The Wisconsin engineer. Vol. 24, No. 1 October 1919

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

The Wisconsin Engineer

VOL. XXIV. OCTOBER, 1919 NO. 1

day
em-
ount
-half
Can-
ovis-
til 3

au

urt
Wick-
cases
k as-

L.
ed

passengers to the American transport was simply to avoid delay.

Editor and Manager Named for Engineer

William J. Rheingans has been chosen manager and C. Armin Weipking, editor of the Wisconsin Engineer for the year 1919-20. Mr. Rheingans, who entered the university from Jackson, will be a senior in the College of Engineering next year. Mr. Weipking is from Milwaukee and will be a senior next year. He is a member of Triangle the engineering fraternity.

Give Firm More Time

kets!!!

years, but the board plans to make it a larger general hospital.

HEADS CHOSEN FOR SCHOOL PAPER

W. J. RHEINGANS AND C. A. WEIPKING, MANAGER AND EDITOR OF "ENGINEER"

William J. Rheingans has been chosen manager, and C. Armin Weipking, editor of The Wisconsin Engineer for 1919-20.

Rheingans will be a senior in the College of Engineering next year. He has been acting manager several months. His scholastic record is excellent. At the time of the signing of the armistice he was in training for coast artillery at Fort Monroe. He is a Tau Beta Pi man.

Weipking is from Milwaukee and will be a senior next year. He has had some experience on The Engineer during the present year, following his return from training camp. He is a member of Triangle, engineering fraternity.

SOLONS WILL NOT

INDEX

Volume 24 **Founded 1896** **Number 1**

The Wisconsin Engineer

$1.00 a Year **15c a Copy**

Subscriptions, payable before February 1, $1.00 a year in United States, Porto Rico, Hawaii, the Philippines, Cuba, or Mexico; $1.25 in Canada; and $1.50 in other countries.

Entered as second class matter Sept. 26, 1910, at the post office at Madison, Wis., under the Act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in section 1103, Act of October 3, 1917, authorized October 21, 1918.

Published monthly from October to May, inclusive by

THE WISCONSIN ENGINEERING JOURNAL ASSOCIATION,

306a Engineering Building, Madison, Wisconsin

Telephone University 177

THE LACK OF OBSERVATION

"No," complained the Scotch professor to his students, "ye dinna use your faculties of observation. Ye dinna use them. For instance—" Picking up a jar of chemicals of vile odor, he stuck one finger into it and then one into his mouth. "Taste it, gentlemen!" he commanded, as he passed the vessel from student to student. After each one had licked his finger, and felt rebellion through his whole soul, the old professor exclaimed triumphantly:

"I tol' ye so. Ye dinna use your faculties. For if ye had obsarved, ye would ha' seen that the finger I stuck into jar was nae the finger I stuck into my mouth."—*Windsor Magazine.*

CONTENTS

The Wisconsin Engineer

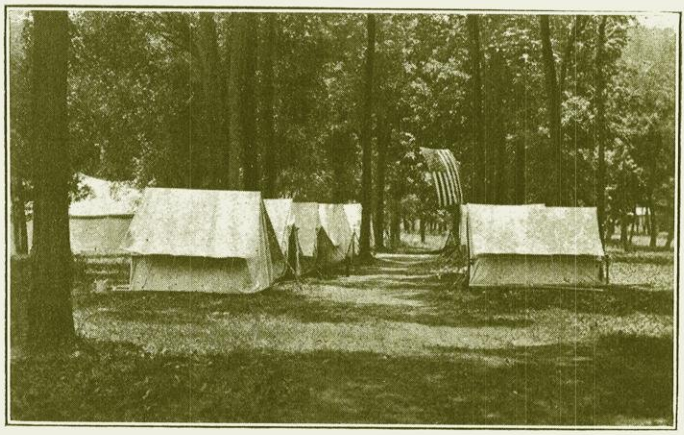
VOL. XXIV OCTOBER 1919 NO. 1

THE 1919 DEVIL'S LAKE SURVEYING CAMP

By WALTER C. THIEL, *Sophomore Civil and*
C. A. WIEPKING, *Senior Civil*

"Say Bill, remember the four weeks we spent at Devil's Lake? Wasn't that the best time you ever had in your life? Don't you wish that we could go back there just once more, with the same old crowd, do the same hard work, enjoy a nightly and refreshing swim, and then sing and yell our heads off with our pep songs until the cows come home?"

Yep, that's just about the way the old grads feel when they meet and talk about school days, and that's the way last summer's surveying crowd feel about it, now that they are meeting again. Dances and picnics have their charms, but the work and play of the surveying camp come before all other campus topics when civils get together. Ask those who attended last summer's camp whether it isn't the brightest spot in their college career, and ask the grads the same thing—they'll all tell you it is.



LANGDON STREET

The charms of Devil's Lake are unknown to most of the members of the contingent that leaves Madison just after exams in June, but you can bet that they are all mighty well acquainted with the whole region when they return four weeks later. Most everyone will swear that it is the prettiest place in the state. When Hank took his last look at the sheer bluffs and the wooded valley between them he said: "After I pile up my $4,000 a year for a while I'm going to come up here and build a summer home." Jim was thinking of the cool and shady paths winding about the turrets and boulders of south shore and of the comfy nooks on West Bluff overlooking the lake when he stated: "Boys, you'll see me up here on my honeymoon."

For those who have no definite knowledge of the location of Devil's Lake we will explain that it lies about four miles south of Baraboo, the county seat of Sauk County, and famous as the home of Ringling's Circus and Bunn the Baker. Devil's Lake station is a little over 30 miles from Madison on the main line to Minneapolis. The lake itself is located between three bluffs of quartzite rock averaging 500 feet in height. The bluffs are steep and partly wooded, and they meet the water abruptly. The rock walls continue as steep below the water surface, so that the depth is often as great as 30 feet only a few feet from shore. The beauty of the lake lies in its crystal clear water and its romantic shores. The bluffs are remarkable because of the uniformly hard rock and the odd formations of vertical parapets and towers. Usually the lower part of a bluff is overgrown with trees; above the wooded belt there is a steeper incline of boulders, the largest of which would weigh several tons. The upper 100 to 200 feet of the bluff usually consists of practically vertical rock formations.

From this description it would seem that bathing in the lake were impossible, but the bluffs are separated by wide valleys, and where the valleys meet the lake the beach is correspondingly flat, and the bottom of the lake slopes back gradually, so that bathers can wade in for several hundred feet. The lake is only a mile and a half long and three-quarters of a mile wide, but it is fifty feet deep in places. The old residents of the region maintain that the lake is bottomless, and they tell a legend about an Indian maiden who committed suicide by plunging into the

unfathomable depths from West Bluff because she was disappointed in love. Not wishing to detract from the romance of the place, but to be truthful engineers, we must report that the surveying crowd never failed to reach bottom with a 55-foot sounding line when they worked the hydrographic problem, and also, we tried to throw a rock into the lake from the top of West Bluff one day, but the stone fell short. So the fair and despondent damsel never did that said act, unless she was a good broad jumper, and if the engineers had been up at the lake those days no fair maiden could ever have been sad. We also can say that the reader will not be disappointed when he visits the lake, for if he has any spark of romance or any love of nature he will have material enough to work on. The lake has been chosen as a place of summer activity by geologists, biologists, sportsmen, lovers, convalescents, summer resorters and most of all, by us engineers.

Field conditions suitable for successful work in practically all lines of surveying are found at Devil's Lake. The bluffs afford good locations for triangulation stations; by building up a system between the lake shore and the rocky heights the students are shown how any large geodetic system would be made. There are plenty of opportunities for developing expert topographers, for the glacial formations in the valleys are extremely irregular. The lake furnishes a good hydrographic problem; the Baraboo River, only five minutes' ride distant, affords opportunities for teaching river discharge and water power surveying. Also, the stars are sometimes available for astronomical problems, and difficult level circuits abound.

Any man who has taken the Devil's Lake course knows that the engineering work is performed with great success from the educational point of view. However, he will recall particularly the ideal camping conditions and the pleasures that accompanied the work. For instance, this experience last summer: Two of the fellows climbed East Bluff one afternoon; Walt and Ray. When they got to the top they saw the wooded plateau and began to investigate its secrets. Soon they ran across cloven hoof tracks, and, following them, they came upon an animal grazing behind some bushes. The beast, frightened by their unannounced entry, let out a roar, and hoisted a pair of horns at them. Of course they turned and fled, slid down the bluff

DEVIL'S LAKE CAMP, 1919
Puerner, Gotham, Margoles, Wiepking, Blau, Ford, Zervas, Heffernen, Rohlfing,
Jaeger, Homstad, Spetz, Grupe, Clarenbach, Birkenwald, Prof. Smith, Rheingans, Strong, Hanson, Light, Walsh, Melnik, Bespalow,
Chase, Thiel, Rotter, Radley, Seder, Zelonky, Miller,
Glaettli, Axelberg, Connell, Knollin, Krez, Bollinger, Emmons, Albers, Schmitt, Neel

in haste, and came to camp with a breathless story about encountering deer. The careful investigation which followed proved that the dangerous animals were only cows.

A tall fellow named Jim always told about meeting some Indians in the woods at the north end of the lake. Yes, the woods are exceedingly dense in places up there, but the persons referred to were white people thoroughly tanned from camp life. Some of the girls from the geology camp, wearing khaki bloomers and red handkers, probably fitted the description.

Every day of work at the lake has its thrills. Someone either falls into the drink or kills a rattlesnake or something. "Lenny" says that at least one snake is killed by the crowd every year. During every camp someone leaves a transit on the railroad track while he goes over to bawl out that lazy partner holding the stadia board right behind a tree, and then the helpful station master saves the instrument two seconds before the train roars up to the depot. On the trip to Baraboo someone always takes a traveling man's suitcase from the pile in the vestibule by mistake, and later on the unfortunate drummer finds a suitcase full of pants (to be pressed) or shoes (to be hob-nailed) in place of his own bag. Also, half the gang hide on the back end of the train on the return trip and beat the conductor out of his fare. In the field such accidents as aiming a wicked instrument into a tent or cottage window have been known to occur. The rodmen are always careful to hold the board at all four corners and on the porch posts of a cottage when necessity demands. When lunches are taken along, someone is sure to forget his, and then he comes home to eat for about two hours. Occasionally someone runs dry in the field and then he has to prime himself before he can take a drink. A hot day on a bluff or leveling up the railroad from Merrimac without a drink usually put a fellow into that condition.

The crowd at the surveying camp last summer was unique in several ways. First of all, it was the largest camp ever held, for there were 36 students in the course. Also, the list included men from all four classes. Seniors and juniors who had postponed their attendance on account of war work were at the camp. As usual, most of the soph civils went up, and this year freshmen were allowed to take the course because they had completed the campus surveys, due to the rapid S. A. T. C.

schedule. Being composed of more men and more different kinds, the bunch was very active, and the spirit of the camp was excellent. Prof. Smith admits that he never worked with a more willing crowd of students, and he has been with 23 different camps, having built up the present system. We wonder sometimes whether we really were so very good at our work, but the opinion of the summer resorters at the lake was that the Wisconsin engineers were a mighty hard working and hard playing lot.

The 1919 Surveying Camp began with a meeting in the Engineering Building at 8 A. M. on Friday, June 20th. Preliminary announcements were made. Henry Ford was made student chief engineer of the camp, with Willard Seder as assistant chief. Prof. Smith announced that Herb Glaettli, '19, and W. J. Rheingans and C. A. Wiepking, both '20, would be his instructional staff. After the meeting the gang began the work of loading a long list of heavy and impressive boxes and piles of interesting equipment onto university trucks which hauled the material to the baggage car. Everyone was rather inquisitive as to the contents of the packages, but the prospect of an early and thorough acquaintance with all of the material prevented the desires from mounting too high.

The crowd met again at one o'clock at the Northwestern station, ready to board a private coach. However, there was a slip somewhere, and the Minneapolis train had to wait for half an hour until the switch engine could chase up the promised car. After the coach was hooked up, the trip began, and soon a higher spirit of impatience took hold of the bunch. However, in an hour we were crossing the Wisconsin River at Merrimac, and then the train rounded the big loop and climbed up alongside of the "Nose" of South Bluff to the station.

Taking a preliminary look at the scenery while the switch engine unhooked the baggage car, we were thrilled by the height of the bluffs, brilliant and clear in the bright sunlight, showing lonely pines growing on the steep slope of reddish stones. Turning our eyes to the west we saw the anticipated lake reflecting the shadow of another bluff through scattered trees. Before we had time enough to see it clearly, the baggage car was waiting at the hotel grounds, and then began another siege of toil. Some of the material, namely tents and camp outfits, were taken to the

camp site near the lake. The instruments were hauled to a store room near the hotel. All of the fellows worked with a vim, and at supper time "Langdon Street," lined on both sides by tents, was completed.

Langdon Street has always been the main street of the campus at Devil's Lake. Campus? Yes, that's what we called it, and it witnessed most of the scenes usual to university grounds. There were parades and fights—even an occasional rush. In fact, there was a rush every meal time. Lake parties, too, for the late sleeper, disrespecting reveille, was sure to be swung off of the "Varsity Pier" with the usual: One, two, three—splash! The "Well, well, well" was there, too, for one night half the crowd acted as the "law school", and then all of the yells were exchanged for the benefit of a delighted crowd of observers. "St. Pat" and all of the famous engineer's songs were sung with plenty of pep, even if there were no concrete steps to stand on. There was also a field day, and races around the tents and boxing and wrestling matches were held. Athletic matches were frequent, and during odd moments the sledge hammer head would do nicely for shot putting, and broad jumping, tumbling, tennis, and baseball came in for a slice of the spare time.

There were, also, a number of mixers at the north end of the lake, but they were of the "All-American" variety. Any occasion was a mixer for the progressive young engineers. More worthy social events were the annual Engineer's Dance, at the dining hall; the Dells trip, and the camp fire party. The dance was held on the night of July 12, and it was a great success, for the boys and their guests alike reported the best time ever. Prof. and Mrs. Smith were the chaperones. The Dells trip was held on July 4th, practically all of the fellows taking this opportunity to see the wonders of the Potsdam limestone and the Wisconsin River. A launch trip, the jumping of Stand Rock, the tipping of the waiters at the hotel, and the inspecting of the Kilbourn power plant were features of the trip.

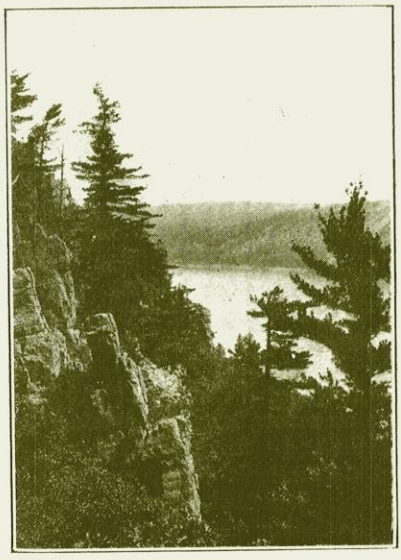
Just now we think again of some stunts that occurred the night of the grand dance. It was a brilliant moonlight night, and there was as much joy outside of the hall as inside. After everybody had about done up the admiring of the moon and the silvery sheen of the rock masses towering overhead, Walt started on a little excursion between dances (not alone, you understand)

and he found the wine cellar. The discovery caused some excitement, but since the cellar was dry, the party was saved. Walt did his best to make the situation funny, so he told us why it is that "Highpockets" is always dry—not because of the empty cellar, but: "Man is made of dust, which explains why some men are always dry". Later that night there was a riot in the Wellington Hotel at Baraboo. Three of the fellows, having taken their partners home on the one o'clock train, were waiting in the lobby for a flivver to take them back to the lake. The three shipwrecked sailors sat in as many soft and stately chairs. Soon all were dozing, for it was not long before dawn. The one named Al broke the silence first; he had one leg hoisted on the other knee, and when he relaxed in the first few winks of a perfectly good dream, his leg slipped, and his heavy foot came down onto the floor with a bang that woke the sleepers in the hotel and frightened the wits out of the dozing trio. As soon as they woke up enough to do it, and yet before the echo of the bang had died down, they had fled to the street. Soon the expected flivver arrived, and the ride home was a real exciting one. The auto passed just behind a passenger train at the first crossing on the way to the lake, and beat the same train by a few seconds at the next crossing, three miles down the track. Some Ride!

Now back to our outline and a discussion of the campfire party. The farewell campfire is a traditional event, and it is held on the night before departure from the lake. The "chateau" or instructor's cottage was the scene of the big fest this year. A huge fire was lighted on the shore of the lake just after dusk, and the entire camp gathered around it for a final review of all of the songs, and for stories by members of the party. As usual, snake stories predominated this year, for Prof. Smith led the program by telling about some grewsome encounters in the southwestern deserts. Those tales, and the one in which Lenny, in his early days as a surveyor, fell over a cliff and saved himself by hanging onto the leg of his transit, and then crawled up and found that "the bubble had never moved a hair" are always the lead-off stories, because any story will do after that. A feed of sandwiches, doughnuts, and coffee followed the stories, and then the party quieted down into a romantic crowd gazing into the dying embers, thinking back to all of the experiences at the

camp, and really beginning to feel sorry that the morrow would be the day of departure.

Unofficial events succeeding the camp fire were, as we have since found out, free launch rides and a serenading party at the north end of the lake. The next morning the camp arose at 5 o'clock, or had stayed up all night, and then all of the equipment was packed and loaded onto the baggage car. Shortly after eight o'clock it was time to say farewell to the friends we had met at the lake; most of them were at the depot to see us off, and yet they were anxious to have us stay. The hotel proprietor felt that way in particular. However, the bluffs soon rolled to us the echo of the approaching train, and a few minutes later the locomotive appeared around the base of East Bluff. An hour later a brown and khaki band of adventurers swept upon the peaceful city of Madison, creating quite a bit of interest as they scraped along the sidewalk with their heavy hob-nailed boots. One hour more, and every last tent, box, tripod, instrument case, level rod, stadia board, chair, cot, and water bucket had been packed into its proper store-room place. The fellows were loyal to the finish and all 40 of the party were there when the last word, "all done", was given; they were there for a last glad hand, and then departed in 40 different directions.



DEVIL'S LAKE
It will linger long in our memories

OWAISSA

The Legend of the Bird Mound at Devil's Lake

By MARJORIE C. CORTIS

Pretty Indian maid, Owaissa
Laughing lightly as the waters,
Gay and happy as the Bluebird,
Singing sweetly as Opee-chee,
Wandered from the lake at twilight,
From the broad and grassy valley,
High among the hills at twilight,
When the Iroquois were slumbering,
Slipped among the rocks and boulders.

Suddenly she stopped her singing,
Listened as a dried leaf crackled,
At the press of stealthy footsteps,
Then against the evening sky light
Was the figure of a warrior,
On his head a crimson feather,
On his shoulder, bows and arrows,
In his heart a bitter anger,
While his eyes glowed dark with vengeance
He, a Chippewa, had come then,
For revenge upon her tribesmen,
From his land of peace and plenty,
To obtain the scalp of Cheeta,
Father of the maid Owaissa.

This she knew, and fear gripped sinews.
Muscles taut, she turned and faced him.
Spoke, and low! Her voice became then,
Cold as moonlight on the waters.
She, to save her father, stood there.
Long the warrior stood, astonished,
Seeing, hearing, unbelieving,
Thinking her an apparition,
While her call rang thru' the valley,
Rousing all the camp to action.

Then from out the warrior's quiver
Came an arrow, long and shining.
Straight and swift unto its target
Sped the Indian's deadly weapon.
And asleep on lowly mosses,
Lay the Indian maid, Owaissa,

Where her lover came and found her,
And his heart was torn with anguish.
In his eyes glowed fierce resentment,
That this lovely maid should lie there
Cold and still upon the mosses.

In the woods he saw the Indian
Fast retreating thru' the pine trees,
Thru' the tall and stately pine trees,
Thru' the sweetly scented forest.
Him he followed while the moonlight,
Bathed the hills in chilly splendor.
And at morn, the sun rose darkly,
On the saddened warrior lover.
In his hand there gleamed a feather,
Bright and red, the strangers feather.
In his belt, a dripping scalplock
Told the outcome of his mission.

Then upon the grassy lake shore,
Where the sun smiled first at morning,
Gently lay the sweet Owaissa,
In her hair the flaming feather
Of the Stranger Eagle warrior.

O'er her grave her Indian lover,
Shaped with soil a spreading Eagle,
So to tell all generations
Of the bravery of this maiden.

THE GAME WITH MARQUETTE

Under a beautiful October sky, we trimmed Marquette neatly, 13 to 0, in a real battle. It was the first game between these two Wisconsin institutions in many years and our visitors came with the intention of giving us a beating. They had good reason for their confidence for they have a real football team. They carried the fight to us for most of the game and showed up our weak line. Quarterback Davey lacked the snap of the week before and our attack was weak. Weston, at end, was the bright light of the game for Wisconsin, and was largely responsible by his deadly tackling, in keeping us out of a hole. Meyers at the other end showed class. Marquette lost ground on every attempt to run the end and quickly learned to direct her attack at the weak center.

A NEW METHOD OF INSTALLING UNDERGROUND PIPE LINES

By JOHN C. WHITE,

State Power Plant Engineer, Wisconsin.

Underground pipe lines for the distribution of steam or hot water for heating buildings or for other use should be installed with greater care than those located in tunnels or basements where they are accessible for inspection and repairs. Being buried in the ground, they are subjected to unusual influences, and their condition is often unknown until total failure makes it necessary to dig up the entire line. This generally happens in cold weather, when the demand for service is most imperative and the inconvenience and expense are greatest.

Such installations, in order to give the best service at the least cost, should embody the following features:—

(a) Correct design of piping and construction suitable to the conditions encountered.

(b) The pipes should be protected by a conduit not easily displaced nor broken, and one that is not affected by the temperatures to which it is subjected nor by the character of the soil in which it is laid.

(c) The pipes should be so anchored and supported that their position is assured and that freedom of movement under temperature changes is ample.

(d) Steam and hot water lines should be so insulated that the heat loss is reduced to the economical minimum, and the insulation should be so applied that it will not be displaced by the movement of the pipes under temperature changes.

(e) Drainage should be such that the pipes are always protected from water, either dripping from above or rising about them, and it should be possible to determine their condition at any time by inspection at manholes or outlets.

(f) The arrangement of the pipes in the conduit should be such that any one of the lines may be removed and replaced without disturbing the others. It is desirable also that a renewal can be accomplished by releasing at anchors and connecting points and uncovering only such length

of the conduit as may be necessary to permit withdrawal and replacement.

(g) Steam pipes should be so pitched and drained that they are always free from water.

The State of Wisconsin has installations of almost every type of pipe conduit that has been devised, and none of those as yet tried out has met the above requirements in a satisfactory manner. As a result of this experience the Department of Engineering worked out a method of installing such lines that has so far proven satisfactory.

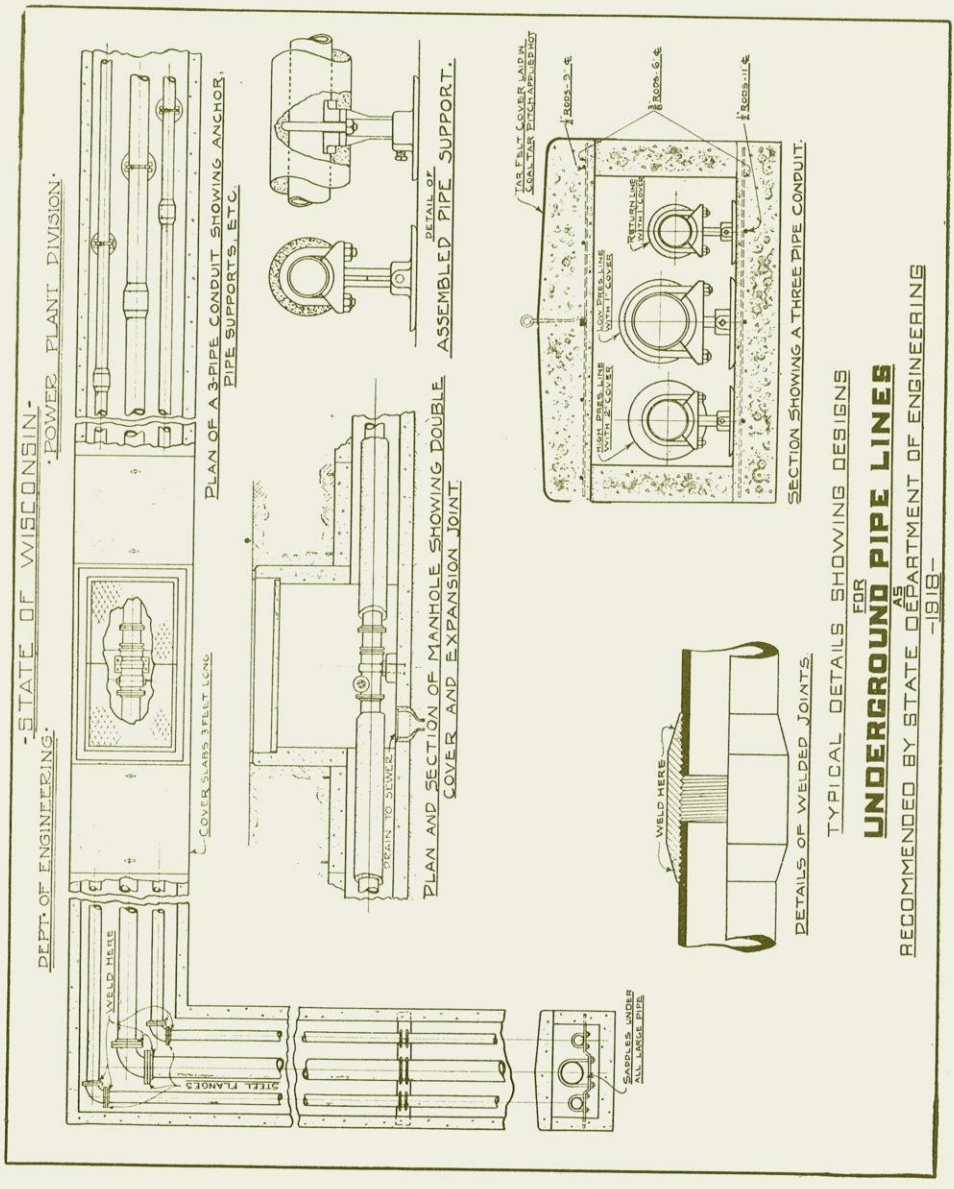
The conduit is made of concrete, of such size as may be required to accommodate the number of pipe lines, and reinforced as necessary. The bottom slab is laid to grade for any section and is trowelled smooth. The sides are next poured, and the work of installing the pipes may be started as soon as the forms may be safely removed. The cover slabs may be molded while the work of installing pipes is going on. These are generally made in three foot lengths bedded in lime mortar. The top of the conduit is covered with a waterproof material such as tar felt before backfilling the trench.

Anchorage is so arranged that the pipes are permanently held in place at anchor points and expansion is taken either at the bends or by expansion joints. The supports are clamped to the pipes and move with them. They consist of a saddle clamp adapted to engage a round shoe which slides on the floor of the conduit as the pipes move under changes of temperature. Rollers are not used.

Insulation is applied as for exposed work and it is not subjected to mechanical injury nor to the action of water.

Drainage is provided for by making the conduit as nearly water-proof as possible and then conducting such water as does find its way into the conduit to drainage outlets at manholes or openings into the buildings. This water flows along the bottom of the conduit, each section of which is graded for that purpose, and by inspection at the drainage points the condition of the lines so far as water is concerned may be determined. Underdrains are not used.

By arranging the pipes in a horizontal plane either line can be removed and replaced by disconnecting at anchors and connect-


-STATE OF WISCONSIN-
DEPT. OF ENGINEERING
POWER PLANT DIVISION
PLAN OF A 3-PIPE CONDUIT SHOWING ANCHOR, PIPE SUPPORTS, ETC.
DETAIL OF ASSEMBLED PIPE SUPPORT.
PLAN AND SECTION OF MANHOLE SHOWING DOUBLE COVER AND EXPANSION JOINT
SECTION SHOWING A THREE PIPE CONDUIT
DETAILS OF WELDED JOINTS
TYPICAL DETAILS SHOWING DESIGNS FOR
UNDERGROUND PIPE LINES
AS RECOMMENDED BY STATE DEPARTMENT OF ENGINEERING
-1918-

ing points, and uncovering a sufficient length of the trench to permit withdrawal of the section. A line should be attached to the section before it is withdrawn for use in pulling in the new pipe.

Where steel or wrought iron pipe is used, the joints are made up with couplings and the backs of the couplings are then welded up until the section of the pipe that has been cut away by the threading process is built up to the original section of the pipe. The joint is thus equal to the solid pipe in thickness and it is sealed against that leakage which is so persistent a cause of failure in the ordinary construction. Cast iron flanged pipe may be used for low pressure steam or hot water lines. Lead joints can not be used where temperatures change to an appreciable extent.

The illustrations will make clear the essential features of the method without further explanation. The first line was installed about two years ago. It is carrying high pressure steam and there has so far been no trouble of any sort.

PLY-WOOD

Milk and animal blood have come to play an important part in engineering. Both of these materials are used in preparing the glues which are used in the manufacture of ply-wood. This new material obtained its prominence during the war when it was used extensively in the manufacture of airplanes. The bodies of planes required large sheets of some light material which would not be affected by weather and ply-wood, which consists of veneer glued together, answered the requirements. Various properties of ply-wood may be obtained by using different numbers of layers, different thicknesses, and different kinds of wood. The disadvantage of all woods, namely the low shearing strength parallel to the grain, is overcome in ply-wood by placing the sheets of veneer so that the grain of one sheet is at right angles to the grain of the sheet beneath it. The use of ply-wood is a step toward the economical use of our forest products. It promises to become important as a material of construction. H. G.

RECENT DEVELOPMENTS IN THE MANUFACTURE OF NON-INFLAMMABLE BALLOON GASES*

By WILLARD B. BELLACK, m '19

The development of the balloon and especially of the dirigible balloon has always been hampered by the necessity of using an inflammable gas to obtain the necessary lifting power. Non-inflammable gases were known, but they were all so expensive that they were impractical even though the lifting power was great enough to make their use possible. The only inert gas which was considered in connection with airships was helium, and the cost of obtaining it was about $6,000 per 1,000 cubic feet, which made its use impractical. During the latter part of the Great War the United States government developed a process for manufacturing helium in commercial quantities and at a cost which revives the interest in the lighter than air machine.

Helium was first discovered in the sun by Lockyer in 1868. In 1895, Ramsay separated it while working with clevite. Since then it has been obtained from the ores of radium, thorium and uranium. It was also found in small quantities in some of the earth waters. Helium is the lightest of the inert gases, being next to hydrogen among the elements. It has a molecular weight of 4.26 as against 2.016 for hydrogen. The molecular weight of air is approximately 28.8. This figure changes, depending on the amount of water vapor present in the air. The lifting power of helium in comparison with that of hydrogen may then be computed:

$$\frac{28.8 - 4.26}{28.8 - 2.016} = .918 \text{ or } 91.8\%$$

Then 1,000 cubic feet of hydrogen will lift 71 pounds while an equal quantity of helium will lift only 65 pounds. This is a very favorable comparison and makes helium a perfectly practical filler for a dirigible or a ballon as far as lifting power is concerned. The other gaseous elements, neon, argon, xenon, krypton, and nitrogen, have such high molecular weights that they would have no lifting power. Helium, therefore, is the only non-inflammable gas which can be used for dirigibles.

*This essay was presented to Pi Tau Sigma in accordance with the initiation requirements of 1919.

Before the war started the United States government made an investigation of the constituents of the natural gas of Kansas, Oklamhoma and Texas. About 1% of helium was found in this gas. There was no way of separating the helium from the other gases for commercial use at that time, but during the war a process was perfected and a small plant constructed. It was found that the plant was entirely practical, and there was such a great demand for helium that the government gave contracts and the right to use the process to two liquid air manufacturing companies. Much of the machinery and equipment in the liquid air plants could be used in the new process and in this way a considerable amount of helium was obtained and used by the government under the name of argon. It was shipped to Europe and a certain amount of it was used in the air craft of the allies.

One of the liquid air plants obtained the best results and has been granted a contract by the Navy for their entire output. This concern is erecting a $2,000,000 plant at Fort Worth, Texas. The plant will be given over entirely to the production of helium for the Navy of the United States.

The method of obtaining the helium is controlled by the government and no statements concerning it are allowed. The general opinion is that it is a liquifaction process in which the boiling point of the helium is made use of to distill it off from the gas after the gas has been liquified. The boiling point of helium is 448.6 degrees below zero Fahrenheit.

The cost of producing the helium by the new process is about $100 per thousand cubic feet. This is remarkably cheap when compared with $6,000 for the same amount, the cost when prepared from the ores of radium and thorium. If there is a demand, it is quite probable that the cost will drop still lower, due to increased production and better methods. In this case helium may sell for $60 or $70 per thousand cubic feet within the next few years. It is quite safe to assume that the cost will not drop much below this figure no matter to what extent the production is increased.

The question as to whether the price will ever drop to this figure depends very much on whether or not there will be a great enough demand for helium to warrant quantity production. It would seem at first that helium would solve the problem of the air. It has enough buoyancy to lift the airship. It is

non-inflammable and non-explosive and thus eliminates the greatest danger to the dirigible. It would be easy to place the engine where it would do the greatest good and in that way increase the efficiency of the airship. The danger encountered from static sparks from the envelope would be eliminated, which would make ballons, as well as dirigibles, much safer. The fabric could be made much more easily and cheaply if there were no fire danger.

The dirigible would seem to be the ideal air craft because the danger of falling is very slight. Even if the engines failed, the only thing liable to happen would be that the airship would get off its course until they could be repaired. All repairs could be made in the air and landings would only be necessary when the supply of fuel was exhausted or because some of the passengers wished it. The dirigible would seem to be much better than the airplane in all these respects. The airplane is the faster of [illegible] machines, being able to go twice as fast as the airship. [illegible] airship can go as fast as seventy miles per hour, this [illegible] be an overwhelming advantage. The airplane [illegible] rise much more easily than the dirigible, which makes it more practical for short flights.

The cost of the dirigible is nearly double that of an airplane of equal capacity, even without considering the cost of the gas. As has been mentioned before, helium would cost about $65 per thousand cubic feet at the lowest figure. One thousand cubic feet of gas will lift approximately 65 pounds. Then the cost of the helium would be about one dollar for each pound weight of the machine and contents. The weight of a typical dirigible capable of carrying twenty passengers and the necessary equipment is about nine tons or 18,000 pounds, which means a cost of $18,000 for helium alone. This is more than enough to purchase an airplane capable of carrying the same number of persons comfortably.

The upkeep on an airship of this kind would be enormous because a certain amount of gas leaks through the fabric continually, and it would be necessary to replace the loss. The housing problem would also have to be solved, for an airship of this size is as large as an ocean liner. There is very little danger of breaking anything while the machine is in the air, but on landing it must be handled exactly right or it will be blown along the land and badly damaged.

Nye Bill, which will undoubtedly give opportunity for many students to secure a college education that otherwise could not do so. This legislation will probably increase the enrollment of the University by at least 1,500 students, and the College of Engineering proportionately. But the increased attendance is not confined to the lower classes, as our estimates of probable numbers of juniors and seniors are being greatly exceeded, and these classes will be about as large as at any time in the history of the College. One of the most striking and interesting features connected with the army is the universal desire of the young men to get out as quickly as possible, return to college, and complete their courses. As a result of all these factors, the facilities of the colleges will be taxed to their limit, and to get the most out of the year's work will require steady devotion to duty on the part of everyone.

How different are the conditions now from what they were a year ago! At that time the thought of everyone was on the war and how to bring it to a quick and successful ending. All educational institutions were organized toward this end. Academic work under the S. A. T. C. was conducted purely as a means toward military efficiency. The S. A. T. C. was a failure from the academic standpoint, but this result cannot be considered as an indication of what would have occurred had the war continued. The armistice, signed within a short time after the opening of the University, left the S. A. T. C. without its spirit; nothing but the shell remained. The military objective having disappeared, the University returned to its normal routine as rapidly as possible, and, although the presence of war was sadly evident in the meager numbers in the upper classes, the work of the last two quarters was reasonably satisfactory.

The winning of the war has been our aim for the past two years. Consideration of everything else has been side-tracked. It is very well worth while to ask ourselves at the beginning of this interesting year what are now our aims and ideals. Are they different from what they were in peace days before the war? Has the war caused any changes in the purposes and ideals of engineering education? This is a question for the student as well as for the faculty, but cannot be gone into at length at this time. It is, however, the particular point which I would

THE DEAN GREETS YOU

F. E. TURNEAURE,

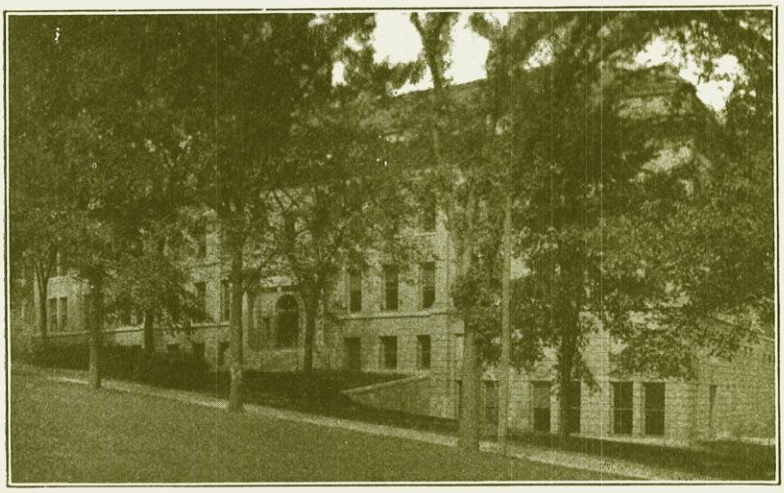
Dean of the College of Engineering

We are off! The pistol has been fired, and the College is starting on its year's work with a rush. The year that lies before us will be one of the most interesting and important in the history of the University. It should likewise be one of the most profitable.

The Engineering College opens with an enrollment of about 1,100 students—approximately double last year's attendance, and the largest in its history. The same thing is true of the University as a whole. The interruption of the steady flow of students from the high schools, caused by the war, has created a good sized pond from which the University is now drawing as well as from the high-school stream direct. Increased attendance at Wisconsin is also brought about by the passage of the

urge the student to consider. The engineer will be a more important factor in industrial life of the country in the future than he has been in the past, and his responsibilities will be greater. Industrial conditions are being discussed in every part of the civilized world. Many changes are taking place, and predictions of still greater changes are freely being made by all sorts of people. It is the duty of every good citizen to inform himself on such matters, and it is the especial duty of those expecting to take part in the management of industries to have the widest possible viewpoint in regard to these things. It is the human element rather than the material element that requires study at this time, and the engineering student should not leave the University without giving serious thought to this problem. The world needs as never before the service of hard-working, devoted men, and the engineering graduate, with his feet planted on a foundation of rational and scientific training, should be prepared to do his full part in the solution of the great problems now involved in our industrial life.

F. E. TURNEAURE, *Dean.*



THE ENGINEERING BUILDING

EDITORIALS

GREETINGS

The *Wisconsin Engineer* begins the new year under the most favorable of conditions. The record breaking enrollment in the college—over 1,000 students—is reflected in the amount and quality of the material that is available for work on our staff and in our long list of subscribers.

W. J. RHEINGANS,
Manager

Allow us to introduce, on the left, WILLIAM J. RHEINGANS, Manager, and, on the right, CHRISTOPHER A. WIEPKING, Editor. Both men are seniors in the engineering course, and members of Tau Beta Pi, the honorary engineering fraternity, and of Triangle, the professional civil engineering fraternity. W. J. Rheingans' home is in Jackson, Wisconsin, and C. A. Wiepking hails from Milwaukee.

C. A. WIEPKING,
Editor

The *Engineer,* like the football team, will be strengthened by the return of the warriors. ED. BLOWNEY, who was editor in 1917–18 and who has been serving in the Navy, has returned as senior in the electrical course, and will be Associate Editor. He is another Tau Beta Pi man. Among others to return are FRANK H. CIRVES and WILLIAM E. ERICKSON, both chemicals.

For the first time in several years positions on our staff are at a premium. However, do not let that fact hold you back if you have ability. If there are any Warrens, Bellacks, or poets like Mantonya among our student body, let them step forth and be identified.

The *Engineer* is again offered at one dollar a year in spite of the advance in the cost of every thing that goes into its makeup. It is going to mean hard and continuous work on the part of the management and it will require the united support of everyone connected with this college if we are to come out ahead of the game at the end of the year.

With war restrictions removed, we are able to secure a better grade of paper for our cover and to resume something of our pre-war appearance. L. F. V.

A FEW HINTS

Get that math. Math is prerequisite to mechanics and mechanics is prerequisite to everything else. Hit that math hard if its the only thing you do.

If you fall behind in your course, try to make up the work in summer school. Summer school is really quite an enjoyable function—see Campus Notes—and the whole world is pleasanter for the man who is even with his course.

When the textbook seems obscure and you have trouble grasping the big idea, try the experiment of using another textbook on the side. You will get a new slant at the subject for no two writers will present the matter in exactly the same fashion. When the engineer wants to measure the size of an object or its distance, he lays off a base line and then takes observations on the object from both ends of the base line. Looking at it from one angle only wouldn't be sufficient. If you are in trouble lay off a base line.

As you study the assignment ask yourself the questions you would ask if you were an instructor and then try to answer them in clear, concise language. It will give you a better grasp of the subject and it will result in snappier recitation periods.

You are here to get all you can out of the college and anything that will speed up the work is to your advantage.

HAVE YOU SELECTED YOUR ACTIVITY?

The average student who enters the Engineering College is, or should be, aware of the fact that he is entering a period of hard work. His studies for the first year will convince him of that, and the first few weeks will find the more energetic freshman "bucking" hard and getting a good start in his academic work which is most commendable. The engineer of tomorrow, however, must be more than a mathematical technician; he must have varied interests outside of his own field which will enable him to meet other men in their own spheres. Participation in a few well chosen activities of the University is the best way to develop such an activity. That this is true is shown by examining the questions on application blanks for engineering positions. Scholastic work is a big item, but great importance is also attached to the applicant's participation in athletics, forensics, and other activities. In other words, the prospective employer is asking what kind of an all around man the applicant is. The kind and number of outside activities must be left to the individual to decide; and in this connection it should be remembered that strong interest in a few is better than half-hearted interest in many. W. A. K.

PROFESSOR BEEBE RESIGNS

It is with regret that we learn of the resignation of Professor M. C. Beebe as Professor of Electrical Engineering. Professor Beebe was granted leave of absence in 1917 to enable him to devote his time to war problems in the Research Department of the Western Electric Company. This leave was extended for the year 1918–19, and a short time ago he announced that he wished to resign his position here so as to continue permanently with the Western Electric Company.

Professor Beebe has been connected with the University for many years. Graduating in 1897, he was at once appointed as assistant for one year, and thereafter as instructor in Electrical Engineering from 1898 to 1900. He was then employed by the Nernst Lamp Company at Pittsburg for five years, returning to the University in 1905 as Associate Professor. He was made full Professor in 1908, and has been chairman of the Department of Electrical Engineering since that time until his leave of absence two years ago.

Having been connected with the university for so many years, Professor Beebe was very familiar with the methods and traditions of the college, and was of very great assistance in committee work of all kinds. He was a member of the Athletic Council and was always interested in student activities. For many years he has been a director on the WISCONSIN ENGINEER. He was a member of the Chi Psi fraternity, and always kept in close touch with the student membership of this fraternity.

Professor Beebe is succeeded as Chairman of the Department by Professor Edward Bennett, who has acted in this capacity during Professor Beebe's absence.

THE TECHNICAL MAN'S UNION

We have recently received the first number of Volume 1 of THE TECHNICAL MAN, the official organ of the UNION OF TECHNICAL MEN. This union is affiliated with the A. F. of L. Engineers look upon the unionizing of technical men with mixed sentiments. The engineer has been strongly individual in his tendencies in spite of a somewhat narrow and clannish attitude toward society in general. He instinctively dislikes to make the surrender of personal liberty that must inevitably accompany membership in a union. He resents the galling yoke that he must wear if he is to pull in union harness with the other members of his profession. He dislikes intensely the thought of taking orders from any "walking delegate." On the other hand, he is beginning to realize that so long as he plays a lone hand, he will, in the great majority of cases, be worse off in a material way than he would be if he were part of an organization. Employers, whether they be individuals, organizations, or governmental bodies, will pay only what they have to for any kind of services, and the minimum wage is determined by what the most modest or most self-effacing engineers demand. An instance comes to mind of an engineer employer in the southwest who took advantage of the necessities of his fellow engineers who had been driven to that part of the country on account of their health and had to have work to pay expenses. He was offering such a scant wage to these unfortunates that a friend of his protested and pleaded for a more reasonable amount. "No sir", said the employer, "I can get them for what I offer and that is

all I will pay.'' When engineers treat fellow engineers in that spirit we need not look for more altruistic treatment from others, nor must we be surprised if the men in the lower ranks of the profession seek relief through the most effective channels that present themselves. Some sort of organization seems essential. Of course, it is conceivable that with a superior class of men we might get along without it. If all engineers were industrious, consciencious, and skillful and were worthy of a high wage, if all engineers were self-respecting to a degree that would make them rather suffer the pangs of hunger than accept a niggardly wage, and if all employing engineers had bowels of compassion, then organization might be unnecessary. But since engineers are average human beings, and the average human being is what he is, we cannot depend upon ''ethics'' alone, even though they be of the highest, to accomplish all that is desired for the mass of the profession. Personally we are not keen for the union idea, but we cannot damn it wholeheartedly. Is there a better solution?

THE DEVELOPMENT OF AERONAUTICS IN WISCONSIN

This is a crucial time in the history of aeronautical development in Wisconsin, if we are to share the enormous profits and advantages of the rapidly advancing aerial age. It may be asked how we can best help to further the interests of our state in this respect. There is only one way to do this: give to our manufacturers hearty co-operation and material backing, if needed; show them that we are eager for their success.

The leading aeroplane manufacturer of Wisconsin is Alfred W. Lawson of Milwaukee. Some of his first products were Army training planes, which proved universally successful. Recently he completed a large commercial ship with a carrying capacity of more than two tons. This machine, like his former products, has an unusually high factor of safety. No one has ever been injured in a Lawson plane.

With such a competent pioneer and leader as Mr. Lawson, there is no reason why Wisconsin should not take her place among the foremost states of the Union in the manufacture and profitable utilization of aircraft. G. E. S.

ALUMNI NOTES

By WILLARD A. KATES

The '04 reunion last June brought out quite a number of the old-timers. The list includes Bennett, Bradford, Hanson, Kinne, McEachron, Petura, Saradakis, Tubesing, Van Hagan, and Zimmerman. Of these two had married '04 girls and brought their wives along. Mrs. Bennett was Florence Moffett, and Mrs. Petura was Marie Miller.

WALTER ALEXANDER, m '97, M. E. '98, formerly a major of the Motor Transport Corps, has been appointed chief of the bureau of motor transportation, Wisconsin Highway Commission. The addition of the army transport vehicles to the equipment already owned by the state has given Wisconsin a mechanical equipment which exceeds that of any other commonwealth, making advisable to create a special department for its care, repair, maintenance and distribution.

Those who read *The Flying Cadet* in last April's issue will be sorry to learn that the writer, BOB CONNELLY, c '17, was badly hurt in an aeroplane smash on July 5. He failed to "keep one foot on the ground", as he put it, and was induced to pilot the plane of a Madison woman. At the time of the accident he was making exhibition flights at Watertown and was carrying a passenger. As the machine

BOB CONNELLY'S AIRPLANE

left the ground the passenger fainted and fell against the control lever in such a way that the plane became uncontrollable and crashed. The passenger was painfully but not fatally hurt. Connelly suffered concussion of the brain, a broken knee, five dislocated joints, and innumerable cuts and bruises. For a time his recovery seemed impossible, but he has pulled through and is now able to get around on crutches. His many Wisconsin friends wish him a quick and complete recovery.

On his way home, GROVER C. ALMON, m '17, passed through Madison. He received his discharge from the 108th Engineers on June 8, and is now with the Gisholt Machine Company, of Madison.

A. O. AYRES, e '16, formerly a captain in the 107th Engineers, stopped in Madison June 10. After his discharge from the army on May 27, 1919, he was employed by the Wisconsin Highway Commission.

F. J. BACHELDER, c '15, announces the opening of an office in the Southern Building, Washington, D. C., in addition to his office at 8 South Dearborn St., Chicago, Ill.

R. A. BAXTER, ch '17, writes from Long Branch, N. J., that he is now employed by the Consolidated Gas Co., of New Jersey.

RAY E. BEHRENS, c '19, has been with the Pennsylvania Railroad at Cambridge, Ohio. Lately he took a position with the Sapulpa Refining Co.

WILLARD B. BELLACK, m '19, the man who put the punch in the Campus Notes last year, kicks through with his subscription, which is pretty good for a man who, in this period of H. C. L., contemplates matrimony. Not only does he send in his dollar, but he cheers us up with a few comments upon various topics. We pass it on herewith:

"I have been waiting for many months to write and send you my little dollar for the WISCONSIN ENGINEER, if it hasn't gone up like the price of living; and if it has you will have to send it to me for as long as the dollar lasts and after that perhaps I will be able to find another dollar.

"I am having a perfectly grand time earning my living for myself, and it is almost as exciting to take orders from a superintendent as it was from a prof. Perhaps you remember that I took a position with the James Company manufacturing cow machinery. Strange as it may seem I am still holding it, and, altho cow machinery was what I called it, I have found out that it is mostly *Bull.* After all the eight o'clocks I attended I don't find it very hard to get up for a seven forty-five whistle, and it does seem good not to have to sit down and spend the evening bucking, although perhaps you think I never did that. I assure you I did once.

"I spent last Sunday in Madison and had just a touch of homesickness for the old U. After all I had a pretty good time and am going to miss it a lot. I would surely like to write the Campus Notes this

year although I don't know who in the dickens I would find to hand a line to now that J. G. D. has left for the east and his corner is dominated by Gus Larson. The steam and gas department always did run to the Scandinavian type and I expect they will be much at home this year.

"I am looking forward to the ENGINEER and really feel that I am entitled to one of the buttons I saw the Hydraulic Department sporting yesterday. You will find my address in the corner and you may be sure that Bluff St. is the right place for me for I learned my lesson in that time sometime ago."

The address he mentions is, 309 Bluff St., Fort Atkinson, Wis.

JOHN BERG, c '05, C. E. '10, may now be addressed at Pierre, South Dakota.

BYRON BIRD, C. E. '15, is instructor in civil engineering, Texas A. and M. College, College Station, Texas.

LEONARD F. BOON, c'10, C. E. '12, has resigned from the staff of the Emergency Fleet Corporation to accept a position with the American Chain Company which is constructing a large plant. His address is 139 E. Market St., York, Pa.

GILBERT G. BOTHUM, c '16, visited us this summer. He is stationed at Highwood, Ill., with the North Shore Electric Co.

ELLIS R. BRANDT, m '17, received his discharge from the Signal Corps early in the summer and is now employed in the standardization department of Fairbanks-Morse Company at Beloit.

ALFRED BRILL, c '16, formerly corporal in Co. A, 42nd Engineers, has taken a position with the Newport Chemical Works in Milwaukee.

JOHN BROYLES, c '16, was in Madison for commencement. He is working for the City sewerage Commission of Milwaukee.

R. W. CRETNEY, ex ch '20, has been at West Point, but expects to return soon to continue his college work.

The Wisconsin Highway Commission has recently issued a pamphlet, "*Instructions to Engineers*", data for which was compiled by GORDON F. DAGGETT, former student in civil engineering.

JOHN R. DU PRIEST, at one time instructor in steam and gas and now at Rensselaer Polytechnic Institute, spent the summer in England and the Scandinavian countries investigating Diesel engines.

E. W. FISHER, c '16, recently returned from overseas. He is now in the auto business in Mondovi, his home. Fisher was a 2nd Lieutenant with the Second Engineers, and was last engaged in hydraulic and dock work at Bordeaux.

WILLIAM H. FOWLER, C. E. '16, was married on June 17 to Violet Lee Baker of Norwalk, Ohio.

FRED GERHARDT, former student in civil engineering, is 3rd assistant engineer on the S. S. Afel, bound for Rotterdam. He intimates that he has recently committed matrimony but we have no details. Gerhardt is one of our regular subscribers and one of the principle sports of our circulation manager is keeping track of his movements so that we can get his copy to him regularly.

HERB GLAETTLI, c '19, is working for the Worden-Allen Co. on construction work in Milwaukee.

JOHN GLAETTLI, c '09, recently presented a paper on "Some Problems in the Design of Concrete Ships" before the American Concrete Institute. A portion of the paper is reprinted in the Engineering News-Record of August 7. Glaettli is at present working at the San Diego plant of the Emergency Fleet Corporation.

EUGENE L. GRANT, c '17, has rejoined the U. S. Geological Survey since his discharge from the Navy. He is making a study of the flow of Kansas streams. His address is 25 Federal Bldg., Topeka, Kansas.

DONALD S. GRENFELL, ch '14, visited the campus August 29. He had just returned from nine months' service abroad, and expected to return to his former position with the M. P. Z. Co., at Depue, Ill.

J. W. GRISWOLD, m '13, visited the University this summer. He is with Henry L. Doherty and Co., industrial heating department, Toledo, O., as Experimental Engineer.

HENRY GUMPRECHT, c '18, who was in charge of a party of topographers at Yellow Creek, N. C., has commenced operating a farm near Baraboo.

MOOSE HANSON, c '19, is working for the Worden Allen Company of Milwaukee, which is putting up a new plant for the Fuller & Johnson Company at Madison.

CARL HAMBUECHEN, e '99, has been appointed manager of factory G of the American Carbon and Battery Co., at East St. Louis.

CARL HENKEL, c '17, corporal Co. F, 313th Engineers, is engaged on road construction work in France.

HARRY HERSH, former business manager of the WISCONSIN ENGINEER, visited the campus this summer. Mr. Hersh is Sales Manager for the Milwaukee Electric Railway and Light Co.

E. S. HERRIED, m '15, was in Madison the last of August. He was recovering from an operation for appendicitis, and expected to return to his position with J. T. Ryerson and Sons, Chicago.

J. U. HEUSER, e '16, is Sales Manager for the Cutler Hammer Co., with an office in the Peoples Gas Bldg., Chicago, Ill.

S. C. HOLLISTER, c '16, was married to Miss Ada Garber, L and S '16, on June 2, 1919.

LIEUT. W. T. HOPKINS, '13, is still in the Navy, being stationed at Brest, France.

E. E. HUNNER, c '00, C. E. '07, Manager, Iron Mines for M. A. Hanna & Co., at Duluth underwent an operation during the summer that left him in a serious condition. He is expected to recover.

ROBERT C. JOHNSON, c '17, son of our former Dean, is back from Archangel where he served as lieutenant in the Engineers, and is now draftsman for the Corrugated Bar Co., of Chicago.

WILLIAM JOHNSON, c '17, isassistant to the City Engineer of Janesville, Wis.

L. A. KIRCH, c '18, who was an instructor in surveying last year, is now with the Oliver Iron Mining Co. at Eveleth, Minn.

MAC. LAKE, Min. '14, visited Madison the forepart of the month. He is a geologist with the Mark anna Iron Ore Co., his office being in Cleevland, Ohio.

R. K. LANE, m '17, received his discharge from military service, and stopped in Madison the early part of August. He was in the Field Artillery, and saw active service with the 10th French Army.

DR. FRED V. LARKIN, g '06, M. E. '15, for the past four years assistant superintendent of the Harrisburg Pipe and Pipe Bending Co., has been appointed professor of mechanical engineering and head of the department at Lehigh University.

KUH TSEN LIU, c '19, sailed for China September 9. He had planned to stay in this country for another year in order to get some practical engineering experience, but was called home suddenly.

PROF. CHARLES A. MANN, ch '09, is teaching at the School of Chemistry, University of Minnesota.

J. R. MC ATEER, c '18, is with the Illinois Highway Commission.

W. C. MACKEY, ch '17, was in Madison for commencement. He began his war services at the Forest Products Laboratory, then became an inspector in the Air Service, and later enlisted in the Navy, being commissioned an ensign. He received his discharge shortly before his visit to Madison.

H. F. MIELENZ, c '17, is in the office of the City Engineer of Beloit.

L. R. MORRIS, c '14, has left the service of the Forest Products Laboratory, at Madison, and is now in charge of the box testing laboratory of the Chicago Mill and Lumber Co. The general offices of the company are in the Conway Building, Chicago.

LOUIS F. NELSON, c '16, is with the Paul F. Kalman Co. as Designing Engineer. His address is Y. M. C. A., Milwaukee.

CARL R. OESTREICH, c '17, writes the usual breezy letter from Canton, Ohio, where he is working in the engineering department of the Berger Mfg. Co., makers of metal lumber. He is planning a visit to Madison for the Home Coming Game.

RUFUS B. PEARCE, c '17, captain, 310th Engineers, was recently discharged at Camp Custer. Captain Pearce received his commission in May, 1917, and shortly after the competion of his training period was sent to France, where he was in the thick of things. He visited the University in July, and is at home in Richland, Tex., at present.

RAY A. PHELPS, c '16, is Sales Engineer with the Davis-Hansen Company, an Oshkosh concern that manufactures air-lift pumps.

We are informed that S. H. PHINNEY, c '14, is now with the Municipal Research Bureau at New York City. He went to New York in January 1919, after two years with the Research Bureau at Philadelphia.

CHARLES J. POPELKA, former student in civil engineering, was in Madison August 26. He was 1st Lieut. and Camp Engineer at Camp Coetquidan, France, where he had considerable experience in road-building. On August 3 he was married at Washington, D. C., to Annette Novak of Burlington, Wisconsin.

R. E. PUERNER, m '19, is with the Milwaukee Electric Railway and Light Company.

JAMES A. SCHAD, c '16, writes that since May 1 he has been in the Continuous Service Department of the American Appraisal Co., at Milwaukee, doing engineering and accounting work.

E. H. SCHWARTZ, min '18, is at Gary, Ind., working as a metallurgist with the Illinois Steel Co.

C. M. SCUDDER, c '11, C. E. '12, is at present at Marinette, Wisconsin.

After 16 months' service in the signal corps in France, E. K. SMITH, c '14, returned to his position of Assistant City Engineer at Beloit.

ENSIGN P. H. SMITH, c '18, visited Madison recently while waiting to take charge of a 110-foot sub-chaser. He has been piloting smaller craft from Detroit to the Atlantic.

ROBERT M. SMITH, c '13, is Assistant City Engineer of Kenosha.

J. W. TANGHE, c '16, has been released from service and has returned to his position with the Johns-Manville Co., at Milwaukee. Mr. Tanghe went to France in November, 1917, returned to work in a mustard oil plant for the Chemical Warfare Service, and returned to France in August, 1918.

WALTER S. TODD, c '15, was released from the army and is back in the bridge office of the Division of Highways, at Springfield, Ill.

T. UTEGAARD, c '17, is in the office of the chief engineer of the St. Joseph Stockyards Co. His address is 2614 Folsom St., St. Joseph, Missouri.

REX VERNON, c '18, is working with the Wisconsin State Highway Commission, as one of their field engineers.

The marriage of WARREN WEAVER, c '16, to Miss Mary Hemenway of Carlsbad, N. M., took place on Sept. 1. Mr. and Mrs. Weaver will live at Pasadena, Cal., where Mr. Weaver will be mathematics instructor at Throop College.

C. R. WEIDNER, former instructor in hydraulics, is now civil engineer for the Prairie Pipe Line Co., Independence, Kan. Mr. Weidner visited the University this summer.

E. O. WERBA, min '19, has been employed by the Grand Rapids Gas and Coke Company, at Grand Rapids, Mich.

Word has been received of the appointment of S. D. WONDERS, c '13, as assistant office manager of the Firestone Tire and Rubber Co., Akron, O.

Lieut. RAYMOND WOOD, e '17, 135th Aero Squadron, returned from overseas May 6, but has not yet been discharged.

L. P. WORKS, e '19, is taking the Central Station Institute course, and is employed by the Commonwealth Edison Co., construction department.

JAMES G. ZIMMERMAN, e '04, E. E. '15, has charge of the instruction in ignition equipment at the Ambu Engineering Institute, Chicago, Illinois.

CAMPUS NOTES

By WILSON D. TRUEBLOOD

Erin Go Braugh.

With all the Engineers decorated with the shamrock button and all frosh a wearin' o' the green, it looks as though we were a section of the new Sinn Fein republic.

Sorry, Frosh, that tradition will not permit you to join the crowd on the steps. But keep your ears open and, when your time comes you will have a full repertoire of our famous songs.

The ENGINEER is thinking about getting out an edition of the songs this year for your benefit.

About here we ought to have an illustration. Cast your eye over the picture below and you will learn why our revered engineering profs like so well to teach in summer school. When you think about it, summer school isn't such a bad idea at that. A great deal can be accomplished in six weeks.

THE FACULTY PIER

THE MATERIAL ADVANTAGE OF EDUCATION

The most valuable result of right education is the broadening, deepening, and refining of human life. It is the purpose of this article to present in some tangible form the definite ways in which education promotes industrial efficiency and increases material wealth.

With no schooling, out of 5,000,000 American men, only 31 attained distinction. With elementary schooling, of 33,000,000, 808 obtained distinction. With college education, out of 1,000,000, there were 5,768 who obtained distinction.

Less than one per cent of American men are college graduates, yet this small percentage has furnished:

50 percent of our presidents
36 percent of the members of Congress
47 percent of the Speakers of the House
54 percent of the Vice-Presidents
62 percent of the Secretaries of State
50 percent of the Secretaries of Treasury
69 percent of the Justices of the Supreme Court
50 percent of the men composing the Constitutional Convention were college bred.

Salaries in the New York Bridge Department show that positions demanding only reading, writing, and arithmetic paid $982 per year; those positions demanding high school and commercial courses paid $1729; while the positions demanding technical or college education paid $2400 and upward.

The remarkable results of education in the United States can not be attributed to racial or climatic differences, for in a like manner, in Denmark, in Scotland, and in Switzerland, where there is adequate provision for education, there follow great industrial efficiency and national wealth. On the other hand in Spain, in Russia, in Turkey, in Mexico, whenever there is lack of the necessary school system, there is the same story of poverty, revolution, and misery, regardless of race, climate, or abundance of natural resources. *Abstract from Lefax.*

We beg to emphasize that little phrase in the Frosh Bible which says, "Get a green cap and wear it with *dignity.*" What do you mean, dignity?

The enrollment of students in the Mining course has been greatly enlarged by a number of men entering as Sophomores and Juniors from other institutions. The Mining Club, too, is very popular. Seems that the fame of the tasty Club "feeds" has travelled far.

YE STAFF BLOWOUT

As a fitting finale to a most successful year, the management entertained the Staff at dinner at the Capitol Cafe, Thursday evening, June 5. After the eats, the party took in the first show at the Orph.

WALTER A. EMANUEL, senior mining engineer, and RALPH F. SPETZ, soph civil, were elected last June to Star and Arrow, the honorary athletic fraternity. Emanuel made his mark in baseball and Spetz on the cinder path.

From governing the engineering college to driving a mule is only a short step for Dean Phillips. During the past summer he was one of a party to take a mule trip through the Yosemite Valley—that is, the mules carried the packs and the men did the walking, about three hundred miles altogether.

What do you know? We found Prof. McCaffery breezing around Green Bay in that yacht of his this summer. Prof was puffing away on the old jimmy pipe while one of the kids smeared a new coat of white-wash on the decks. Pretty soft, eh? Who said mining engineers led a hard life?

ROSS W. ROGERS, junior electrical, is president of the Y. M. C. A. this year. It runs in the family. His older brother was also president of the Y. M. C. A. and his sister was similarly honored by the Y. W. C. A.

The following men were elected to Tau Beta Pi last spring: R. E. Hamilton, E. E.; R. E. Hantzsch, E. E.; E. A. Kerler, E. E.; R. R. Knoerr, E. E.; D. R. Lamont, E. E.; D. W. Nelson, M. E.; W. J. Rheingans, C. E.; R. C. Siegel, E. E.; C. A. Wiepking, C. E.

The Blast Furnace and Steel Plant for May carries the first of a series of three articles by PROF. R. S. MCCAFFERY on the duplex process of smelting iron ore.

Robert W. Hunt, of Chicago, spoke before the students of this college on June 10 upon the development of the steel rail.

SEIZE HIM SCOUTS!

It is reported, upon reliable authority, that BIRNEY L. MILLER, mining soph, is taking junior English this semester.

Try on a gas mask! The Mining Department has made arrangements for a visit of the Mine Rescue Car No. 10 from the Houghton district. The car has a complete outfit for use in case of mine accidents, and is under the charge of Foreman Miner Sporle. Mr. Sporle and his staff are conducting a class in Mine rescue work for Mining seniors, and a class in first-aid work which is being generally attended by Mining students. Everyone interested is invited to attend the lectures and to inspect the car.

The Mining Department has also arranged a series of talks to be given throughout the year by Engineers connected with various Powder and Mining machinery companies. Among the companies to be represented are: The Bucyrus Co., Ingersoll-Rand Co., Denver Rock Drill Co. and the Dupont Powder Co. These talks will be open to all students in the Engineering college, and it is hoped that many will attend.

The football season opened well on October 4 when 3,500 students saw Ripon defeated 37 to 0. Ripon put up a stiffer defense than the score would indicate and, during the early periods, had a healthy punch when on offensive, but the Wisconsin machine began to function well after the first few plays and the size of the score was the only thing in doubt. Naturally some raw spots appeared in our work; but on the whole the showing was excellent, and we can feel assured of a team that will represent the institution in a worthy manner. Engineers were especially interested in the work of Paulie Meyers at end. Meyers, who has been two years in the aviation service, will be a senior in the chemical engineering course this year.

Some amateur football fans have been breaking into public print lately with their infantile records. Let us introduce you to the real record holder—Professor Bill Kinne. When Prof. Kinne handed in his pasteboard at the Ripon game it made the twentieth consecutive opening game that he has attended. In 1900 he attended his first game as a frosh and since that time he has never missed a home game when he has been in town, and he has taken in a goodly number of out-of-town games. If you ever want to know about past performance, ask him. He has the dope.

We are glad to announce that our happy friend, Malt Basin (a second cousin of Walt Mason), has poured forth his soul in an appeal to the Alumni. The following prose poem of his is being mailed to all the old-timers who are not subscribers. If it strikes the old boys the way it strikes us, our subscription list will bat 100 percent and with the Cincy Reds we will enjoy a long and prosperous winter.

THE COLLEGE MAGAZINE

The world is full of magazines—I tumble for them all; the postman opens wide my door and piles them in the hall. I stumble over Rustic Life when I start off at morn and wipe my feet at evening on the Bolshevistic Thorn. I cannot read the printed stream that riots through my door for I'm too busy striving to increase my world store. I haven't time to masticate this mass of printers' ink, and if I tried to read it all I'd have no time to think. I amble gently on my way and let the flood roll by, but now and then a sparkling sheet attracts my eagle eye. I fish it out and open it and bless old Cadmus then, for he has made it possible to print the thoughts of men. And first among these choicest ones I count the magazine that comes to me with college news that keeps my memories green. The college journal that the boys so gravely labor o'er. They have my full comprendez vous,—I too have done that chore. I labored early, labored late and drained my thinkpot dry to get December's issue out e'er June exams rolled by. I wrestled with our students who were frozen to their pelf and pleaded with alumni who were centered all in self. I rustled ads around the town until the merchants there arose in righteous self defense and

chased me off the square. And when I thought I had a bone hid in our treasury, the printer sent a billet due and took that bone from me. I thought my efforts would exalt my alma mater dear. Perhaps so, but the profs took stock and conned me out that year. I think of those old college days as each fall rolls around and when they ask me to subscribe I'm eager as a hound. I send that measly dollar bill akiting on its way. I know I'll get my money's worth and make some young hearts gay. I waste a plenty every year, but one investment pays,—the coin I spend to buy a breath of dear old college days. The host of famous magazines lies piled up on the floor; I tear the wrapper from the little piebald two by four. I read about the happenings upon the campus where I used to hustle up and down with pals and co-eds fair. I read about the old boys first and then those campus notes. I chuckle at the law-stude squibs; we still have got their goats. From A to Iz I read it through, including Eds and Ads, and then I leave a solemn sigh and say, "God bless them lads." You too, my son, will bless them if you'll loosen up your roll and spend one lone simoleon for tonic for your soul.

MALT BASIN.

PROF. RAY OWEN

Prof. R. S. OWEN, better known to the civils as "Ray" Owen, is back with us again. After spending months overseas in the engineer's corps he was finally discharged the first of August with the rank of Major.

H. M. CROTHERS has been relieved of all classes, and, with PROFESSOR BENNET, will carry on a study of "transient" currents and the "steady state" in involved electric circuits or networks. The results of the investigation will be used in a further study of radio telegraphic and telephonic circuits.

The firm of Mead and Seastone, of which PROF. D. W. MEAD of this college is a member, has prepared plans for a heating system that will serve the city high school, the new vocational high school, the city library, and the proposed new city hall.

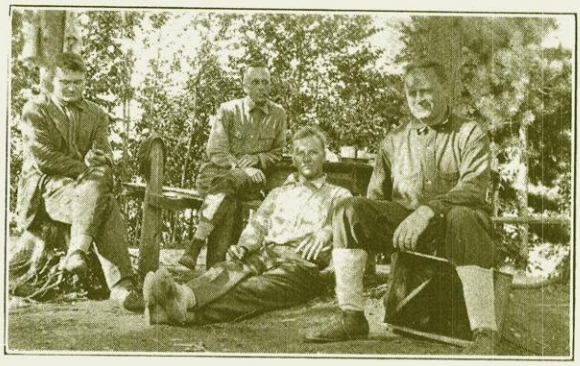
D. R. Lamont and R. R. Knoerr, both senior electricals, are teaching mathematics this year.

Extensive improvements are being made in the Electrical Lab. They include the moving of the stairway, the enclosing of the dynamo room, and the constructing of a new switch board and instrument room. Plans also call for a new shop for Mr. Stephen, the mechanical assistant, fire-proof doors between the shops and the Electrical department, and a new dark room. Valuable electric equipment has been loaned to the department by the government for an indefinite period. This equipment will be used in connection with the R. O. T. C. engineering courses.

RALPH HANTSCH and RICHARD SIEGEL, two senior electricals, are instructing in Physics lab.

The marriage of PROFESSOR A. G. CHRISTIE, formerly of this College, took place in Brooklyn the past summer.

You probably think that our faculty spends the summer vacation in academic research and in getting together that heavy intellectual pabulum which they feed us during the school term. If so, here is evidence to the contrary. Johnny Price, Axel Berggren, and Bus Larson, together with C. M. Larson, c '05. Chief Engineer for the Railroad Commission, spent several weeks in Northern Wisconsin with canoe and rod. Get Gus to tell you about that musky he caught that weight about 40 pounds, how they made chowder of him, and how the four of them ate him at a sitting.



C. M. LARSON, J. R. PRICE, A. BERGGREN, G. LARSON

THE FACULTY ROLL CALL

Professor R. C. Disque of the electrical engineering department has severed all relations with the University of Wisconsin and is now head of the electrical department of Drexel Institute, Philadelphia. E. O. Lange is now assistant professor of electrical engineering in the same institution.

J. E. Wise, editor of the ENGINEER in the year 1915–16, was discharged from the army in February and is now back to assist in the Standards Lab.

Another '16 man to be back with us this year is Harry Pollak. He will assist in the Dynamo Lab.

Professor F. A. Kartak has resigned to become Professor of Electrical Engineering at the Milwaukee School of Engineering.

Professor Shuster, who resigned last spring after many years in the Electrical Department, recently left by auto for his farm in South Dakota. From there he will continue by train to California, where he will make his future residence.

Profesor Beebe has accepted a position with the Western Electric. He will be in the research department, and will have charge of investigating the financial posibilities of inventions and labor-saving devices that are submitted to the company.

J. L. Ellis, a Georgia Tech. graduate in '17, is another new man in the electrical department. Before coming here he was in the Detroit offices of the General Electric Company.

Mr. R. J. Roark, former instructor in Mechanics here, is now

Associate Professor of Mechanics and Hydraulics at Iowa State College. It is only a short time since he was discharged from the army as a captain of artillery.

Professor J. O. Cameron, a graduate from the University of Illinois in '07, will arrive here about October 20th to teach several junior and senior electrical courses. He has had a wide teaching experience, having been an instructor at the University of Pennsylvania, an associate professor at Pennsylvania State College, and an associate professor at the University of Oklahoma.

Mr. E. M. Homer, architectural draughtsman, has left the drawing department to accept a position with the Stark Land Company of Madison.

To take care of the large number of freshmen this year, four new men have been secured to teach elementary drawing. Mr. Edwin Anderson is a graduate of this university; Mr. L. H. Baldwin is a graduate of the University of Illinois; Mr. Werrell has had considerable experience teaching drawing in the Janesville high school; and Mr. Doke has spent the past few years working for Fuller and Johnson, and the Forest Products Laboratory.

Mr. H. T. Dysland, who will assist Mr. Millar in Descriptive Geometry, taught for five years before entering the State Architectural Department.

Charles and Joseph Longfield, two Madison men, will teach in the engineering shops this year. The former will take the place of Mr. Fisher in the machine shop, and the latter the place of Mr. Brunsell in the pattern making department. Both received their preliminary training at this university.

Clint Goude, new assistant in foundry practice, learned the moulding trade at Payton's Foundry here in Madison.

Bert Bridge, formerly employed in the service department ofthe university, is now an assistant mechanic in the engineering shops.

During his leave of absence this year, Professor Callan will be with The Eastern Manufacturing Company of Bangor, Maine.

C. N. Ward, Assistant Professor of Hydraulics, had charge of the survey and layout of fifteen miles of Michigan trunk line

highways during the latter half of the summer. The first weeks were spent on his father's farm near Toledo, Ohio.

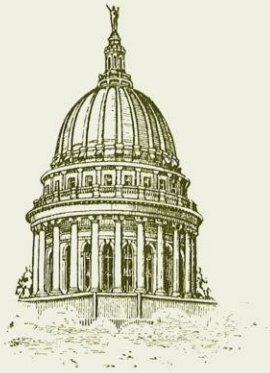
Mr. H. C. Perkins is the new instructor in Mechanics. He is a graduate of Cornell, where he taught Mechanics for three years before coming here.

G. A. Beebe, formerly captain in the engineers, will teach several Engineering subjects this year. Before entering the army he taught two years at Pennsylvania State, and two years at Cornell College, Iowa.

G. H. Montillon has taken H. D. Valentine's position as instructor in Fuel and Gas Analysis. Valentine is getting into the sales engineering game with the Ozone Company of America at Milwaukee, which has offices in the Y. M. C. A. Bldg. Mr. Montillon holds the M. Sc. degree, and comes from Ohio State.

Mr. E. R. Shorey, '08, is now acting as an Assistant Professor in Mining. He has under his supervision the Mining courses in the Mining and Metallurgy Dept. He was formerly Superintendent of the Blackstone Mine at Benton, Wis.

MAJOR O. B. ZIMMERMAN, m '96, M. E. '00, formerly liason officer between the Army Engineer Corps and the Bureau of Standards, has accepted a position with the International Harvester Company in Chicago.



BOOK REVIEW

CONVEYANCE AND DISTRIBUTION OF WATER FOR WATER SUPPLY, Aqueducts, Pipe-Lines and Distributing Systems. A Practical Treatise for Water Works Engineers and Superintendents.—By Edward Wegmann, C. E. New York, D. Van Nostrand Co. Cloth, 6x9; pp. 663; illustrated.

By PROFESSOR D. W. MEAD

This book, as will be noted from its subtitle, is intended for the practical water works designer and operator rather than for the engineering student. It brings together a large collection of valuable facts and data compiled from reports, society publications, the technical press, and manufacturers' publications, which information is otherwise unavailable except from many sources and through a wide range of reading. It presents, in convenient form for reference, information of value to the engineer and superintendent of water works properties.

The book is divided into three parts: I. Water Consumption and Hydraulic Formulas; II. Design and Construction; II. Maintenance and Operation. There are also five appendices. The first three appendices are devoted to standard specifications for cast iron pipe, valves and hydrants, and structural and boiler steel; the fourth includes a brief description of the inside fire protection of buildings; and the fifth is a reproduction of the fire stream tables of the National Board of Fire Underwriters. The first part, including 54 pages, gives various data concerning the use and waste of water in American and foreign cities and a very brief discussion of the flow of water in pipes and conduits. The latter is too short for the engineer and not sufficiently simplified for the non-technical superintendent. The second part of 436 pages is devoted largely to the description of pipes, conduits, reservoirs, and tanks. The third part, of 147 pages, includes descriptions of various service appliances and of maintenance methods, tools, and instruments.

The book touches practically every subject connected with water works distribution, but is more valuable for bringing together, in convenient form, a mass of data widely scattered, than for any distinct addition to a knowledge of the various subjects. The book will be of the greatest value to men just beginning practical work in connection with water works design or operation.