bishop Samuel Fallows, '59, were the principal speakers. Rather curiously, the struggle of the women of the state for equal educational opportunity formed the main thread of all the addresses. The pre-coed era presents a strange situation to Wisconsin students of today. It is hard to appreciate the views of the people who, in those early days, insisted that the women students should be completely segregated. It is amus-

AT THE ICE CARNIVAL, FEB. 8, 1919

And to think that fifty years ago
Some folks didn't want co-eds around!

ing now,—though the situation was probably exasperating then,—to hear how slowly and grudgingly equal educational opportunities were granted. Imagine the women being forced to sit in the back of the class-room, behind the men, and placed under a restriction not to open their mouths.

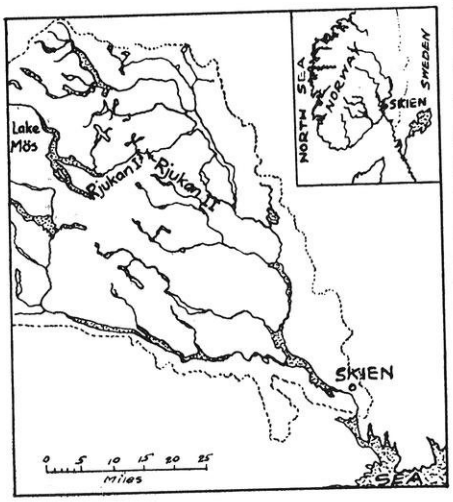
The stories of the old days recalled to our mind several rare prints that Prof. Callan brought back from the East last fall, and, feeling sure that they would interest the engineers of all ages and sexes, we here reproduce two of them. The view of the University in 1851 is evidently an architect's sketch. Apparently he did not know that co-education was taboo, for his women do not seem to be effectively segregated. Also he has taken strange liberties with the topography of the campus. From the description on the back of the print, we quote as follows: "The Institution was chartered in 1845. The Corporation is a Board of Regents, with general university powers. It is already accumulating the means of imparting knowledge, by the formation of a library, the collection of cabinets, etc., and with the manifestations of proper liberality on the part of the public, will confer immeasurable benefit on the present, and future generations. In addition to the undergraduate department, the Charter provides for departments of Law, Medicine, and Normal instruction. The site is a beautiful eminence, in the town of Madison, one mile west of the Capitol, commanding a view of the valley of the Four Lakes—a scene of unrivalled interest and promise, embracing the flourishing town of Madison, with a broad and lovely margin of agricultural lands. Considering the advantages of its position, and the probable value of its public endowment, it bids fair to become the leading institution of the Northwest." So say we, all of us.

The view of Madison in 1858 probably represents the Alumni Re-union of that year. The old grads—of the five-year class—may be seen resting upon the greensward, or strolling about with their bow-legged little girl and trick parasol. Our oldest inhabitant says that the shed near South Hall was the grandpa of our Service Building. It served as a tool house and work shop. But where are the stately elms that now tower above the buildings?

THE RJUKAN NITROGEN PLANT

By Aksel Taranger, e '21, and Joakim Ihlen, e '21

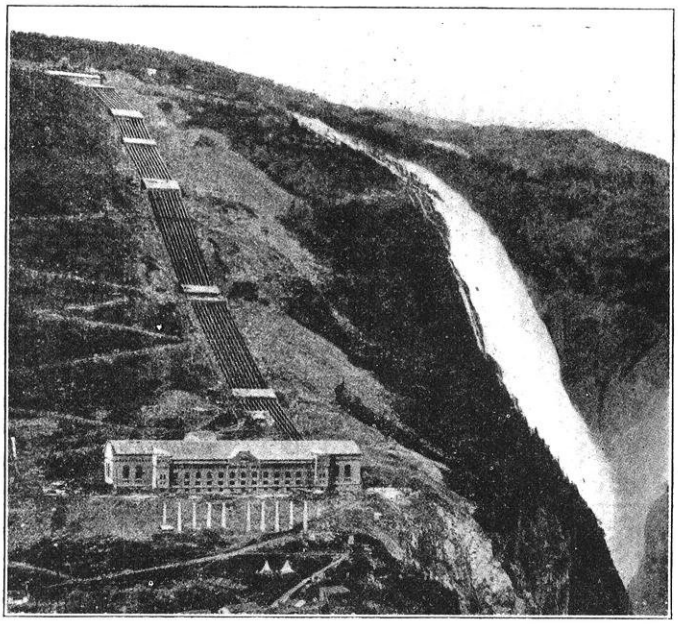
Steepness and height are two things that characterize Norwegian waterfalls more than anything else. The utilization of electrical power in modern industry has made these waterfalls more valuable to Norway than anyone could have dreamt of 50 years ago. It has been calculated that if all of them were developed they would yield 15 million horsepower.



The "Rjukan" falls are situated in the southern part of Norway, at a very wild and mountainous place, at the beginning of a deep and narrow valley. About ten years ago the falls were considered one of the most beautiful places in Norway. Getting their supply of water from a number of lakes scattered all over a great mountain plateau, the falls at that time fell straight down many hundred feet. Standing on a little plateau cut into the rock at the top of the fall, one had indeed a wonderful view of the immense masses of water streaming by with a terrible speed, and falling thundering and hammering on the rocks many hundred feet below. Since the Rjukan falls were situated at a very inaccessible place where no raw materials could be found or imported, no one ever thought of the possibility of utilizing them. It was the working together of two ingenious men that made this possible.

It was at a party in Christiania that Mr. Birkeland, the ingenious inventor and professor at the university of Christiania, and Mr. Eyde, a chemical engineer, met each other for the first time. Mr. Birkeland told about his latest invention; it was a

flamedisk that could develop a temperature of 3,000 degrees Centigrade. Mr. Birkeland's invention made it possible to utilize the long known fact that the nitrogen and oxygen of the air will unit chemically if the air is sufficiently heated. The utilization of this would be in the production of nitrogen compounds. (Nitric acid is made after the Birkeland-Eyde method



by heating air with an electrical flame of about 3,000 degrees Centigrade. A part of the oxygen and nitrogen in the air then unites, and forms NO, which with oxygen forms NO_2. This NO_2 then forms with water, among other things, nitric acid.) It was for this invention that chemistry had been waiting for many years. A great chemist, Sir William Crookes, has said that he looked upon the oxidation of the nitrogen of the air for industrial purposes as one of the biggest problems of chemistry. Today the problem is solved.

For the utilization of Mr. Birkeland's invention a fall like "Rjukan" is valuable. There the immense power necessary could be secured. Since in the production of nitrogen by the

Birkeland-Eyde process, air is the chief raw material, the nitrogen industry at "Rjukan" was possible.

Sam Eyde and Mr. Birkeland had difficulty in raising the necessary capital for the development of "Rjukan." Finally they got what they needed, and in 1908 the work was started. Two years later the first nitrogen production at "Rjukan" began.

It is wonderful to see how "Rjukan" has changed. The old waterfalls have disappeared, and some deep grooves in the mountain-side are all that is left of the once beautiful falls. All of the water is now carried in a big tunnel within the mountain bordering the valley for a distance of about 6 miles. The entire fall is about two thousand three hundred feet in height. There are three different power plants having a total capacity of three hundred and fifty thousand horsepower. The water for Rjukan I is taken from the river about five miles below Lake Moes, and conducted thru the tunnel for 2.64 miles. Above the plant there is a great basin inside the mountain, and from this basin the water drops down through a number of tubes to the power station situated at the bottom of the valley. The head utilized here is about 950 feet, and one hundred and fifty thousand horsepower is developed. The water discharged from this plant is led through the tunnel for 3.42 miles to a similar plant, Rjukan II, situated at Saaheim. At this place the head available is nearly 800 feet, and one hundred and thirty-five thousand horsepower is developed. In 1917, a third plant was being built farther down the river to utilize as much as possible of the remaining three hundred feet of fall. All of the power of these plants is used in the electrochemical plants at Saaheim.

It is wonderful to see how easily all this power is controlled. You will be surprised to find relatively few workmen at the station. All they have to do is to turn a few handles, and watch the machines doing the work. You get a great impression of man's control over nature when you see this wonder.

Editors Note: It may interest the reader to know that the authors of the above article are natives of Norway. They came to America in 1917, and are now enrolled as sophomores in the College of Engineering. Shortly before coming to this country they visited this interesting plant.

The magnitude of the undertaking is best realized by comparison with some of those with which we are familiar. The great Keokuk plant was designed for an ultimate capacity of 300,000 horsepower, and the combined capacity of the American and Canadian plants at Niagara Falls is only 570,000 horsepower. Large as it is, the Rjukan project has other features of greater interest than its size.

The normal flow of the stream varied from 44 cu. ft. per second in winter to 10,000 cu. ft. per second at flood time. By building a dam at the outlet of lake Mös, a reservoir was created having a capacity of 26,720,000,000 cu. ft. or half the average annual discharge of the water-shed. This reservoir, with a capacity nearly equal to that of the great Assuan dam on the Nile, so regulates the Maana River that it is possible to utilize a continuous flow of 1,692 cu. ft. per second, or nearly twelve times the minimum discharge.

The electric generators of Rjukan II are interesting because of their size (18,900 horsepower). They were the largest single-phase, water-wheel generators in the world at the time they were installed (1916).

The Birkeland-Eyde process is also of considerable interest. That the oxidation of atmospheric nitrogen takes place when air is heated in the electric arc has been known for a century. Many men,—notably Sir William Crookes and Lord Rayleigh, in England; and Lovejoy and Bradley, in this country,—have worked on this problem. The success of Birkeland and Eyde is due to the fact that they used a large amount of power in a single arc while the others divided the power among a large number of small arcs. The very low cost of hydro-electric power in Norway—about $8.00 per horsepower year—also contributed to their commercial success.

The Birkeland-Eyde furnace uses alternating current at 5,000 volts to produce an electric arc between U-shaped copper-tube electrodes. These electrodes are water-cooled and are placed in the field of an electro-magnet which causes the flame to spread out into a thin disc. The power consumed is about 1,500 horsepower, the amount used being regulated by an induction coil in series with the arc. Air is drawn through the arc, the high temperature of which causes part of the nitrogen and oxygen to combine to form the oxide of nitrogen (NO).

The air, as it leaves the furnace, has a temperature of 800 to 1,000 degrees C., and is conducted to the boiler house where its heat is used to generate steam for various heating and power purposes about the plant. From the boiler house it goes to the coolers,—large aluminum tubes over which water is flowing. This cooling is necessary in order to obtain suitable absorption afterwards.

The cooled gases next pass to the oxidation chambers which are vertical iron tanks lined with acid-proof stone. Here the reaction

$$NO + \tfrac{1}{2}O_2 = NO_2$$

is completed. The necessary oxygen is contained in the air which accompanies the gas from the furnace.

The next step is to absorb the nitrogen dioxide. This is done in rows of towers filled with broken quartz over which water is kept trickling. The gas has an up and down course through these towers, passing up through one and down through the next, and being driven forward by centrifugal fans. In these towers the reaction

$$4\,NO_2 + 2\,H_2O + O_2 = 4\,HNO_3$$

takes place. As the gas goes forward, more and more of the nitrogen dioxide is absorbed until, when it leaves the last tower, at least 97 per cent of the oxide has been recovered.

The nitric acid produced is used for explosives, fertilizers, and other commercial purposes. The first experimental plant was built in 1903, and by 1914, it was estimated that the company was supplying three-fourths of the nitrates used by European manufacturers of explosives. F. E. V.

ESPRIT: A LETTER FROM FRANCE

The following letter was written by a recent graduate of this college to a relative. Comment upon it is unnecessary other than to say that it was written on July 2, 1918, just before the tide turned in favor of the Allies. The feeling of confidence displayed by the writer is significant in view of the military situation at that time.

July 2, 1918,
A. E. F.

"To prove to you how much I enjoyed and appreciated your good letter, I'm calling off the war long enough to answer it within two days of its receipt. Of course, any news from the front is expected to be "War news," but to attempt descriptions of our experiences is a rather futile bit of work. The only way to get any grasp of the game is to be here and see it—to "live it!" Have been at the front continually since January with the first American Division to really take its place in the line, and the first to stage an American offensive action, the capture of Cantigny. We have been in things long enough to develop a true "esprit des corps" that is of great value in all our operations. Our losses have been normal in comparison with our fighting—six months in line demands some sacrifices I assure you, and we have stood the cost when necessary.

"Our men have been very rapid pupils in the art of modern warfare. That can be readily seen here in the battery. Six months ago we thought it was essential that an officer do everything from digging the gun pits to laying the telephone wires—but today we are merely the scientific managers of a sweet running machine. Its nothing short of marvelous. If the other American troops develop as rapidly as we have, and there's every reason to believe they will develop faster, we will soon be able to stage an Allied offensive that will make these Hun pushers look obsolete. For the present we must be content with limited objectives and the old game of throwing every attempt of Hindenburg into stabilization. There's not an Ally on the whole front that has any doubt as to the final outcome, and the line will *never* be broken. We *know* we've got them licked.

"You speak of my letters as being cheerful—they merely re-

flect the spirit that prevails among us. One needs to be on the front only a short time to realize that there's just one way to fight—to make a *game* of it. It's the greatest sport on earth after you once catch the spirit. We joke about everything from gas to shrapnel—and if you miss sleep for three or four days, well, that's just an extra inning game. We have a splendid regimental spirit, a Colonel who is the idol of the men, and as for the battery,—we intend to plug away until we are the best outfit in the world—the best shooting, fastest traveling, best looking battery in A. E. F. As a matter of fact, we believe we're in the running right now.

"There has been one great hardship to me—the news of the death of three of my classmates. They were three of the finest, bravest fellows I have even known and men of the type whose friendship will always remain a cherished memory. As I wrote to Arthur, I feel it the privilege of us who live to make sure that they have not died in vain.

"Thinking back on days at the University called to my mind the fact that R— must be doing some thinking about a college career. Don't let him miss it. Four of the happiest, cleanest, most progressive years of my life were spent at Wisconsin. Next to my home and my family, I know of no factor so strong in the development of character and of mind as my college years. In the last twenty years the American college man has developed a stamp of his own, and I strongly believe it is a true stamp of merit. The fantastic picture of the youth with cigarette and peg top trousers is rapidly becoming a myth. The battery and Company commanders, the lieutenants of practically every organization in this division, and some in the ranks, are products of American Universities of the last five years. Proud of them? I surely am. And it's the same throughout the army. I know of no better balanced, thorough and yet progressive University than Wisconsin—it rings true. If R— is considering it, I would be only too glad to write a letter of introduction to any one of several members of the faculty with whom I am well acquainted. I sincerely hope that I may have that opportunity."

ITALY UTILIZES VOLCANIC POWER

Italy has perhaps suffered more than any of the other allied nations from a scarcity of coal. She has no source of coal supply within her own borders except a small quantity of a poor grade of lignite. During the last few years of the war, only 7,000,000 tons of coal were imported annually, while her minimum requirements were 10,000,000 tons. This, with the resulting high price of coal, has resulted in the industrial exploitation of the natural heat emitted from the soil in those regions more or less volcanic in character.

The first experiments along this line were made some years before the war by Prince Ginori-Conti, in Tuscany at Larderello, near the salt-mines of Volterra, a region extensively covered with volcanic formations, the most wonderful being the so-called "soffioni," which are certain volcanic vents emitting powerful jets of very hot steam containing boric salts and various gases used in the extraction of boracic acid. Instead of limiting the use of these steam-jets, as in the past, to extracting the salts contained in the exhalations of these natural vapor-vents, the ejection of the steam is stimulated by boring holes. In this way it is possible to obtain powerful jets at a pressure of two to three atmospheres, according to the locality, and in some exceptional instances as high as five atmospheres, the temperatures varying from 150 to 165 degrees Centigrade. These jets maintain their force and temperature unchanged for many years, and they are not affected even when other openings, not too near each other, are bored in the ground, proving that they do not influence each other reciprocally, so great is the underlying thermic energy below. In 1905, Prince Ginori-Conti applied this natural steam to a 40 H. P. engine, using only a small section of the Nenella fissure, which is the most powerful "soffioni," the steam ejected having a pressure of five atmospheres. The results obtained during several years of experimentation were satisfactory, so that he continued to make larger and deeper borings.

In 1912 an experiment was made, very wisely on a modest scale, but sufficient to obtain conclusive results, for which a 300 H. P. turbine-alternater was used.

Later, because of the enormous increase in the price of coal, the Prince decided to exploit the thermic energy of these soffioni

on a much larger scale, but as other substances are emitted with the steam, among them sulphuric acid which corrodes metals, particularly iron and therefore the pipes in which the steam was to be collected, he attempted to use this steam only for heating. Three turbine-alternaters of 3,000 kilowatts each were installed, fed by boilers at low pressure not heated by coal or other combustible fuel, but by the natural steam, superheated to 165° C., issuing from these soffioni and piped and carried to the boilers.

Today the works at Larderello have a central plant of 16,000 H. P. operating without interruption and distributing current to Florence, Livorno, and Grosseto. The capacity is soon to be increased.

As the natural steam available at Larderello and the surrounding country is, one might say, unlimited, and depends upon the number of bore-holes made in the boraciferous soil, the great possibilities for further development are readily seen.

DO SOMETHING

"Every young man comes sooner or later upon a dilemma, in which he is more or less drawn in opposite directions by his confidence on the one hand and timidity on the other; a desire to perform backed by the courage of his convictions, but on the other hand resisted by his inability to see his way through in orderly progression to a desired end. This is about the time to show your nerve. Don't be dazed and baffled, but make a start. Use your wits and you will get somewhere, and if you cannot always see the end it will constantly get nearer and plainer when you go as far as you can see and then see how far you can go."
—*Walter C. Kerr: The Point of View.*

EDITORIAL

LABOR'S SHARE IN PRODUCTION

Before the war the vague rumblings of industrial and social unrest were coming ever nearer, and assuming ever greater importance. With the outbreak of the war, however, capital and labor buried the hatchet, and, shoulder to shoulder, helped to realize that great slogan of France, "They shall not pass." With the passing of the danger, and with the unsettled economic and industrial conditions which come from the necessary readjustments to peace conditions, a great cloud of industrial unrest is again beginning to darken the sky, and not without cause.

In view of these conditions, the address given by Mr. John S. Baker, of Evansville, Wisconsin, before the joint meeting of the engineering societies, February 27, and printed in this issue of THE ENGINEER, becomes of particular importance. Mr. Baker has succeeded in working out a practical plan whereby the workers in his plant share in the profits even to a greater degree than do the original capitalists. Not only that, but each man in the plant has a direct interest in the efficiency of production, the amount of the output, and the profit of the business. The majority of the stock, and thus the control is in the hands of the workmen. Unlike most other concerns where this has been tried, the company is still on a sound financial basis.

It does not make much difference how the result is accomplished, whether by government ownership and operation, private ownership and government control, or private ownership and profit sharing; but, in the near future, some system of distribution will have to be worked out, whereby the laborer gets a larger share of the results of his work, whereby he will have a direct interest in the prosperity of the business of which he is a part, and whereby free rein may be given to those men of vision, daring, and ingenuity who can develop new enterprises, improve old ones, and build up industrial organizations like those built up by Carnegie, Hill, Schwab, Westinghouse, and others in the past.

G. B. W.

A PLACE IN THE SUNSHINE

The engineer has played a prominent part in the "Great War." Consequently it has been brought home to the general public, as never before, that the whole structure of our modern civilization rests on a foundation of engineering achievement. Having attained a place in the sunshine, we must now exert ourselves to maintain our position. The national engineering societies have already taken steps to safe-guard our interests, but the best results can only be obtained by each one of us putting our shoulder to the wheel and boosting. "But," you ask, "what can I do besides joining one of these societies?" You can take an active part in the affairs of your community. When some municipal improvement is being considered, you may not be able to discuss the matter as fluently as your lawyer neighbor, but your opinions will be based on a better understanding of the facts involved. You can not, however, speak or write well without practice. THE WISCONSIN ENGINEER needs articles, editorials, campus notes, and alumni news. Here is your chance. Start the habit of being public spirited by writing something for us. Polish it up to the best of your ability, and drop it into the editors mail box as I have done with this. He may publish it, rewrite it, or drop it into his waste basket, but in any case you will have had some good practice.

THE NELSON TROPHY

About a month ago the Nelson Trophy was placed in the lower hall of the Engineering Building, to the intense satisfaction of all engineers.

Regent A. P. Nelson, of Grantsburg, gave this work of the prominent sculptor, Leonard Crunello, to the University as a prize to the winning college in intra-mural athletics. It is awarded each year to the college gaining the most points in a tournament which includes all university sports and which is carried on throughout the year.

In the spring of 1916 the College of Agriculture won the prize, and the following year the L. & S. men captured it. The Engineers have been strong competitors every year, but lack of time for team practice has handicapped them. Last year, however,

considerable interest was shown in the games, and several good teams were developed. The basketball team won the championship, winning all of its games. The indoor track men ran away with first place in the annex meet. The engineers' crew won a neat mile race in the regatta on Lake Mendota. Second places in outdoor track, gymnastic meet, swimming meet, and a tie for first place in wrestling gave the Engineering College 214½ points, against 190½ for the Commerce School, 176 for L. & S. and 121 for the Agrics.

Winning the Nelson Trophy is evidence of the spirit of the Engineers, and shows that the bunch which has much scholastic work is not necessarily backward in athletics. The prize adds considerably to the appearance of the lower hall. Every live engineer wants the Trophy to remain with us; we want to win it more often than any other school. With the winning of the indoor track meet this year we have started well toward winning the tournament again. There is room on the teams, however, for all good material, and every engineer who can perform in any major or minor sport should take an active interest in the contest and do his utmost to help win the trophy this year. C. A. W.

KNOCKERS

A great organization must be judged, not by the frailties and failures of certain of its component parts, but by its ideals and purposes as demonstrated by the great bulk of its members. Its achievement must be judged on a similar basis. The Y. M. C. A. in France, has recently been attacked violently for various shortcomings; the army doctors and nurses are the victims of slanderous criticism; and even the army itself—that wonderful army that accomplished what the German military experts declared to be the impossible—even the army is being denounced by certain congressmen who apparently appreciate the advertising value of such denunciation. In all these attacks, there is, doubtless, a basis of fact. There are unquestionably, Y. M. C. A. men, doctors, nurses, and army officers who are no credit to the nation; but we are not justified in condemning these organizations because of the shortcomings of a comparatively few individuals. We accept the fact that a certain percentage of the

human race is below grade; it is sad but unavoidable. What we are really interested in, however, is not the shortcomings of individuals; but rather the general spirit and accomplishments of these organizations taken as a whole. And who is there to say that, taken as a whole they were failures? L. F. V.

QUO VADIS?

What are you going to do after you graduate? How often that question is put to the seniors; and how seldom there is a definite, clean-cut answer. The fact is that few men who graduate from the University have any idea, until a job is actually offered to them, just what it is they expect, or wish to do after commencement. They merely drift. If luck favors them they land a position which is to their liking. If they are of the great majority, they become one of the many square pegs in round holes, and go through life at half load, and half efficiency.

During his four years of hard preparation for a profession, the engineer should develop some preference. He should analyze himself and reach some well-defined idea of what he is fitted to do. Then we will have fewer men who pick their jobs at the end of the course solely by the standard of salary. We will have more men who really put the best that is in them into their work,—who, as Prof. Callan says, "Work, as the average man plays golf, for the sheer love of the thing."

READ THE NEWSPAPERS

It was discovered the other day, that several upperclassmen at this University did not know even yet that Theodore Roosevelt was dead. These men were engineers. True it is that we have a lot of work to do; but so have other men. It takes only about fifteen minutes to read a newspaper from cover to cover as it should be read. We should make it our business to keep in touch with the issues of the day, and with progress in fields other than our own. Every engineer should make it just as much a part of his day's work to read and study at least one daily paper, as to write his reports, or study his E. E. It will do him more good, and without a doubt is a lot more fun. G. B. W.

ALUMNI NOTES

By ETHAN W. SCHMIDT

W. H. BESSLEY, e '08, visited friends on the campus Feb. 24. Mr. Bessley, who is business manager of the H. V. Bessley Music Co. of Texarkana, Ark., will be accompanied on his return home by Mrs. Bessley and their two children who have been visiting Mrs. Bessley's parents here in Wiscinsin.

CAPT. AUBREY H. BOND, c '17, Topographical Officer of the 5th Engineers, reached France last August. After a short training period, the division he was with took over a sector before Metz which it held until after the armistice.

WILLIAM J. CAMLIN, c '18, is with the Illinois State Highway Department at Springfield, Ill.

GEORGE H. CONNOLLY, c '14, of the Wisconsin Gas and Electric Co., Racine, visited Madison on Feb. 19 and 20.

LT. B. M. CONATY, c '18, was discharged from the Supply Section of the Field Artillery in January. He was at Washington, D. C., directing the distribution of Materiel. He has taken a position with the Aluminum Company of America, at Yellow Creek, N. C.

JERRY DONOHUE, c '07, of Sheboygan, a Convention visitor, spoke affectionately of his classmate, COL. A. B. CAREY, of the 54th Canadian Infantry, B. E. F. Carey manages to get into every public fight that's open and while he was in college he decorated his room with his war relics. He had a tiger hat from the Boer war, a canteen from the Spanish war, and, in a bottle, his appendix, which was removed during his four year campaign in Madison.

WILFRED EVANS, c '17, writes from El Paso as follows: "Since graduation, I have been in the field artillery branch of the army. Upon completion of the first training camp, I was assigned to the 148th F. A. After several months in camp near New York City, we sailed for France the last of January. We trained in southern France for about five months. July 4th we were ordered into the fight, going in behind Chateau Thierry. I consider it my hard luck that I was ordered back to the States July 23, as an instructor, and so saw only a few weeks of action. Promotion to 1st lieutenant and assignment to the 33rd F. A., were my orders when I arrived home. In October I was given a battery and a captaincy, and we were all set for a return trip when the flu and a little later the armistice hit us."

ENSIGN F. P. GERHARDT, c '18, is on the U. S. S. Wyoming. He can be reached in care of the Postmaster, New York City.

WALTER B. GESELL, m '15, 2nd Lieutenant, 4th Division, Regulars, lost his right arm, as a result of a shell explosion, in the battle of Fismes, August 12, 1918. Gesell is still on the hospital list at Washington.

TERENCE A. GILL, ch '17, is with 158th Co., Signal, 1st Reg., U. S. M. C., Naval Station, Guantanamo Bay, Cuba.

W. H. GLOGER, e '17, died of pneumonia, at Washington, D. C., on October 2, 1918.

L. F. HARZA, c '08, is superintendent of the government concrete shipyard at Jacksonville, Fla. HARRY E. STOCK, c '06, is assistant to Harza.

CARL F. HAYDEN and JOE STAIDL, ch '19, have returned to the University after being mustered out of the service.

C. A. HENDEE, e '13, received a commission as Ensign on the U. S. S. Delaware, in service on the Pacific.

W. P. HIRSCHBERG, c '01, who is with the Federal Engineering Co. of Milwaukee, has been elected vice-president of the Engineering Society of Wisconsin.

O. A. HOUGEN, Ch. E. '18, who was formerly an instructor in Chemical Engineering, has returned to Madison for a visit. He was in charge of the evaporating work at the U. S. Chemical Plant No. 4, Saltville, Va.

GLEN S. HOUGHLAND, ch '17, is Sales Engineer for the Walter E. Lummus Co., Boston.

C. E. KAUFFMAN, m '17, has been in service as an Ensign for 18 months. He was released from active service Jan. 1, and is now at Edwards, Ind., as engineer in the power house.

E. A. KAUMHEIMER, e '16, after attending the Officer's Training Camp at Ft. Sheridan received a commission as 2nd Lieutenant, and placed in service at Camp Custer. He was given a medical discharge in Feb., 1918, and was then engaged in research work at Long Island. He expects to be released soon.

LT. GLENN H. KLEMME, writes from Ft. Washington, Md. He was orientation officer for the 2nd Battalion, 60th Regt., C. A. C., First American Army. He sailed for France in April, 1918, and went through the St. Mihiel and Argonne offensives from start to finish. He may be reached at his home address, Belmond, Iowa.

JOHN W. LOWELL, e '11, is with the Universal Portland Cement Co. of Pittsburgh, Pa.

CARL F. KOTTLER, e '18, was released from active service Feb. 5, 1919. He enlisted June 20, 1918, and after attending the Officer's Material school, Sept. 1 to 24, was commissioned an Ensign in the Naval Reserve. He then was a member of the 5th Reserve Officer's class, Annapolis, Oct. 20 to Jan. 31, 1919.

C. H. LUCKEY, c '14, has accepted a position at Williston, N. D., as Assistant Roadmaster with the Great Northern Ry.

HAL MARTIN ex c '04, who had been in the mining game on the Mesabi Range for many years, died of influenza on December 14.

JIMMY McATEER, c '18, after taking the course at Ft. Monroe, was sent to France in November. He stayed until December 26. He has been discharged.

PATON McGILVARY, has been awarded the Italian croce al merito di guerre.

E. E. MEISEKOTHEN, junior chemical 1917–1918, has returned from France where he served in the heavy artillery, and is now working for the C. F. Burgess Laboratories, Madison, Wis.

R. J. MEISEKOTHEN, e '14, was a visitor Jan. 19. He had just received his discharge from the army, having spent about four months in the Radio Development Division at Washington, D. C. He expects to return at once to his former position with Sloan, Huddle, Feustel & Freeman, valuation engineers, of Chicago.

LIEUT. EDMUND MILLER, ch '17, is assigned to the Felt Procurement Division of the Chemical Warfare Section, 2 West 53rd St., New York.

LIEUT. IVAN C. MILLER, ch '18, is back at the University doing some special work on lubricating oils in the Chemical Engineering Department, for the Spoco Oil Co., Denver.

E. B. MORSE, e '18, has recently received his commission as Ensign. He spent two days in Madison on his way to Briggsville where he was married to Miss Eva Schwemerlein on February 25. Immediately after the wedding Mr. and Mrs. Morse left for New York on a short honeymoon. Morse has not received his release from duty as yet and expects to be assigned to a ship as soon as he reports back from his furlough.

CAPT. RAY S. OWEN, c '04, has been promoted to major and is assigned to the intelligence section at General Pershing's headquarters with a large force of engineering and clerical help under him. Prof. Owen was one of the first university faculty members to enlist, and prior to his promotion was a captain in the engineering corps in France.

E. E. PARKER, c '07, who is superintendent of the shipyard at San Diego where the government is building concrete ships, expects to return to take up his duties as city engineer of Madison, about May 1.

LT. GLENN RICHARDSON, c '16, was held captive at four different German prison camps. While flying over the battle line his machine developed motor trouble, and he was forced to land in enemy territory.

L. T. RICHARDSON, e '10, Ch. E. '13, has been mustered out of service in the Ordinance Dept. He was stationed at Saltville, Va., in the U. S. Chemical Plant No. 4. He will go back to his work with the Cutler-Hammer Co., Milwaukee.

LT. WILLIAM D. RYAN, c '18, is with the Construction Q. M. at Camp Jackson, S. C., in charge of road construction and some dredging. He has had some experience with Puerta Rican laborers and says that they are small, weak men who cannot stand up under heavy labor, and that they do not stand cold weather very well. They came north in October, clad in "palm beach" suits and barefoot. Woolen underwear was issued to them, but did little to improve their condition as they insisted in wearing it wrapped around their heads. Ryan made a trip to Washington early in Feb. and writes, "Being a reader of THE WISCONSIN ENGINEER, I knew that Bernard Conaty was in Washington, so I looked him up. He was being discharged that day." Write your own moral.

H. E. SWEET, ch '17, Ch. E. '18, has taken employment with the Beloit Water, Gas and Electric Co., following his discharge from the army.

F. C. THIESSEN, c '10, who has been engaged on the design of concrete ships at Washington, is going to France where he will be engaged in educational work in the army.

N. B. THOMPSON, ch '15, has left the Dupont Powder Works at Wilmington, Del., to become general foreman of the benzole department of the National Tube Company's Coke Plant at Lorain, Ohio.

HAROLD G. TUFTY, e '18, has published an article in the Electrical World for Feb. 8, 1919, entitled "Photographic Study of Porcelain Insulation." Tufty made a preliminary study of insulators under the direction of Professors Edward Bennet and A. H. Winchell here at the the University.

F. W. ULLIUS, Jr., e '11, Village Engineer, Village of Shorewood, Wis., has been elected president of the Engineering Society of Wisconsin.

CHARLES J. SCHMIDT, e '97, has formed a partnership with Harvey L. Hanson, for the practice of patent, trademark, and corporation law under the name of Schmidt & Hanson. The firm address will be 1330 Monadnock Block, Chicago.

ARTHUR E. VAN HAGAN, e '06, E. E. '10, is Traffic Engineer of the Chicago Telephone Co., at Chicago.

G. H. WATZKE, ch '16, has joined the staff of the National Carbon Co., East St. Louis, Ill. He was formerly with the Briggs Loading Co., Milwaukee, Wis., making hand-grenades.

LT. ROBERT B. WHITE, m '18, former Editor of THE WISCONSIN ENGINEER, was a visitor Jan. 17. He has recently been discharged after having served as instructor in the Aviation Corps.

LT. HOWARD T. VALENTINE has returned as instructor in Chemical Engineering. He was in France with the Gas Defense Service where he suffered from shell shock and gas.

LT. F. N. SCHUSTEDT, c '17, returned to his home in Madison February 20.

JACK BOYNTON, m '06, was commissioned Captain in the Engineers Corps, stationed at Camp Humphreys. He has been discharged and is reported to be with a ceramic company in St. Louis as chief engineer.

F. A. DE BOOS and L. L. SMITH, e '06, are in the sales department of the Under-feed Stoker Co. of America. The company has offices in the Harris Trust Building in Chicago, but plans to move to Detroit within a short time.

CHARLES E. DENNIS, c '18, who has been at the Forest Products Laboratory for the past year, left on Jan. 8 to take a position with the Union Shipbuilding Co., at Curtis Bay, Md. His address will be 1021 Madison Ave., Baltimore.

WALTER J. GRODSKE, c '08, who has been in government work in the Philippines for a number of years, was commissioned 1st Lieut. in the Engineers Corps and was at Camp Humphreys. He has been discharged, and it is believed that he returned to the Islands.

ARTHUR HOWSON, who was a student in civil engineering at Wisconsin from 1912 to 14, was commissioned 2nd Lieut. in the Engineers Corps. Howson received his degree from Illinois in 1918.

CAMPUS NOTES

By WILLARD B. BELLACK

'Raw for Saint Patrick!

All out on the steps again!

Sophs all trying out their new class pipes! Holy Smoke!

One good thing about the spring weather. Prof. Terry has discarded those passionate red mitts.

Nine hundred new stars will complete the university service flag, representing 2,650 men in service. There will be 15 new gold stars, making 48 on the finished flag.

Photo by G. B. Kuebler, '20

The University Service Flag

Co-eds are enlarging the flag and embroidering the additional stars. Names of the 900 are also being added to the honor roll in the historical library.

No provision has yet been made for men who joined the S. A. T. C. and neither are student or faculty included who entered government war service but remained in civilian status.

Greatly encouraged by having sold a copy of the ENGINEER to one of our Co-ed friends, we have inaugurated a Woman's Section in this issue in the hope that the ENGINEER will get more of this co-ed business. So far we haven't been able to collect on the copy sold last month.

WOMAN'S SECTION

STAFF

Editor ..... AXEL BERGGREN
Assistant Editor ..... "MIKE" GODDARD
Committee on Diplomatic Relations ..... OPEN TO THE PUBLIC
The Technologist's Easy Chair ..... EDMUND WISE

The Technologist's Easy Chair

Dear Tech:—How would I start to make a cork-screw in my shop course?—*Blue Middy.*

Ans. For this most intricate of operations, you place a long nail in the lathe by means of a wobble chuck, and proceed in the same manner as you would in making a sky hook. Better hurry before July first.

Dear Mr. Technologist:—Why won't the Nordberg engine in the laboratory run?—*Co-rufnek.*

Ans. The Nordberg engine is a particularly difficult engine to run. The governor is attached directly to the aspiration valve and the differential clutch causes a large periodicity which is entirely amalgamated. Berggren insists that the entropy is too large, but this seems doubtful.

The lady engineer in the shops was hard at work. Both hands were busy shifting levers and regulating feed except when, with a swift gesture, she tucked in a wayward curl or smeared machine oil over her nose with a well-gloved hand. We sidled up in an ingratiating way and asked what she was making. "A mule," quoth she. That was a new one on us and we went outside, where it was cool, to think it over. Pretty soon we came back. "Say! Isn't that a worm-gear you are making," we inquired with some indignation. "I guess that's it," she answered indifferently, "Its some kind of an animal."

OH HELL!

"BILL" MANTONYA

In days gone by the engineers
Were always pretty tough,
Their talk around their building
Was 'most always pretty rough.

When once they climbed the old stone steps
And got into E. B.
They felt a certain freedom there,
The place was women-free.

But now you ought to see the place
It doesn't look the same,
The labs and shops are full of girls,
Its getting pretty tame.

A fellow going in the shops
Can't learn things any more,
Prof Goddard doesn't have the time
He used to have before.

A fellow wants a little help
And then he gets it—NOT,
A co-ed sighs, and looks around,
The Prof is on the spot.

In Steam and Gas its just the same,
And Berg's like all the rest,
The fellows get the leavings;
The co-eds get the best.

I wish the co-ed engineers
Would rest a week or so,
Then maybe Berg would have the time
To make the Nordberg go.

It wouldn't take him very long
To get these valves re-set,
But with the co-eds all around
He hasn't found time yet.

The time is evidently near
When it will come to pass
The profs will all be ladies
In Shop and Steam and Gas.

The Drawing Department is using a new DESCRIPTIVE GEOMETRY written by Prof. A. V. Millar, of this college, Prof. Maclin, of the University of Tennessee, and L. J. Markwardt, c '12, engineer in the Forest Products Loboratory. The features of this text are the elimination of the use of traces and groundline, and the introduction of the use of auxiliary views. Auxiliary views are any views other than top, front, or side, and are used to assist is visualizing the object under consideration. The book is handled by Track & Kilgore, of Madison.

PROF. CALLAN, in a reminiscent mood, related an incident in his college career, which we dramatize thus: Mob scene: Students pouring out of class in bookkeeping after a session in which

Did you hear PROF. TERRY talk to the A. I. E. E., on Feb. 11, about the oscillator bulb and its function in radio telephony? No? Well, keep your eyes open for the good things to be had about this campus, young fellow. These are the happy days, and they will soon be gone with their opportunities. Prof. Terry explained, in easily understood language, how the bulbs are used and then gave a demonstration of radio telephony. We had "Mary's Little Lamb" and music, both by radio.

The MINING CLUB had 32 out to the meeting on Feb. 12. WARREN WALTERS talked about his work on the Range last summer, HERBERT J. KEMLER spoke on *Electrical Precipitation of Smoke,* and LT. WRIGHT told of his experience with the artillery in France. The Club decided to have a banquet every other meeting. Those lab furnace chefs must have made a hit.

EARL S. PRINCE, c '19, who was a C. P. O. at Great Lakes, returned to Madison in February. He will make his home here, and will resume his studies next quarter.

LTS. ROBERT W. CRETNEY and CLARENCE H. ZARSE have been released from active service and have resumed their course of study.

LTS. V. G. McGRAW, c '19; C. L. NASH, ch '20; and C. C. CONGDON, c '20, visited the University for a few days last month. They were commissioned in the Field Artillery at Camp Zachary Taylor.

PROF. MAURER spoke to the U. W. Engineers Club, Feb. 21, upon *Airplane Wood Tests.*

F. H. SCHMITT, soph civil, re-entered early in February after some months in training at Great Lakes.

The space in the Chemical Engineering Building vacated by the Medical Department is being remodeled for use by the Chem. Eng. Dept.

Johnny Callan had *not* been the fair-haired boy. Johnny's pal speaks: "Gee, Callan! I'd like to be you in English; but I'd hate like hell to be you in bookkeeping."

The entrance to the E. B. is much more orderly and sociable, and traffic accidents are less frequent, since the Trophy was placed in the center of the hall. We all stick to the right. Some day the bird who keeps his eyes on his feet and who is the last man in to drawing class will come bounding up the steps into the pedestal. Who is going to hold the floor down so that it doesn't come up and hit the fellow's beak?

PROF. McCAFFERY attended a meeting and banquet of the Minnesota Society of Engineers, at Hibbing, Minn., on Washington's birthday. About two hundred and twenty-five engineers from the iron companies of the Mesabi range, and approximately thirty Wisconsin alumni were present. Prof. McCaffery delivered an address upon *Co-operative Research.*

The Engineering Society of Wisconsin held its annual Convention in the Auditorium of the Engineering Building on February twenty-first and twenty-second. There was a good attendance and a number of interesting speeches on timely subjects. Prof. Smith was re-elected secretary.

PROF. WILLIAM BLACK, who was a teacher in the steam and gas department of this college from 1909 to 1917, died at Boulder, Colo., February 5, after an operation. He had been a member of the faculty of the University of Colorado since leaving Wisconsin. He leaves a wife and two children. The news has caused extreme regret among his many friends at Wisconsin who will not soon forget his absorbing interest in the college and its work, his willingness to help in any public endeavor, his enthusiasm and energy in carrying forward any task he undertook, and the charming personality which made his friendship a thing to be desired.

NOT BLACKBERRY

He sat at the lunch counter of the small town restaurant. He finished the sandwich and the glass of milk. Then pointing to a pie back of the counter, he said:

"I'll have a slice of that blackberry pie."

"T'aint blackberry," said the waitress. And then as she "shooed" the flies away with a waive of her arm: "It's custard."