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ENGINEERS' "MAG" IS 25 YEARS OLD

The May issue of the Wisconsin Engineer marks the twenty-fifth milestone in the history of the magazine. Hence the special interest of the feature article for this month, which is a tale of the struggles and successes of the founders of the magazine and their successors down to the present day. The article contains much of historical interest, reminiscent of old Wisconsin men, and many points of benefit to staff workers on any campus publication.

The part played by the College of Engineering in the University Exposition is set forth in detail, illustrated by photographs, in the second article of the issue. If you didn't understand some of the engineering exhibits, read this article and have your questions answered.

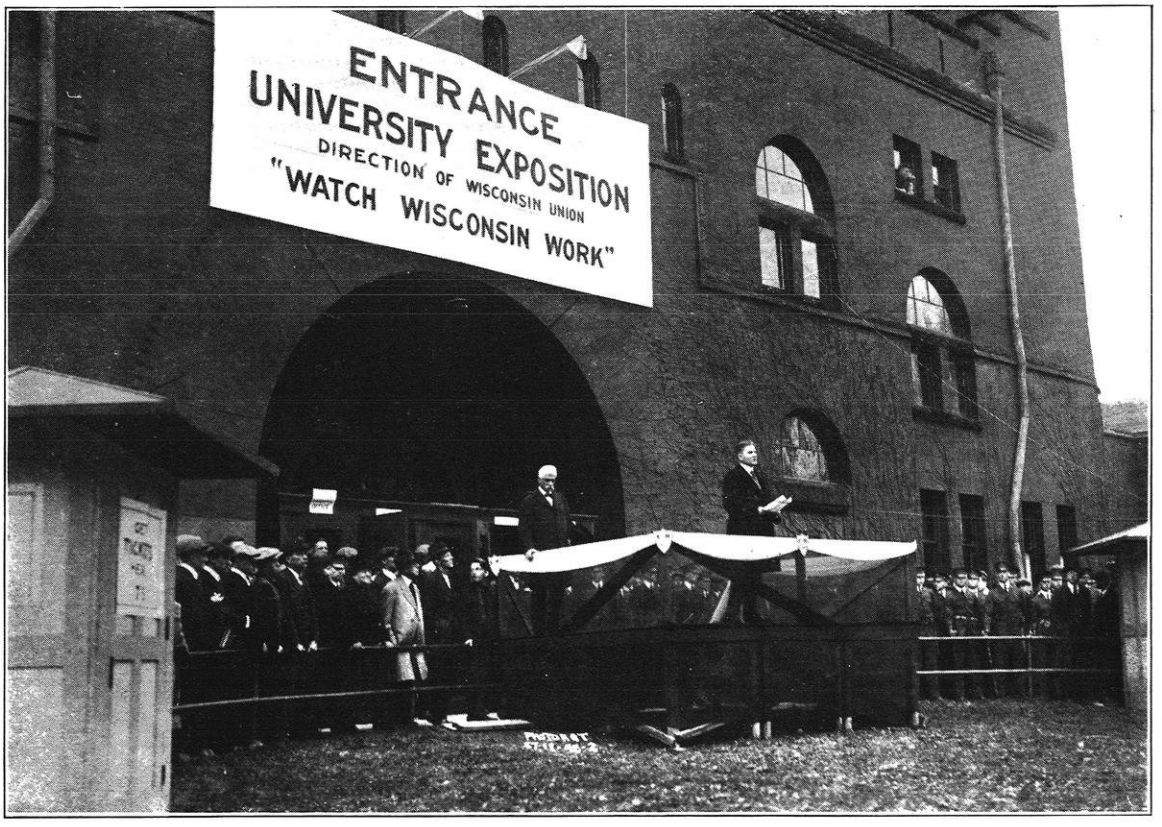
For those with a philsophical turn of mind, some material abstracted from notes on "The Fundamentals of Electrical Engineering," by Profs. Edward Bennett and H. M. Crothers, entitled, "The Necessity for Precise Ideals," will offer food for thought.

Another account of a "Successful Wisconsin Engineer," together with the usual editorials, campus and alumni notes, etc., complete the last issue for the year, and make this number uphold the traditions of 25 successive years of sound engineering and journalistic practice.

The WISCONSIN ENGINEER

Published by the Engineering Students of
THE UNIVERSITY OF WISCONSIN

VOL. XXV MADISON, WISCONSIN, MAY, 1921 No. 8



UNIVERSITY EXPOSITION

Governor J. J. Blaine makes the opening address

1896 ANNIVERSARY NUMBER QUARTER CENTURY **1921**

Volume 25 Founded 1896 Number 8

The Wisconsin Engineer

$1.50 a Year 25c a Copy

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THE WISCONSIN ENGINEERING JOURNAL ASSOCIATION
306a Engineering Building, Madison, Wisconsin
Telephone University 177

Dear Alumnus:

We are mailing this copy of the WISCONSIN ENGINEER to you in the belief that you will find it of interest and that the time you spend in glancing over it will not be a total loss.

Incidentally—oh, quite so—we would like to arouse your interest and enthusiasm to a degree such that you would eagerly seize your pen, fill out the form below, and mail it to the Manager, thus becoming a member in good standing of our loyal order of alumni subscribers.

The ENGINEER is doing its best to fulfill the duties incident to the place it occupies in the College of Engineering. We feel that it has a real and important function to perform in affording opportunity to the students in keeping alumni informed regarding the college, and in furthering the fame and reputation of this school and its graduates.

Your support and encouragement are mighty stimulating to the men who are following you. The price of subscription is low. You will not regret keeping in touch with the old school.

Yours very truly,
THE BOARD OF DIRECTORS.

Manager, Wisconsin Engineer,
Madison, Wisconsin.
Dear Sir:
Enclosed is a _____for $_____ to pay for my subscription to the Wisconsin Engineer for_____years.

Very truly,

(Name) _____

(Address) _____

Subscriptions $1.50 a year.

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The Wisconsin Engineer

UNIVERSITY OF WISCONSIN

VOL XXV, NO. 8 MADISON, WIS. May, 1921

TWENTY-FIFTH ANNIVERSARY OF THE FOUNDING OF THE WISCONSIN ENGINEER

By Leslie F. Van Hagan, Wis., '04,
Professor of Railway Engineering.

Sometime during the year 1894-95, a sophomore in electrical engineering,—R. F. Schuchardt, now electrical engineer of the Commonwealth Edison Company of Chicago—while browsing around in the library, ran across several technical college journals. "I think they were the Sibley Journal of Engineering, of Cornell, the Technograph, of Illinois, and perhaps one other," he says, in relating the incident. "That Cornell should have such a magazine seemed natural—we looked up to Cornell and to Boston Tech as two colleges that we admitted might outrank Wisconsin. But that such an insignificant school as Illinois (so we considered it at the time) should be in the lists of technical journals and not Wisconsin was an unbearable thought. It was a situation that required immediate remedying. I found that Beebe and Owen, to whom I unburdened myself, agreed with this conclusion, and so the three of us went to Prof. Mack, who was so completely and sympathetically one of us. The result was a meeting to organize the Engineering Journal Association, which blotted out the disgrace and put Wisconsin on the map of technical journalism."

The first number of the Wisconsin Engineer—2500 copies—was published in June, 1896. Edward C. Bebb, civil engineer of the class of '96 and now with the U. S. Geological Survey, was the first editor. W. H. Williams, an electrical engineer of the same class, was the first manager. The first issue was a success in every way.

Four numbers were published during the next school year, 1896-97, which, together with the number of June 1896, constitute Volume 1. Financial difficulties arose before the end of this first volume. During the next year only three numbers were published for Volume 2. The first two numbers were not successful financially, and a new manager, C. A. Keller, a junior electrical, undertook to finish the year. The outlook, as he describes it, was not encouraging: "In lining up matters for the third number we found that about half of the concerns who had been carrying their advertisements in the previous two numbers asked to have their ads discontinued because the circulation was too limited and didn't pay them. In addition to this I found that the incumbent board had inherited a big debt, apparently an accumulation of deficits from the last three or four numbers.

"About this time war clouds (Spanish American War) were looming on the horizon and everybody had started to economize, which added to our troubles. We were facing a crisis that gave us much concern, in fact we seriously considered the discontinuance of the publication for the time being at least. After burning much midnight oil and presenting our case to the members of the faculty who were most interested and sympathetic, we decided that we would not be responsible for a disastrous ending of the magazine and that it was up to us to pull the Engineer out of the hole. We issued the third number in April. About this time war was declared which made it impossible to issue the fourth number, principally because of the military activities among the students."

It was necessary for the faculty to come to the rescue before the April number could be printed. The printer showed a disconcerting lack of college spirit and altruism; he wanted his money in advance. It was not until he had a note for $200, signed by faculty members, that he would take the copy for the last issue. This was the first time, but not the last time, that the good ship almost went to pieces on the financial rocks, and more than once the faculty members have showed their interest in the magazine by financial support. The Engineer, in those early days, was trying to do what many another enterprise has tried to do without success,—it was trying to run a business without any working capital. Occasionally a manager turned over a small surplus to his successor, but the usual policy, until the magazine became seriously involved some years ago, was for the staff to divide the year's profits, if there were any. The debts were passed along intact. This policy of dividing profits has been abandoned for a new one which includes the maintenance of a small working capital and the use of all other funds for the purpose of improving the magazine.

The third year found the Engineer still gasping for breath. In order to conserve its vitality, it was reduced from a quarterly to a semi-annual, and the expensive "Engineering Index" which had featured the magazine and which is one of its notable achievements had to be discontinued. In place of the Index, the magazine started to publish a directory of engineering alumni. The number of graduates was small when this was started. It

was continued until 1909-10, when it had to be abandoned on account of the increasing number of graduates and the labor and expense in connection with the department.

The business manager made a trip to Milwaukee and Chicago for advertisements. "Being practically a stranger in Chicago", he relates, "I called on a friend for advice. He suggested that I call on the concerns in 'machinery row' in the Clinton Street and Canal Street districts. Here I spent two days going up and down the street from one building to another. The experiences encountered would make a good story in itself. Here is where I lost some of my 'student conceit'. I also learned that I was woefully deficient as a salesman. However, I succeeded in securing eight or ten new ads, which, together with those secured in Milwaukee, made my trip worth while and brought in more than sufficient revenue to carry the two numbers of Volume 3. When we closed up matters for the volume, we had wiped out practically all of the debt we had inherited. For each of the three numbers that were issued while I was manager I had a different editor to work with, which is an indication of the troublous times we had. Much credit is due Mr. R. T. Logemann, '99, editor-in-chief of the first number of Volume 3, as he did much to maintain the morale while piloting the ship through the storm."

The fourth year was a successful one and resulted in a further decrease of the debt. Some difficulty was experienced due to a claim on the part of certain advertisers that the circulation of the magazine had been misrepresented to them. Many advertisements were not renewed and some advertisers refused to pay their bills. This difficulty illustrates one of the dangers inherent in a constantly changing personnel and a lack of fixed policy. Faced with a feeling that he must make good in the one year that he is in office, uncertain as to actual figures, unrestrained by future responsibility for his actions, a manager is sometimes tempted to be overly optimistic in his estimates of the number of subscribers he is going to have during the year ahead of him. His successors must face the enemies he creates for the magazine. This evil, it is believed, has been eradicated by the substitution of a definite policy of exactness in circulation figures. It might be well, at this point, to call attention of students and alumni to the importance of each individual subscription to a small magazine. Advertising is essential to the life of a magazine, and the advertiser measures value by the quantity and quality of circulation. A subscriber not only contributes the price of his subscription to the support of the magazine; he also adds one more inducement to advertisers to use our columns.

Even in those "good old days" when, as tradition tells us, every engineering student was full of pep and always supported all college activities, there were one or two flies in the ointment, so to speak. A. J. Quigley contributes the following pen picture which illustrates the point: "One hot afternoon, late in the spring of 1900, Lewis E. Moore, then a senior, entered the drafting room where about 50 of us undergraduates were perspiring over our boards, and announced that all loyal engineers would buy a copy of the books he had under his arm. He proceeded to peddle same, with about the expression of a man caught stealing chickens. That was my introduction to the WISCONSIN ENGINEER, and the episode was an index of the low estate to which it had then fallen. Moore was business manager that year and I suspect that he had the pleasure of making up any deficit out of his pocket."

The spring of 1901 saw a real crisis in the history of the ENGINEER. The writer of this article, who was freshman at the time, well remembers a student mass meeting that was called that spring for the purpose of deciding what to do with the magazine. The poor invalid was laid out on the operating table in all its financial illness and nakedness. Some of the surgeons advised a major operation; some thought chloroform would be more merciful. It was a solemn occasion and it looked like thumbs down for the poor old wreck. I remember that my own freshman feelings, after listening to the tale of woe, was that the case was pretty hopeless and that, even if the patient were permitted to live, it would be a hopeless invalid. But a few courageous souls—among whom Horse-Power Howland, with his long arms beating the air, stands out in my memory—pleaded that the ENGINEER be given one more chance. It is difficult to realize that our energetic, well-organized, and financially sound ENGINEER of today could have been that puny invalid of long ago.

Today places on the staff of the ENGINEER are at a premium and it has been necessary to establish a waiting list. It was not so always. Quigley, who was manager in 1901-02, at which time Jimmie Watson was editor, says, "When I was elected to the Board of Editors for my junior year, my class, generally, considered I was handed a large, juicy lemon, and the honor (?) was accepted because I couldn't find any excuse for sliding out from under." Many an editor and manager after him had the same feeling of being the goat. It was not only difficult to collect a staff for the magazine, but it was difficult to organize the staff and lay out the work so that every one did his share. Usually the staff became a two-man affair, the editor and the manager doing all the work. Quigley, as he puts it, "made lemonade out of the lemon" and split a comfortable profit with Jimmie at the end of the year.

Professor Watson, by the way, was the first of a long line of editors and business managers who were members of Tau Beta Pi. Tau Beta Pi was established at Wisconsin in 1899 and since that time 18 out of 24 edi-

tors, and 13 out of 21 managers have been members of the fraternity. And while we are on the matter of statistics, we might add that the publication of twenty five volumes has required the efforts of 31 editors and 27 managers. They have been distributed among the several courses as follows:

Course	Editors	Managers
Civil	10	10
Chemical	0	1
Electrical	13	13
Mechanical	8	3
Mining	None	None
Total	31	27

Apparently, the worries incident to publishing the ENGINEER have not undermined the constitutions of those responsible, for all of the editors and managers are still living with one exception,—W. E. Reynolds, editor for the second number of Volume 3.

Following the crisis of 1901, the ENGINEER began to prosper in a mild way under the able management of men whose names have become college tradition. It was a time of peaceful progress without many outstanding features. Elmer T. Howson, editor for 1905-06, now western editor of the *Railway Age,* describes the times and conditions:

"Although it is almost 19 years since I first became connected with the WISCONSIN ENGINEER through election as the freshman representative on the editorial staff, I still vividly recall the interest displayed in the first campaign in our freshman class and the speeches made by Otto Kowalke and Jess Kommers. Positions on the staff representing the various classes were then elective and were frequently the occasion of considerable campaigning. With this election I began a connection with the WISCONSIN ENGINEER which continued through my four years at Wisconsin, during the last year of which I was honored by selection as editor.

"The one impression which I have carried with me from my connection with the staff was the lack of appreciation on the part of the alumni of the efforts of those engaged in the preparation of the WISCONSIN ENGINEE. As an under-graduate, whose knowledge of technical literature was confined largely to the WISCONSIN ENGINEER, I could not understand the reason why its magazine did not receive the unanimous support of all Wisconsin engineering graduates. Since leaving college, and particularly since I have had an opportunity to become intimately familiar with technical journalism, I have felt that the difficulty may have been, and may still be, largely with the character of the magazine which the staff endeavors to issue. It has been my observation that the alumni are more interested in the news of the university, and particularly of the engineering college, and in information concerning their class-mates, and they look to the WISCONSIN ENGINEER as the only place where they can secure this information, with the possible exception of the alumni magazine. On the other hand, in attempting to publish a highly technical magazine covering all phases of engineering, the WISCONSIN ENGINEER must necessarily be hopelessly outclassed and is simply *another* magazine, rather than one with a distinct mission and field.

"However, in spite of this fact, I have recently had occasion to look back through several years' papers of the WISCONSIN ENGINEER and I was impressed with the high character of the material contained therein. I could not but feel that the articles are on a par with those appearing in the current periodicals."

The next big event in the history of the ENGINEER was the change from a quarterly to a monthly basis in 1910-11. S. H. Ankeney was the manager responsible for the change. "I recall very distinctly," he writes, "a meeting that Mr. Pearsall, who had been selected as editor, and I had with Professors Mack, Disque, Beebe, and Pence at the latter's home in University Heights one evening. The meeting was for the purpose of considering plans I had made for the ENGINEER. I had developed an editorial program that looked very attractive, but most important of all was the increase from four to eight issues a year. I had gone to a great deal of work to get figures on the cost of publishing the enlarged magazine, additional revenues needed, etc. The professors listened to my report very attentatively. But I think the thing that had the most weight with them was that I agreed, in my enthusiasm, to assume any deficit that might be incurred. * * * * * I was filled with Wisconsin altruism and proposed to put into the magazine every cent of profit except some infinitesimal amount which I think was 10 per cent. Furthermore I agreed to pocket any loss. Can you wonder that the professors agreed to my plan and authorized monthly publication during the school year?"

Ankeney put his idea over successfully, took his percentage out of the profits, and turned over $100 to the faculty directors to start the magazine the next year.

Besides being responsible for making the ENGINEER a monthly magazine, Ankeney also secured office space for the staff on the second floor of the Engineering building in the room that Professor Smith now occupies. "Here, in our new office," he says, "with our name on the door, we worked in state. We had a desk 'and ever'thing'. And the very glory of this office attracted to us a number of freshmen and sophomores who wanted to try out for a place on the staff. That was just what we wanted, too, and what the ENGINEER had missed in the past, as it had been a sort of a close corporation, the management being passed along to worthy seniors regardless of their editorial fitness or experience."

Ankeney was one of the great managers among those

who have guided the destinies of the ENGINEER. He became manager during his sophomore year—the only sophomore to hold either editorship or managership—and held the position for two full years.

Shortly after the ENGINEER became a monthly magazine and it was decided to incorporate. The Wisconsin Engineering Journal Association came into being February 13, 1912, as a Wisconsin corporation.

The year 1912-13 is notable for the fact that the ENGINEER had three editors and two managers during the period. It was the precursor of a time of trouble. Advertisers were liberal during the year and this caused overconfidence on the part of the next administration. The 1913-14 ENGINEER was to be "bigger and better than ever". The number of pages was increased, a high grade of paper was used, and illustrations were sprinkled throughout the pages most liberally. The 1913-14 volume stands out among its fellows on the shelf, but it nearly sank the ship. Instead of passing on a tidy surplus to the succeeding board, the 1913-14 management passed on a debt of $600 and a badly impaired credit with engravers and printers. Again the faculty advisers came to the rescue and negotiated a note with the First National Bank. The Dean and Professors Mack and Beebe signed the note. Closer faculty cooperation with the ENGINEER was evidently needed to prevent a recurrence of these periodic bad years. Professor Disque, a former editor, was made advisory editor and under his active supervision the long climb back to solvency was commenced,—a climb that wasn't finished until June 14, 1919, when the last note for $100 was taken up and the magazine was once more square with the world.

The ENGINEER has lived through two wars, The Spanish-American war of 1898—it was a mere infant then, but possessed enough vitality to pull through that period—and the World war which involved this country during 1917 and 1918. This second war was a real test of endurance, and those connected with the staff during that period like to mention—with all due modesty, of course—that the ENGINEER was one of the very few college journals that continued regular publication during the war. Although the magazine was financially successful during the war period, the situation was one of constant uncertainty and worry.

The year 1918-19 was the most trying year. The editor and the manager, who were appointed in June, were both in the service by September and new appointments had to be made. The S. A. T. C. (Student's Army Training Corps) had been established in the University and the few students who remained on the campus were either below military age, physically unfit, or in the S. A. T. C. and under military discipline. Advertising support was uncertain because of unsettled business conditions.

The Board of Directors of the magazine looked over the situation dubiously, but, under the stimulus of "Johnny" Mack's dauntless optimism, decided to take a chance. The magazine was still in debt and Mack was one of the signers on a note covering the debt. Nevertheless, said he, "I am in favor of continuing publication even if we run behind financially for the year and add to our deficit." And so the die was cast.

Finley L. Fisbeck agreed to be manager and Glenn B. Warren undertook the editorial duties. Both were "gobs" in the S. A. T. C. Navy. A slim staff surrounded them. By the time the staff was organized some time had been lost. Nevertheless, the first issue came out on time and cleared expenses. Fisbeck established his reputation right from the jump. The writer of this article found the "dummy" for the advertising section lying on his desk for his inspection one afternoon with a note which read, "There are two empty spaces in this dummy. I have gone out after two more ads. (signed) Fisbeck." He got them. It is not surprising that the ENGINEER had a good year.

Between October and June there was a long rough road to travel, however. The "flu" came upon us and a quarantine was clamped down on all members of the S. A. T. C. at a time when it was necessary to "chase ads" for the next issue. The manager and his assistant couldn't go up town. Two or three inexperienced members of the editorial staff were pressed into service and sent out after business. They saved the day. Things were better after the S. A. T. C. was disbanded, and the close of the year found the magazine in good shape.

During 1919-20 the magazine was under capable management both financially and editorially. Places on the staff began to attract men for the first time in year. Editor Wiepking did some effective publicity work on the campus, the most spectacular stunt being the engineer's edition of the Cardinal which was published March 17, 1920. "Bill" Rheingans, one of the best managers the ENGINEERS has had, left a handsome surplus in the treasury.

The rising tide of high prices in the spring of 1920 created another crisis. Printers and engravers had more work than they could handle and held out for exorbitant prices. Paper was difficult to obtain. It would have been bad enough without further complications, but there were further complications. An attempt was being made to organize the technical college magazines of the country and to bring them to a standard size. It was decided that the ENGINEER should go into the organization and change its size and style completely. That involved a complete revision of subscription and advertising rates. All advertising contracts had to be cancelled. It was like making a fresh start. It was not certain how subscribers and advertisers would take the new rates and the monthly bills promised to be so high that

even one month's experiment, if a failure, would be a costly matter. With this number we complete the year. We have paid our debts and the balance in the treasury is greater than when we started.

An article such as the present can not hope to give more than a bare outline of events. We have scarcely touched upon the work of the editorial department. There is much that must be left unsaid because of lack of space. The account would be woefully incomplete, however, without a mention of some of the faculty men who have given the ENGINEER unselfish support.

Professor "Bob" Disque was one of several faculty members who have shown a genuine interest in the student efforts to maintain a magazine worthy of Wisconsin. As one man puts it, "Bob Disque was the general factotum in my day. He was censor, editor emeritus, comptroller of the treasury and the daddy of us all. To put down all the things which he taught us outside of the class room would be too much like a combination sermon and an American Magazine article. But, after all, he was the power behind the throne. The WISCONSIN ENGINEER would never have gotten very far in our short reign without his backing." Professor Havard, of the Mining department was another advisory editor who was wise and sympathetic and aided greatly in keeping the magazine going. The Dean and Professors Pence, Holden, Beebe, and Corp have been active and consistent advisers and supporters. Probably the person most responsible for the existence and success of the ENGINEER is Professor, now State Engineer, "Johnny" Mack. Professor Mack has been a consistent friend from the day that Schuchardt and his friends broached the idea of establishing the ENGINEER right down to the present moment. His courage and optimism have been the deciding factors upon several occasions when the fate of the ENGINEER seemed sealed. He has backed it in every way, with his courage, with his financial resources and with editorial contributions.

THE UNIVERSITY EXPOSITION

By CHAUNCEY M. MORLEY,
Senior Electrical.

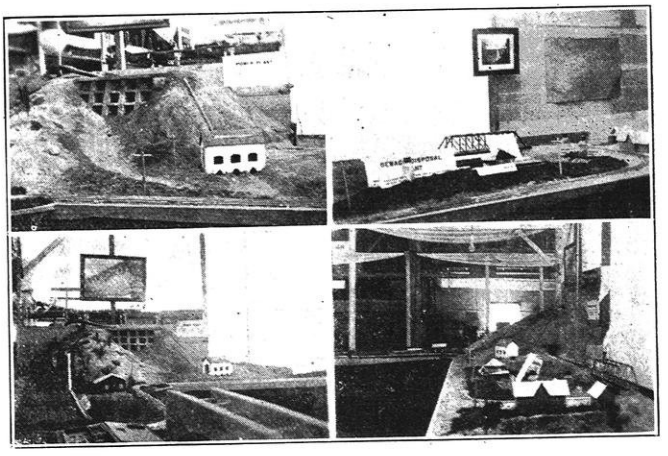
The All-University Exposition was held April 21, 22, and 23. It was excellently conceived and well executed, and its beneficial influence, in showing students in each college what other departments and colleges were doing, and in conveying to the people at large an idea of the scope and function of the university, will doubtless be far-reaching.

To completely detail the exhibits shown, and the interesting things that each contained, would require a volume whose size would lay somewhere between that of the Chicago Telephone Directory, and a Webster's Unabridged. This article can only attempt to review the exhibits of the Engineering College, which were located in the Gym Annex, and on which many men labored for days—some through the entire spring recess—accumulating in the process numerous bruises, blisters, and contusions, but sticking at it and completing the job. The excellence of their exhibits was the only compensation for the hard work entailed.

The Steam and Gas exhibit was in charge of a committee comprised of Royer, Strate, Smith, James, Wallman, Kellogg, Ferris, Samp, Schaub, and Glenn. The exhibit included a ten kilowatt General Electric turbo generator; a half-ton Lipman refrigerating machine which busily refrigerated throughout the show and caused a thick crop of frosty whiskers to appear on the coils; a Diesel engine; a locomotive headlight turbine, dissected in order that the interior arrangement might be seen. A small Corliss engine, made by an employee of the Allis-Chalmers Co. and presented to the University, proved its utility by running a small generator, which furnished current for an electric light.

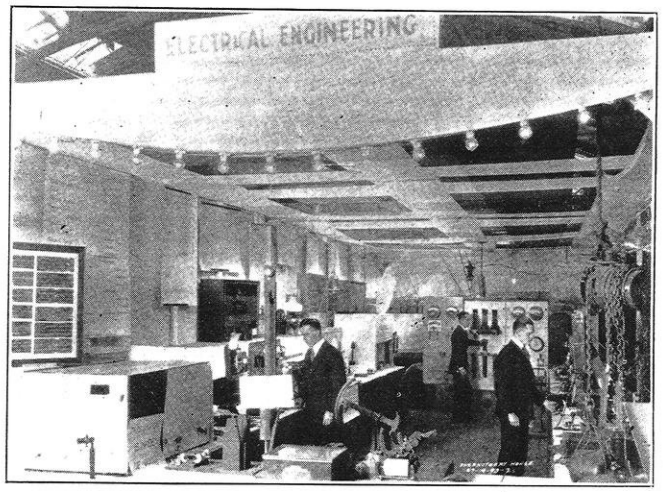
A Rider-Erickson hot air engine attracted much attention, as did a small model of the Steam and Gas laboratory, which had been laboriously constructed by a patient artisan. This model was exhibited at the World's Fair several years ago. Crane models, a cut-away cylinder of a sleeve-valve engine, efficiency meters, indicators, planimeters, and charts used in checking up the efficiency of a steam plant completed the exhibit.

The Roads and Pavements exhibit was prepared by Chase and Moehlman. A small model, furnished by a cement company, showed a concrete road under construction, the different stages from the grading of the dirt road to the completed concrete highway being represented.



EXHIBITS OF THE DEPARTMENTS OF RAILWAYS, STRUCTURES, AND HYDRAULICS

Another model showed a road curving up over a hill, while the course along the contours which it should have followed indicated the advantages of highway relocation. The exhibit also included testing machines for testing materials used in construction for wear, hardness, etc., and samples of materials—as bricks, tar, and macadam—that are used in road building.



THE ELECTRICAL ENGINEERING BOOTH

Harbaugh, Youngberg, Zervas, Olson, Crider, Steinmetz, Mackey, and Everett had charge of the Topography exhibit, showing numerous kinds of instruments used in surveying. The use of the instruments was demonstrated to those interested. A flow meter, for measuring the flow of streams, was the thing which attracted the most interest. A tent pitched in one corner of the booth gave an indication of the manner of living of the summer surveying parties at Devils Lake.

Butterman, Larson, Vobach, Pitzner, Bennett, and Koresch were the men responsible for the chemical engineering exhibit. A 35 K.W. tilting electric arc furnace was in operation, melting brass, aluminum, steel and bending brittle graphite rods by the influence of the high temperature.

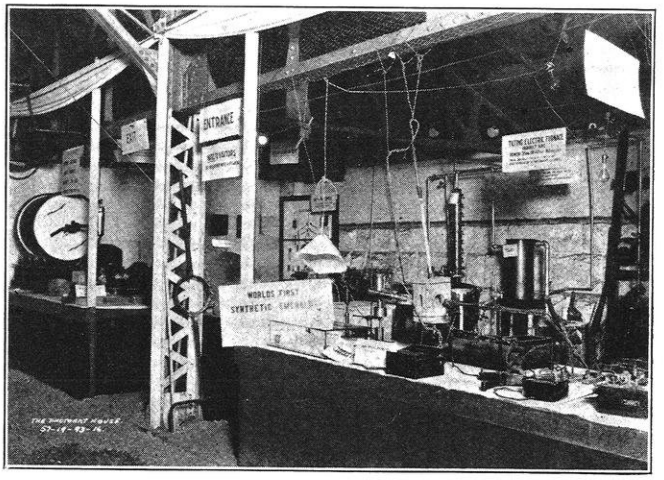
An alcohol still was busily engaged in recovering 90% alcohol from pharmoceutically impure mixtures, while a nickle ammonium sulphate electro-plating bath was utilized in plating all sorts of souvenirs.

Exhibits of materials made in the laboratory electric furnace included a piece of steel with a strength of 250,000 pounds per square inch in tension—one of the strongest specimens ever manufactured,—and synthetic emeralds.

Other displays were a Junker gas calorimeter, and a metallography exhibit.

Next to the Chemical Engineering booth was that of the Mining Engineers, arranged by Link, Humel, Tsao, Hussissian, Hymer, Uhlig, Gericke, Wegner, Jones, and Hiestand. The main exhibit was a Diester sand concentrating table, driven by a motor from an overhead line shaft. The concentrate and sand were pumped to an overhead Callow cone, the overflow from the cone being used for wash water on the table. The sand was returned to the table from the lower part of the cone. In a working model of a mine, headframe, and hoist, small skips were hoisting rock to the top of the head frame and dumping it into bins. Two long charts were fastened to the walls, one being a diagramatic representation of an iron blast-furnace plant. Samples of the raw material, the intermediate, and the final products were shown. The other chart diagrammed a by-product coke oven plant. These charts were the work of C. K. Tsao. Different types of rock drills, and pictures showing various mining operations were included.

McLenegan and Donovan had charge of the machine design exhibit. This included different types of cams and gears, some so irregular in shape that it seemed impossible that they should operate together. A flasher, without a cover, operated an electric sign, and showed the principles of operation of these devices. One of the most interesting of the exhibits was an arrangement of



CHEMICAL ENGINEERING DEPARTMENT EXHIBITS

cams and levers, which, when operated by rotating a handle, actuated a pencil point in such a way that it wrote "Wisconsin".

The shop exhibit, under the supervision of Prof. Dabney, was in the hands of Hanson and a group of assistants. Patterns and moulds showed the steps in foundry work. Numerous ash trays and paper weights were cast by this group during the exposition. A feature of the booth was a new type of gas engine, designed by Osman, '20, for a thesis, the motor being opened to show the ingenious arrangements of ports which does away with the present types of valves.

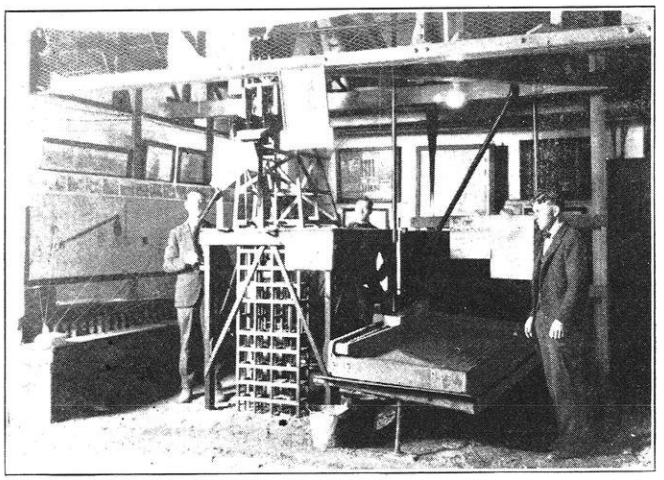
The drawing booth was in charge of Romig, Shields, Orth, Doke, Daubner, Baldwin, Keck, Werrel, Livermore, Millar, and Mackey. This booth was well patronized by visitors, most of whom had their silhouette made. The process by which this was done was rather clever. The subject sat at the end of a long focusing cone, and the outline of the head was reflected on a piece of ground glass, and traced with a pantograph. The out-

line was then inked in. In small boxes around the wall were placed interesting displays: one, which contained a bolt and nut, was found on examination to contain a standard bolt, the nut being represented by a small mirror, which showed the curious visitor his own features.

The Railways and Structures booth was a large one, and was in charge of Wheaton, Congdon, Barth, Striegl, Ford, Jaeger, Hendrickson, Rotter, and Miller. The structures and railways display consisted of models of masonry arch and concrete bridges, bridge deflectometers, and a miniature railway system, which passed over a truss bridge and through a tunnel. The Hydraulics department was represented by an air lift pump and a centrifugal pump operating a Doeble water wheel, which in turn ran a continuous flow pump. The old fashioned water wheel was contrasted with the modern hydraulic turbine.

The Topographic Engineering department showed a complete water power development and an irrigation system. A small sewage disposal plant was in full operation, and the last display showed the water softener equipment, projected for Madison.

The Electrical Engineering booth was prepared by Hantzsch, D. J. Stewart, Kates, Jackson, Miller, Bohn, Mueller, Strong, Nolte, Schroeder, S. Stewart, Svitavsky and Morley. A complete telephone board made possible a demonstration of just how calls are handled. An Edison generator, one of the first built, proved its worth and the care with which it had been constructed by furnishing current for several arc lights throughout the three days. A rather complete display of heating devices was furnished by the Electrical Supply Co. Eggs frying in a griddle set on an ordinary wood table attracted much attention. An oscillograph, connected to a telephone, and set to throw its waves on a screen, showed the shape of the waves set up by the vocal cords. The color booth, partitioned off, showed how differently certain colors appear under different types of light. Different types of meters were on display, enabling the consumer to see what sort of a device determined the current he consumed, and also showed the relative amounts of current taken by different appliances.



THE MINERS' EXHIBIT

The interest that was shown in the Exposition leads to the hope that in the future it will become an institution at Wisconsin.

THE NECESSITY FOR PRECISE IDEAS*

Types of Knowledge and Kinds of Interest.

It is of interest to contrast the three types of knowledge of the relations in any field,—the qualitative, the quantitative, and the profound,—and to consider the *kind* of interest attaching to the pursuit of each type.

Consider, for example, the knowledge relating to the principles involved in the common pole-top transformer to which the residential lighting circuits are connected. The usual qualitative knowledge of these principles includes little more than that the transformer is a device which receives a small current at the high electrical pressure (electromotive force or voltage) suitable for transmitting power, and delivers a large current at the low pressure suitable for lamps and motors. The principle involved in the transformation of the voltage is that if two coils are wound upon a common magnetic circuit (iron core) and if a varying magnetic field is set up by a varying current in one of the coils, the relative magnitude of the electromotive forces induced in the two coils by the varying magnetic field is directly proportional to the ratio of the number of turns in the two coils. Therefore to transform from the 2,200 volts of the power distributing lines to the 110 volts for the lighting circuit, the transformer should contain two coils wound upon the same iron core,—one coil containing twenty times as many turns as the other.

Quantitative Knowledge.

Contrast this with the quantitative knowledge required in designing the transformer, or in passing judgment upon the merits of two transformers. In the course of the design, after having determined the maximum power which the transformer is to be rated to deliver and the way in which the demand upon the transformer for power will vary (upon the average) through the day and from season to season during the year, the designer must raise and answer questions such as the following:

a. Of the many possible geometrical arrangements of the copper windings in relation to the iron core, which is the best?

b. To what extent should the two coils be subdivided and interleaved?

c. How many turns of wire should be used in each winding, and what diameters should the wires have?

*Abstracted from notes on "The Fundamentals of Electrical Engineering," by Edward Bennett and H. M. Crothers.

d. What should be the cross-sectional proportions and length of the iron core?

e. What should be the exact (not approximate, as given in the qualitative explanation) ratio of the turns in the two coils to give a specified ratio of transformation under specified conditions?

f. To what extent will this ratio of transformation vary as the demand upon the transformer for power is varied from no load to full load?

g. What will be the power loss in the transformer at different loads?

h. How hot will the different parts of the transformer get?

i. Cooling questions—For example, what oil ducts should be provided through the windings and the iron core to permit the cooling medium to circulate and carry away the heat? What cooling medium should be used?

j. Of two grades of steel, one costing 6.5 cents a pound and the other costing 2.5 cents a pounds each having losses of known value, which should be used for the steel core?

k. Questions as to methods of insulating the windings.

These questions or problems are not independent questions which may be taken up one at a time and independently answered. The solution of question (x) hinges upon the solution of question (y), and so some of the questions must be worked through a number of times, starting with tentative assumptions and using the data from the solutions so obtained to correct the assumptions for a second approximation, and so on. The answers to these questions hinge, not only upon the physical properties of the materials entering into the transformer, but upon such matters as the cost of generating the power which is to be transformed, the cost of copper, the cost of steel, the cost of the labor in the manufacture of the different designs, the estimated life of the transformer, and the interest rate upon money. A marked change in any one of these items may mean a change in many of the answers—and a marked change in the design.

Qualitative versus Quantative

The qualitative statement of what the transformer tank contains and how it functions is, in its apparent simplicity, highly gratifying. In the absence of such a statement, the transformer tank is a veritable sealed Pandora's box,—a thing which is not in human nature to tolerate. The statement opens the box and releases the contents, to bless or to vex, as the case may be.

The recital of the above quantitative questions (and they may be duplicated for almost any piece of apparatus) is an indication of the infinite complexity of nature. *The attainment of quantitative knowledge in such a situation is through a long exacting discipline in which the acquiring of precise ideas through a painstaking consideration of many details plays a large part.* It is the necessity of submission to this discipline which makes the pursuit of quantitative knowledge generally distasteful.

The general interest in qualitative knowledge lies in the fact that it is essentially *explanatory;* explanatory in the sense of accounting for the striking features of the particular complex phenomenon under immediate consideration in terms of more remote relations having a broader application. Moreover, the qualitative explanation invariably relates, not to the properties of the actual device under observation, but to a simplified make-believe device. The explanation brings into play the make-believe practice of childhood and of the childhood of the race,—a game which is always a delightful recreation. However, in the design (and design is another word for engineering) of *actual* transformers, motors, power stations, radio stations, and transmision lines, qualitative explanations do not carry the designer very far.

Even in those cases in which the explanation (so-called) is no more fundamental than the plain recital of the phenomenon itself, things appear to become more intelligible, or at least less puzzling, since, by the explanation, the ultimate unresolvable fact is frequently pushed farther and farther into the background. All too often, however, the qualitative explantion is of the type occurring in the cosmogony of one of the Hindu Vedas, in which the earth is said to rest upon the back of an elephant, and the elephant to stand upon the back of a tortoise, and for the footing of the tortoise,—no necessity is felt!

Profound Knowledge

This leads to a consideration of what is involved in a *profound knowledge* of a subject. A profound knowledge implies at least a realization that the present day accounts of nature (every day affairs) undoubtedly contain elephants and tortoises which are as unnecessary and as stultifying to growth in clear thinking and in clear seeing as those of the ancient Veda. While it may in all truth be said that no forest primeval ever presented a more formidable aspect to timid natures than does the array of questions relating to the quantitative properties of a transformer or any other device, it may with equal truth be said that no virgin region ever presented to our hunting and fishing ancestry a more alluring prospect of high adventure and rich reward than is presented to the pioneering spirit who, engaged in the pursuit of quantitative knowledge, has caught a glimpse of the game with which the region abounds.

Explanatory versus Descriptive Accounts

Dropping the allegory, the kind of interest which is necessary to a profound knowledge is an interest, not alone in the recital of physical relations, but in the way in which the mind operates upon the food for thought. The interest necessary to a profound knowledge is an interest in the sorting and classifying of ideas. As an example, one ought to recognize that all accounts of phenomena resolve into two broad classes, or into a mixture of the two, namely,

Explanatory accounts and
Descriptive accounts.

There must be an interest in resolving any involved account into these elements. There must be a recognition

that if any inquiry as to the "how" and "why" is pushed deep enough, it always ends with a purely descriptive statement,—an unresolvable statement of fact for which there is (at that time) no explanation in terms of anything more elemental. (1) With this should come a realization that the intense dissatisfaction with the descriptive account and the craving for the explanatory account is a human trait to be alternately nourished and suppressed. For each,—the description and the explanation—there is a proper time and place. In some situations, the craving for a tortoise or at least an elephant is the criterion of the pioneer, in other situations the craving is utterly unwarranted, and the surrender to it is fraught with the gravest possibilities of stagnation.

Interest versus Citizenship

It is not within the powers of any man to carry into very many of his fields of interest the exacting discipline necessary to quantitative knowledge, or the critical attitude necessary to profound knowledge. The interests in many fields must necessarily be qualitative; for recreation, and for sanity. But having in mind the growing complexity of the social organization, with the consequent change in the constraints resulting from the diversion of human interests into new and unnatural lines, may we not be warranted in saying that the three kinds of interest under consideration play the following parts in good citizenship?

Qualitative interests

An element in good citizenship from the viewpoint of the necessity for stabilizing recreations.

Quantitative interest

A necessary element in good citizenship from the economic point of view. A good workman must know "how much." (2)

Profound interest

A necessary element in good citizenship from the spiritual or moral side. The thing men have in common is the same mind stuff, and loyalty to the critical interest in mental operations and achievements may well constitute one of the common ties. (3)

(1) In this connection it is difficult to refrain from directing attention to the grossly misleading character of the constantly reiterated statement that "We do not know what electricity is." What more do we know about iron than we do about electricity? Simply this, we can see, and feel, and smell iron. Plain seeing and feeling and smelling is, however, a very small part of knowledge. The correct statement is not that "We do not know what electricity is," but "We cannot see, feel, or smell electricity."

(2) See The Grammar of Science, Chapter 1. By Karl Pearson.

(3) See The Philosophy of Loyalty. By Josiah Royce.

Prof. Jesse B. Kommers, who is now engaged in research on the fatigue of metals at the University of Illinois, will return to Wisconsin next year to resume his work in the mechanics department.

SUCCESSFUL WISCONSIN ENGINEERS

WLLIAM ALFRED BAEHR

WILLIAM ALFRED BAEHR

William A. Baehr was born at Oshkosh, Wisconsin, September 15, 1873, and was graduated from the University of Wisconsin in June 1894, with the degree of bachelor of science in civil engineering. Today he is president and general manager of the North American Light and Power Company, a holding company that owns and operates various public utilities in about one hundred and twenty-five communities in the middle west, and he is recognized as an expert in matters concerning gas, electric light, and power. The story of his career since leaving college is an illustration of the fact that the engineer who has breadth of vision, and the courage to put his plans into effect can create his own opportunities.

Baehr, apparently, finished school in that state of mind that causes worry to many of today's seniors,—he didn't know just what he was to do in the world. He tried railroading first, spending a short time with the old Wisconsin Central. In the spring of 1895 he became a draftsman at the Edgemoor Bridge Works, near Wilmington, Del., and, subsequently, was employed in the same capacity by the Wisconsin Bridge and Iron Works of Milwaukee. It took him nearly three years to find his real work, for it was not until March, 1897, that he finally entered the public utility field as superintendent of distribution for the Milwaukee Gas Light Co.

In June, 1899, he was made superintendent of the gas department of the Denver Gas & Electric Co. In March, 1903, he went to St. Louis as engineer for the Laclede Gas Light Co., which was doing seven million dollars' worth of construction at the time. Five hundred miles of gas mains were laid and sixty thousand new services and meters were installed. The experience gained on this work was broad and valuable.

While he was with the Laclede company, Mr. Baehr conceived the idea of going into business for himself. He was able to develop a fairly good consulting practice, his clients being bankers who wanted reports upon gas and electric properties, and municipalities that wanted some one to design plants for them. In April, 1909, fifteen years after graduation, he gave up his position with the Laclede Co. and opened offices as a consulting engi-

neer in Chicago. He specialized in artificial and natural gas properties, electric light and power companies, artificial ice, and central heating. The organization he established has expanded steadily, and today is one of considerable proportions. Its activities embrace all phases of design, construction, operation, valuations, rates, and reports.

One of the troublesome features of a consulting practice is that there are serious fluctuations in the amount of business to be done. At times there is a great deal of work and the organization must be expanded to meet the demand. At other times, there is less activity and the force must be reduced. The undesirable features of such fluctuation need not be elaborated. Mr. Baehr was confronted with this condition and set himself to remedy it. As a result he decided to enter the operating field, upon the theory that there was need for centralized engineering, financing, and operation for public utilities. A group of utilities served by a central engineering force, for example, is in a position to receive better service than the single utilities could command. Furthermore, the demand for service is more constant in the case of the group, and the engineering force will not need to fluctuate seriously. Another reason that influenced Mr. Baehr in his decision was that the members of his staff, in meeting the problems of operation, would keep in close touch with the developments in the public utility field. With these ideas in mind, the North American Light & Power Company was organized.

The North American company is a holding company, as already stated, which owns and operates electric light and power, artificial and natural gas, artificial ice, central heating, and some minor electric railway properties in about one hundred and twenty-five communities in Montana, Idaho, Oklahoma, Missouri, Illinois, Wisconsin, and Ohio. The operations of these properties, including all construction work, engineering, purchasing, accounting, financing, valuation, and rate work, are handled from the Chicago office. In addition to the North American group of properties, there are a number of other public utility properties for which the William A. Baehr organization acts as consulting engineers.

Mr. Baehr's wide experience in his field has commanded general recognition of his ability. He has been personally employed in a number of important cases, among which might be mentioned the Des Moines gas case, in 1911, the Georgia Railway and Power cases in recent years, the Minneapolis Gas Light case, and the Peoples Gas Light & Coke Co. case of Chicago. He was employed by the Public Service Commission for the First District of New York to investigate and report on gas pressure conditions in New York City. The investigation extended over a year. His findings were adopted and now govern gas service in that city.

A warm interest is shown by Mr. Baehr in the young engineers in his organization, among whom are a number of Wisconsin graduates. They are given an opportunity to learn the work of the various departments in a practical way, and usually find themselves promoted as rapidly as they qualify themselves for positions of responsibility. He takes pride both in the growth of his splendid organization and in the quality of men that he is developing in that organization.

THINK!

This has been called the era of machine production because so much of the world's work is done without the aid of the human hand.

Brain is replacing muscle. Men do only that work which machine cannot do.

Machine production dates from the revolutionary improvements in the steam engine by James Watt a little more than a century ago.

So great has been the development of labor saving devices since that time that many people actually fear that there will soon be no work left for the human animal to do. There is no basis for any such thought.

The adding machine, for instance, has not eliminated the bookkeeper, but it has taken most of the drudgery out of bookkeeping. It has largely contributed to the development of a new profession—that of accounting and cost finding.

When the human spirit is freed from deadening toil, it turns to its nobler function—that of creating.

With this adding machine the modern bookkeeper becomes an interpreter. He now has time to more than "figger." He analyzes his figures, and translates them into terms that make them useful.

The once lowly bookkeeper, pitcured so effectively by Dickens, is now doing finer, better and more useful work because he has the proper tools with which to work.

The other day I visited an exhibition of manuscripts which were transcribed in the thirteenth century. This was before the invention of the printing press.

Some of the volumes contained over 10,000 words, every letter being laboriously produced as perfectly as though printed from type.

An ancient scribe often worked five years on a book.

The modern scribe sits at a linotype machine, which has a keyboard like a typewriter. He can do more work, in a week than the ancient scribe could do in a year.

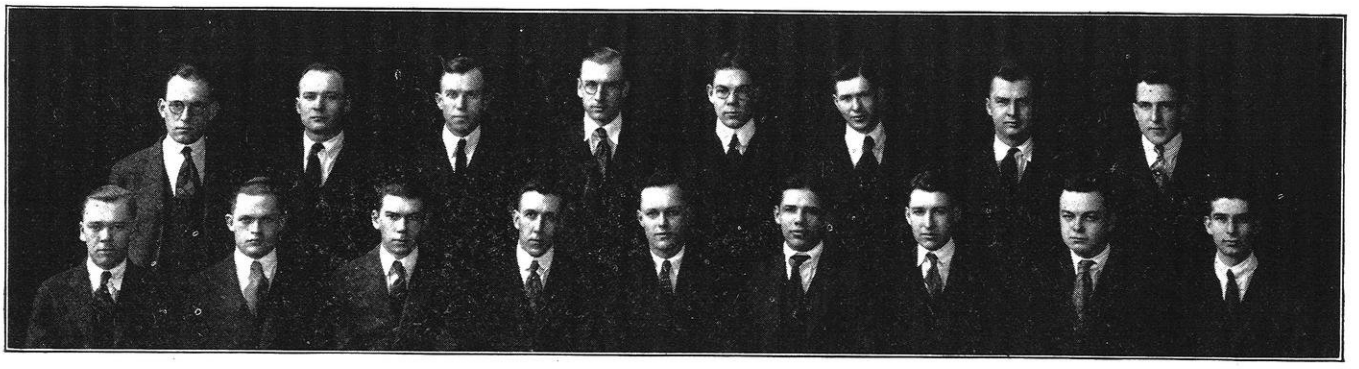
Freed from stoop-shouldered drudgery, he can do creative work. Some of the finest typesetting is now done on the linotype.

The machine does not displace human energy.

It liberates human energy.

The human factor will always be the dominant factor in industry, because it is the creative factor. Machines may be made to do anything except think.

And after all, isn't that the function of man—the chief, if not the only function, as far as production is concerned? Think! (From *"Through the Meshes"*)



THE STAFF

Drewry *Rove* *Harbaugh* *James* *Nolte* *Miller* *Gerhardt* *Buese*

Hentzen *Kates* *Editor* *Betzer* *Morley* *McLennegan* *Paulus* *Hamblen* *Manager* *Edwards* *Hirshberg*

EDITORIALS

TWO FACULTY MEMBERS LISTED AMONG "GREATEST LIVING ENGINEERS"

Under a magazine heading, "Greatest Living Engineers", appear the names of two of Wisconsin's teachers of engineering. The lists appeared recently in an engineering publication and were obtained from questionnaires sent to deans of engineering colleges. To find the names which we know so well classed with those of Edison, Goethals, Steinmetz, and other famous engineers, is gratifying. It is probable that in our everyday "grind" we fail to appreciate the true value of our daily contact with our faculty. But that is a selfish consideration if it goes no further. Appreciate the fact that they are sacrificing valuable time everyday for our training and that the tangible compensation is a mere pittance compared to what commercial activity would bring. Then consider, and reserve for further daily consideration, that scholastic effort on the part of every student furnishes the remainder of the compensation, the intangible part. Let's give the faculty a "raise"!—M. K. D.

POSSIBILITIES OF ENGINEERING JOURNALISM

When interviewed as to the possibilities of engineering journalism as a profession, Mr. E. E. Thum, associate editor of *Chemical and Metallurgical Engineering* summed up his opinion in the phrase, "Engineer first, journalist next. The engineering profession little realizes the position of the man writing or editing articles for the scientific journals.

"First of all, the material must be original. The lack of originality in subject matter discourages the attention of readers and hence is detrimental to the interests of the magazine.

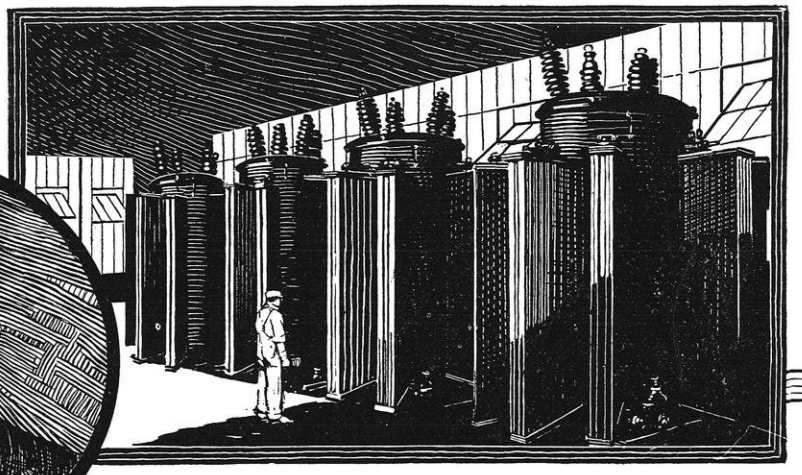
"Since, also, the material for the various articles is obtained from the ranking authorities in their respective fields, the would-be journalist must have sufficient knowledge to converse intelligently on the subject attacked, and to co-ordinate the facts obtained from various sources. He must stand equal to those he interviews.

"Common-place, accurate, English is the best means for expressing engineering thought to American people. Flowery style and literary quality are of little value in technical articles. Only one man on our staff, a Yale graduate, known as proof-reader, is necessary to approve and correct the copy.

"Before taking up my present work I had twelve years experience as a practicing engineer. This experience has been invaluable and prompts me to advise the aspiring engineering journalist to enter the field first as an engineer."

FACTORY OR COLLEGE

In an article by Professor Robertson Matthews of Sibly College, in the March issue of Industrial Management, he uses the expression "mass production" in referring to the policies of our engineering schools. He seems to strike at once the keynote of the situation. In an effort to educate in great numbers, the human element is being neglected, and, as a logical sequence the quality of the product must fall. What modern industry needs more than anything else is men of leadership, men of character, men of broad understanding. The place where these qualities can be developed is in the college through the intimate relations with professors, men themselves of the highest type, and men who should have inestimable influence on us. It is through just such personal contact that our lives are moulded and we begin to grow. Without it we accumulate a mass of text-book facts, maybe learned something, and perhaps sharpen our intellects, but have we developed in character? A man who graduates with "high honors" may be nothing more than a book-worm and have no stamina whatever. —R. W. T.



GEORGE WESTINGHOUSE
the founder of the Westinghouse industries

The Vision of This Man

Gave America Alternating Current

Thirty-odd years ago state legislatures were being importuned to prohibit the distribution of alternating current on the pretense that it was dangerous. Today, legislatures are asked only to compel its makers to distribute it more widely and sell it more cheaply.

Times have changed since Westinghouse bought the Gaulard and Gibbs Transformer patents, and brought Alternating Current to America. This was the necessary preliminary step to the tremendous developments that Alternating Current, once known as "Westinghouse Current," has made possible.

To eliminate all the alternating systems and apparatus that are in use everywhere today would set this country back thirty years; but there was a time when all the resources and courage that Westinghouse could command were required to withstand the bitter opposition of those who fostered direct current instead. The whole Electrical Industry now recognizes that there is a proper field for each system, but it was all or nothing in the late '80's, when the question was first raised.

The original alternating current system was hardly practicable, even for lighting purposes. From it, however, have resulted all the modern applications of the alternating current system, the many methods and devices for transmitting current at high voltages and stepping it down to lower pressures by transformers located in connection with the consuming apparatus, whether in the home, in industry, or for the Public Service.

The foresight, the engineering genius, and the courage of Westinghouse fathered the evolution of Alternating Current, one of the greatest modern commodities.

Westinghouse

W
WESTINGHOUSE ELECTRIC

BRINGING MORE DAYLIGHT INTO INDUSTRIAL BUILDINGS.

Dr. George M. Price, writing on "The Importance of Light in Factories," in "The Modern Factory," states: "Light is an essential working condition in all industrial establishments, and is also of paramount influence in the preservation of the health of the workers. There is no condition within industrial establishments to which so little attention is given as proper lighting and illumination. Especially is this the case in many of the factories in the United States. A prominent investigator, who had extensive opportunities to make observations of industrial establishments in Europe as well as in America, states: "I have seen so many mills and other works miserably lighted, that bad light is the most conspicuous and general defect of American factory premises."

"My own investigations for the New York State Factory Commission support this view. In these investigations it was found that 36.7% of the laundries inspected, 49.2% of the candy factories, 48.4% of the printing places, 50% of the chemical establishments, were inadequately lighted. There was hardly a trade investigated without finding a large number of inadequately lighted establishments."

Inadequate and defective lighting of industrial buildings is not confined to the establishments in New York State alone. The same conditions prevail in most sections of the country.

Such conditions as mentioned above are entirely opposed to the laws of health, sanitation and efficiency. Wherever poor lighting conditions prevail, there must be a corresponding loss of efficiency and output both in quality and in quantity. American industry is not using nearly enough daylight and sunlight in its buildings. Every endeavor should be made to use as much as possible of daylight for lighting purposes. To obtain this it is of course necessary that the rays of daylight and sunlight are permitted to enter the interior of the buildings as freely as possible, with the important modification that the direct rays of the sun must be properly diffused to prevent glare and eyestrain. A glass especially made for this purpose is known as Factrolite, and is recommended for the windows of industrial plants. Windows should be kept clean if the maximum amount of daylight is to pass through the glass, but the effort will be well repaid by the benefits secured.

In the presence of poor lighting, we cannot expect men to work with the same enthusiasm as when a well lighted working place has been provided. The physical surroundings have a deep effect upon the sentiments of the employes, and where bad working conditions are allowed to prevail, there is invariably a lessening of morale and satisfaction created thereby. Neglecting to utilize what nature has so bounteously provided, daylight, and which is so essential toward industrial efficiency, we have an instance of wastefulness, but now that the importance of good lighting is becoming recognized, undoubtedly more attention will be given by progressive industrial employers to furnishing the means which are essential for their workers to secure and maintain the efficiency, which counts for so much in the success of any industrial concern in this competitive age.

If you are interested in the distribution of light through Factrolite, we will send you a copy of Laboratory Report—"Factrolited."

MISSISSIPPI WIRE GLASS CO.,
220 Fifth Avenue,
St. Louis. New York. Chicago.
No. 3.

ENGINEERING REVIEW

By M. A. HIRSHBERG

Railroad Capstan

Railroad yards are now being equipped with a system which dispenses with the necessity of making use of a locomotive and its crew merely for the purpose of shifting a car or two. An electric capstan was recently introduced for just such a purpose. The car puller, as the device is called, consists of a powerful electric motor driving a capstan through a low reduction gear. In order to pull one or more cars along the track, one end of a stout rope is made fast to a car while the other end is wrapped around the capstan and pulled by the operator so as to insure a firm hold. A handle protruding through the motor casing serves to start and stop the motor.

Road Building Program

The second annual convention of the Asphalt Association, held in New York, April 13, marked important general advances in the road building and street paving field. The association took the lead in advocating measures which will go far toward placing the road-building and street-paving industry on a higher plane and will eliminate waste and extravagance in highway construction.

They adopted resolutions taking the stand that efficient engineering and executive management are essential to the improvement of the nation's highways; that highway expenditure should be proportional to traffic importance; that advantage should be taken of every opportunity to benefit by the road building experience of other nations; that the unemployed of the nation should receive employment as quickly and as extensively as possible through a vigorous public works program, thus offsetting industrial depression.

The adoption of this program would set an army of a million unemployed at building highways, would help to solve our rail problems, would release money for local circulation through wages, and in payments to local producers of road-building materials, and would reduce the dangers to travel by abolishing railroad grade crossings, more adequately bridging rivers, and would put the farmer of the outlying district closer to his market and to medical and hospital aid.—*Association Bulletin.*

Mirrors for Oscillographs

Recently the Bureau of Standards, Washington, D. C., has developed a new method for producing very small and light mirrors for use on oscillographs. Sometime ago an attempt was made to produce these mirrors from aluminum, polishing the metal in the usual way. However, it was found that the metal was too soft to be satisfactorily polished and some other means had to be devised which would give a better and at the same time as light a mirror. The process, as finally worked out, consists in pressing the aluminum between two optically flat steel dies. The mirrors thus made are highly polished with the surfaces sufficiently plane to produce satisfactory images of the spot of light.

Record Blast Furnace Production

What is believed to be a world's record blast furnace production has been made recently at the South Chicago plant of the Wisconsin Steel Co.

On March 17th No. 1 furnace produced 745 tons of iron; No. 2 furnace 744 tons; a total for the day from two furnaces of 1489 tons. On March 22nd No. 1 furnace produced 818 tons and the No. 2 furnace 643 tons, the total for the day being 1461 tons. It is worthy of note that while these tonnages were being produced, the No. 2 furnace was put in blast on September 5th, 1915 and has been continually in blast ever since, during which time this furnace has made over 1,100,000 gross tons of pig iron on the same lining. The figure of March 22nd of 818 tons produced in one furnace is said to be a world's record in blast furnace production. "Horse Power" Howland, Wisconsin, '03, is superintendent of the plant.

Reversible Turbine

A newly invented reversible steam turbine for ship propulsion will shortly be ready for delivery, according to the *Engineering Review*. The value of the invention lies in the act that the blades are confined to one section, instead of to two, as formerly, making possible the reversing of motion of ships almost instantaneously, without loss of either pressure or velocity. F. P. Machado, a Brazilian, is the inventor.

The Chinaman, an Engineer

In the light of the huge engineering project which is being contemplated, by means of which we will be able to utilize the tides along our coasts and carry the power they furnish far inland, it is interesting to note that it was the Chinaman who first made use of the energy of the tides. Along the shores of China we find tidal rice-mills, which, though quaint and crude, nevertheless show considerable ingenuity and engineering ability on the part of their makers. These tiny plants are situated on tidal creeks. A dam, which is opened at high tide and closed when the tide begins to ebb, furnishes a quantity of water sufficient to rotate a water-wheel for five or six hours at a time. The wheel is entirely of hardwood, even to the bearings of the shaft, and is constructed in the precise manner so characteristic of the wooderaft of these people.

ALUMNI NOTES

By DAVID W. MCLENEGAN

C. H. ANDERSON, ex-m 23, was around the campus at the time of the exposition. He is now attending Milwaukee School of Engineering, Milwaukee, Wis.

EDWIN L. ANDREW, e '16, is with the Merchandising Section of the Department of Publicity of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

RAY E. BEHRENS, c '19, is now with the Wisconsin Highway Commission. He has only recently returned from South America where he was employed by the Aluminum Company of America.

PROF. BERGGREN and PROF. LARSON attended the recent meeting of the American Society of Industrial Engineers at Milwaukee, and while in the city visited the Lakeside Plant. They saw H. C. PROCHAZKA, m '12, who is an engineer with the Milwaukee Electric Railway & Light Co.

PAUL B. BEST, e '12, telephone engineer with the Central Union Telephone Company, has been transferred to Cleveland, Ohio, where mail will reach him in care of Ohio Bell Telephone Co.

BERNARD CONATY, c '18, dropped in during spring recess. He is now a field engineer with the Wallace & Tiernan Company of Chicago. FINLEY FISBECK, m '19, has a similar position with the same company.

WADE EDMUNDS, e '21, who finished last February, is now working with T. M. E. R. & L. Co., Milwaukee.

"BUD" EMANUEL, min '20, who has been working as mining engineer at Anaconda and at Hibbing, Minn., is at the present at his home, Fallcreek, Wis.

J. H. GEISSE, m '17, is employed as experimental engineer by the Wright Aeronautical Corporation, Paterson, N. J.

F. W. GREVE, m '08, has just prepared a paper for the A. S. C. E. on Parabolic Wiers. Mr. Greve is assistant professor of Hydraulics at Purdue University.

J. W. GRISWOLD, m '13, is a mechanical engineer, residing at 4025 Chestnut St., Philadelphia.

Among those who returned to the campus to celebrate Founder's Day were BILL BELLACK, E. B. MORSE, O. H. MARSHALL, BILL STEELE, GORDON FRATER, DON SLAKER, BILL MANTONYA, E. W. SCHMIDT, CARL KOTTLER, R. R. KNOERR, GEORGE ZAMZOW and W. ZAMZOW.

R. E. HAMILTON, e '20, is an engineer with the Central Electric Co. His home address is 1128 Michigan Ave., Fort Wayne, Ind.

HARRY HERSH, e '15, who has been with the Signal Electric Mfg. Co., of Menominee, Mich., for some time, is planning to go into business for himself at Milwaukee, about May 1. His temporary address will be 71-74 Cawker Bldg.

ROBERT D. HUGHES, c '13, is in business at Dayton, Ohio, under the firm name of Hughes White Truck Sales Co. His address is 119 Franklin Street.

H. R. HUNTLEY, e '20, is a transmission engineer with the Wisconsin Telephone Co., Milwaukee, Wis.

CLARK E. KAUFFMAN, m '17, is at present located in Milwaukee. His address is 200 Mason St.

H. E. KRANZ, e '14, E. E. '17, is a manufacturing methods engineer with the Western Electric Co., Dept 6425, Hawthorne, Ill.

"HANK" KURTZ, c '18, and "LOUIE" KIRCH, c '18, are with the People's Gas Company, Chicago.

W. H. LANGE, c-ex '21, stopped in Madison the week before Easter. He was on his way to take a position in the Green Bay division of the Highway Department. He had previously been employed by the Texas Highway Commission.

FRED V. LARKIN, g '06, M. E. '15, who has until recently been chief inspector for the Harrisburg Pipe and Pipe Bending Co., Harrisburg, Pa., is now professor of mechanical engineering at Lehigh University. He has been visiting various engineering colleges around the country and stopped off at Madison on his way to the meeting of the American Society of Industrial Engineers at Milwaukee.

H. O. LORD, c '20, who is employed by Mead & Seastone, is back again at the Madison office. He has been at Danville, Illinois, superintending a water supply project.

GEORGE T. MOORE, m '13, came down from Oshkosh to attend the exposition.

LOUIS C. NEWTON, m '17, is a construction engineer with the Stark Construction Co., Duluth, Minn. He resides at 4532 London Rd.

CARL R. OESTREICH, c '17, who has been with the Berger Mfg. Co., at Canton, Ohio, for a number of years, is now located at Dallas, Texas, where he may be reached in care of the same company.

"VINCE" O'SHEA, e-ex '21, has entered the commercial engineering department of the American Telegraph & Telephone Company, New York City.

RAYMOND C. PARLETT, m '16, is a mechanical engineer with the Johns-Manville Co., Madison and 41st St., New York City. His home address is 1509 Biddle St., Baltimore, Md.

J. O. REED, c '08, is with a mining company at Stigler, Okla.

L. C. ROCKETT, c '15, who is with the Wisconsin Highway Commission has removed to 46 Arlington Place, Oshkosh, Wis.

WILLIAM RYAN, c '18, is about to join the benedict class, according to the announcements. He is working for the Wisconsin Highway Commission.

O. J. SCHIEBER, c '12, who has been in the U. S. Reclamation Service, in Idaho, is now production engineer with the Southern California Edison Co., at Big Creek, Calif.

ETHAN W. SCHMIDT, m '19, is doing research work on electrolysis for the People's Gas Company, Chicago.

H. C. SCHMITT, c '13, has left his position with the city engineer of Milwaukee and is now located at Mason City, Ia. He has become interested in the Henkel Construction Co., of which firm CARL A. W. HENKEL, c '16, is also a member.

BOB SMITH, c '20, wishes to announce that he is deputy state engineer for the State of South Dakota. Bob writes that "The country seems to be interesting enough to attract a regular mob of engineers, but not many from Wisconsin. He also sends us the following alumni news:

CLAYTON J. LOOMER, c '12, is Engineer of Tests, South Dakota Highway Commission, Pierre, S. D.

PAUL S. EGBERT, c '16, is County Engineer, Brown County, with offices at Aberdeen, S. D.

EMIL F. STERN, m '19, is employed by the Worthington Pump and Machinery Corporation, West Allis, Wis. He is designing gas engines. His address is 7316 National Ave.

C. K. TEXTER, ch '14, Ch. E. 16,' who was formerly connected with a paper corporation at Howland, Maine, is now with the Northwest Paper Co. at Cloquet, Minn.

HOWARD THWAIT, c '16, is an assistant engineer for the Edward C. Gillen Co., Wells Bldg., Milwaukee.

J. REX VERNON, c '18, is assistant division engineer for the Wisconsin Highway Commission, at Lancaster.

W. H. WILLIAMS, e '96, sends word that his address is now Stevensville, Mich.

CAMPUS NOTES

By FREDERICK W. NOLTE

Now balmy breezes usher in the Spring
And Heaven's azure hemisphere is fair.
The flowers bud and bloom—the birds all sing
But I still don my winter underwear!

Now Nature seems about to laugh aloud
Above, the clouds like dabs of whipped cream float.
The earth is freed from Winter's glacial shroud
But I have not sent home my overcoat!

The ground is all inlaid with living green
Soon you and I will roam the hills together.
But wear your long ones—(You know what I mean)*
You'll find you cannot trust this gosh darn weather!
*Dear Kates,—Meaning long gloves.

Having got that out of our system, we very likely will not have any boils this year.

Bill Bellack (M. E.) blew in town the other day, and expounded the following theory. He says that even though a mechanical engineer quits his chosen profession and goes into the clothing business, the initials M. E. still apply. The new meaning is "Men's Emporium."

Tau Beta Pi announces the election of the following Juniors: F. A. Buese, M. K. Drewry, B. J. Bjornson, C. A. Andree, Ernst Guillemin, J. S. Baker, R. L. Paulus, G. W. Wegner, H. C. Hubbard, T. B. Maxfield, W. D. Trueblood, and L. E. Chase.

The engagement of Delmar Nelson to Miss Elizabeth Miller has been announced. Both are graduates of the class of 1920. Mr. Nelson has returned to continue his studies, having received a graduate fellowship in Mechanical Engineering.

Elections this year were well contested for the most part and some real old-time electioneering was carried on. Engineers gaining positions in the last elections are: S. B. Green business manager of the 1923 Badger; Al Knollin president of the Athletic Board; Everett Jones, Cardinal Board. The Athletic Board presidency went by default, but the other positions won by engineers were won under strong campaigning.

Every three or four weeks during the past months, the graduate students and several of the seniors in the Mining Department have held a seminar meeting at some down town restaurant. Dinner is followed by a paper, and a general discussion.

Papers which have been presented are:

"Mineral Resources of Armenia," by K. L. Hussissian.

"Development of United States Mining Laws," by Julian Conover.

"History and Development of the Compressed Air Rock Drill", by Marcus W. Link.

"Sub-Level Stopping on the Marquette Range", by Loyd M. Scofield.

It is planned to have two more meetings this year. At the next meeting, H. G. Hymer will present a paper on "Mine Examination". It is hoped that the meetings will be continued next year, as it is the opinion of all who have attended that they are well worth the time and effort.

Eta Kappa Nu announces the election of Bjorn Bjornson, Ray Paulus, E. J. Mohr, and Ernst Guillemin.

WHAT SAY, ENGINEERS?

The following letter from a Physical Ed has reached the sanctum of the ENGINEER:

"We were looking over an old ENGINEER the other day and found this,—'The Home Ecs and Agrics are always throwing parties. Why can't the Physical Eds and the Engineers get together?'

"Well, of course, we did not know before how you felt about it. When we want anything like that we just put a poster up in Lathrop with a sign here space. We asked the rest of the crowd about it and they all thought it a beautiful idea. They had all been just dying to look through those three legged telescopes and make funny wig wag signals, and now here is a chance, they thought It was suggested to combine hiking and survey. Of course, we couldn't compete with the Home Ecs in the kitchen, but we can make coffee over a camp fire and so, now that the open season for picnics is here—well, you see how it is with us, boys. When shall we go?"

Professor Ray Owen spent the spring vacation subdividing Camp Zachary Taylor, near Louisville, Ky., into building lots. The camp site is to be sold at auction.

AGRICULTURAL ENGINEERING

Longnecker recounts the following episode: an irrigation power project in Montana was attempted without first consulting the farmers, and with poor results. Sez they, "Can't do business with your company. We don't want that there water on our crops after all the electricity has been took out of it."

In an address before the Roxana Club of Madison, on April 19, Mr. Arthur F. Peabody, state architect, advocated the establishment of a school of architecture at the university. He estimated that $15,000 a year will support such a school, and went on to show the present inadequate facilities in this state for developing architects. The state is now dependent entirely upon outside schools.

The maneuvers of Wisconsin's crew this year are to be supervised and directed by two engineers. Art Samp, '22, has been elected captain, and Ed Hanley, '22, is to be coxswain. Samp is a brother of Eddie Samp, famous stroke on a Badger crew in the days when they rowed in the Hudson Regatta. The crew is to meet the Lincoln Park Boat Club of Chicago on Mendota, May 28, and on June 25 it is to travel to Duluth to meet Minnesota.

THE NELSON TROPHY

In the battle for the Nelson Trophy, the Engineers, on April 30, made large gains which enabled them to consolidate their position. The track meet was run off with the following results:

Engineers	64 1-3 points
L. & S.	23
Agriculture	14
Commerce	11 2-3

Point winners for the Engineers were: Sternlieb, 3rd. in the 100-yd. dash; Wade, 2nd. in the 220-yd. dash; Phillips, 1st. and Sternlieb, 2nd. in the 220-yd. low hurdles; Stuart, 2nd. in the half mile; Nelson, 2nd. in the mile; Gibson, 1st. and Bautz, tied for 2nd. in the high jump; Bautz, 1st. and Stegeman, 3rd. in the broad jump; Schroeder, 1st. and Woods, 2nd. in the shot put; Hammann, 1st. and Steele, 2nd. in the discus throw; Schroeder, 2nd. and Hammann, 3rd. in the javelin throw; Hammann and Tomlinson, tied for 1st. and Schmidt and Krieger, tied for 2nd. in the pole vault; Wade, 1st. and Rosecky, 3rd. in the 440-yd. run. If the Trophy doesn't repose in our lobby next year it will not be the fault of these fellows. Good work!

Prof. Kelso: (speaking of static electricity obtained by rubbing various substances with cat fur). "How long has electricity been known?"

Wee sma' voice in rear: "As long as cats have been tame."

John R. Smith, a graduate of the mechanical engineering course of the class of 1905, spoke to the junior and senior engineering students April 27, upon the subject of estimating. Mr. Smith, who is estimator for an electrical contracting firm in Chicago, told something of the incidents that led to the organization of the electrica estimators of that city into an association for the purpose of putting the art of estimating on a scientific basis so far as possible. He also went into the detailed methods used in his line of work. A record breaking crowd heard the address.

The Madison section of the A. I. E. E. met on April 27, 1921, to hear Mr. J. N. Cadby speak on problems in connection with extending electric service to prospective consumers. Mr. Cadby has had wide experience with these problems and gave an interesting lecture. This lecture was followed by a discussion of the possible use of iron wire for small loads by F. J. Singer and W. R. Lyon.

A bill before the state legislature, raising the non-resident tuition to $300, was killed by an overwhelming majority at roll call. Yes, people, we are still the free-minded, progressive state that you have known.

Pi Tau Sigma announces the election of the following juniors: E. A. Longenecker, R. F. Kellogg, N. C. Richardson, R. P. Bethke, J. P. Woods, Earl Hanson.

THE OMNIPRESENT PUPIL

"Pat" Hyland: (calling roll). "Where is he?" Helpul voice from rear: "He's here, but he's down stairs."

Dean Turneaure and Professor Kinne spent part of the spring vacation making tests on the high arch bridge at Niagara Falls.

THE SUB-CONSCIOUS MIND

Prof. Warren Mead—"What mountains of the central United States were above water in the early prehistoric period?"

Schubring—(snoring in back row)—"Oh-h-h-z-z-z-ark-k."

Prof. Mead—"Correct,—the Ozark Mountains.

A. A. E.

At the April chapter meeting Mr. Baker of the Wisconsin Sanitation Commission gave a lecture of "Sanitary Engineering". The lecture was followed by some motion pictures on aviation.

Not to be inquisitive at all, y' understand, but have you a job yet?