# The Wisconsin engineer. Vol. 26, No. 3 December 1921

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

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

Dec 13(?) 1921
1350 Copies

# The WISCONSIN ENGINEER

Published by the Engineering Students of
THE UNIVERSITY OF WISCONSIN

VOL. XXVI MADISON, WISCONSIN, DECEMBER, 1921. No. 3

OUR EARLY WINTER
*The Upper Campus on November 8, 1921*

Volume 26 Founded 1896 No. 3

# THE WISCONSIN ENGINEER

$1.50 a Year *Copyright*, 1921. 25c a Copy

 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

*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 of 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.

## TABLE OF CONTENTS

# The Wisconsin Engineer

UNIVERSITY OF WISCONSIN

VOL. XXVI, NO. 3 MADISON, WIS. DECEMBER, 1921


## THE MINNESOTA-WISCONSIN BOUNDARY SURVEY AT DULUTH AND SUPERIOR


By GORDON F. DAGGETT, C '20*

*Assistant Engineer — Construction, The Wisconsin Highway Commission, and Consulting Engineer for Wisconsin on the Boundary Survey.*


During the Fall of 1920, Mr. John G. D. Mack, State Chief Engineer of Wisconsin, requested me to represent him formally in the location and subsequent surveying work on the Minnesota-Wisconsin interstate boundary line at the "twin ports". I little realized the significance of the matter until I began to study commerce and harbor conditions. Believing that others may not realize the amount of commerce passing yearly through the twin ports at Duluth and Superior, I will attempt to give the reader an idea of what the boundary discussion is about and how it started.

*Importance of the Twin Ports*

Harbor improvements were started years ago under federal and local appropriations and of necessity have increased to handle the commerce properly. Shipments have steadily increased until, in the year 1913, the total tonnage passing through the harbor reached 47 million tons. Figure 1 is interesting in that it shows the rise and fall of the commerce curve with a steady upward trend.


*Importance of the Twin Ports*

Harbor improvements were started years ago under federal and local appropriations and of necessity have increased to handle the commerce properly. Shipments have steadily increased until, in the year 1913, the total tonnage passing through the barbor reached 47 million tons. Figure 1 is interesting in that it shows the rise and fall of the commerce curve with a steady upward trend.


Tables I to IV also give some very interesting information about the last two years. It will be noted that last year (1920) the total value of all cargoes clearing through the "twin ports" passed the 550 million dollar mark,—an astonishing figure.

**At the time this is written, while the war-weary nations of the world are in conference trying to find some way to lessen armaments and avoid war, the states of Minnesota and Wisconsin are settling an irritating boundary dispute by peaceful methods. Like all boundary disputes this one has an economic basis; it involves the right to tax valuable dock property at Superior and Duluth. Nations have gone to war over matter of less material importance; but this dispute is being settled with no army other than a thin little survey party, and no artillery other than the "guns" of the engineers. It looks simple enough.**

*The Boundary*

The boundary is described in the state constitution of Wisconsin as, "* * * thence through Lake Superior to the mouth of the St. Louis River; thence up the main channel of said river to the first rapids in the same above the Indian village (Fond du Lac, Minn.,) * * *."

For a portion of the distance there were three river channels of navigation. Wisconsin was naturally anxious to secure the greatest return possible from the commerce taxation and laid claim to the most westerly one of the three channels of navigation as the boundary between the two states. She accordingly assessed docks and personal property that were on the Duluth side of the harbor. In other words, several dock companies were taxed in both states and forced to pay said taxes, which they did under strong protest. This practice of double taxation was continued from 1913 to 1917, when sentiment in reference to the boundary became very strong. Finally, in 1918, Minnesota filed suit against Wisconsin in the

*Mr. Daggett was Wisconsin's active representative in this important case and deserves a large portion of the credit for the careful and skillful way in which the position of the boundary line was determined and marked. His selection for the responsibility by State Engineer Mack was a recognition of his wide experience in the field of civil engineering and his well-established reputation for care and thoroughness. He has had a year and one-half of municipal practice, three and one-half years as chief of party on all classes of surveys, one and one-half years in general contracting, and seven and one-half years with the Wisconsin Highway Commission.

The year of Mr. Daggett's class, as given above, is somewhat misleading. He entered Wisconsin University in 1912, from Washington State University, as a junior. He made an excellent record, and, during his second year was appointed student assistant in the Railway Engineering department. At the end of two years he lacked a few credits for graduation, and, as he was married, he decided to make them up through the Extension Department rather than spend a semester in school. His spare moments for six years were devoted to these correspondence courses which were completed in 1920.—(Editor)

Supreme Court of the United States, praying for a definite determination and establishment of the state line. After considerable litigation covering a period of two years, the Supreme Court, in October, 1920, handed down a preliminary decree establishing the boundary as follows:

"Said boundary line runs from a point midway between Rice's Point and Connor's Point through the middle of Lower St. Louis Bay to and with the deep channel leading to Upper St. Louis Bay and to a point therein

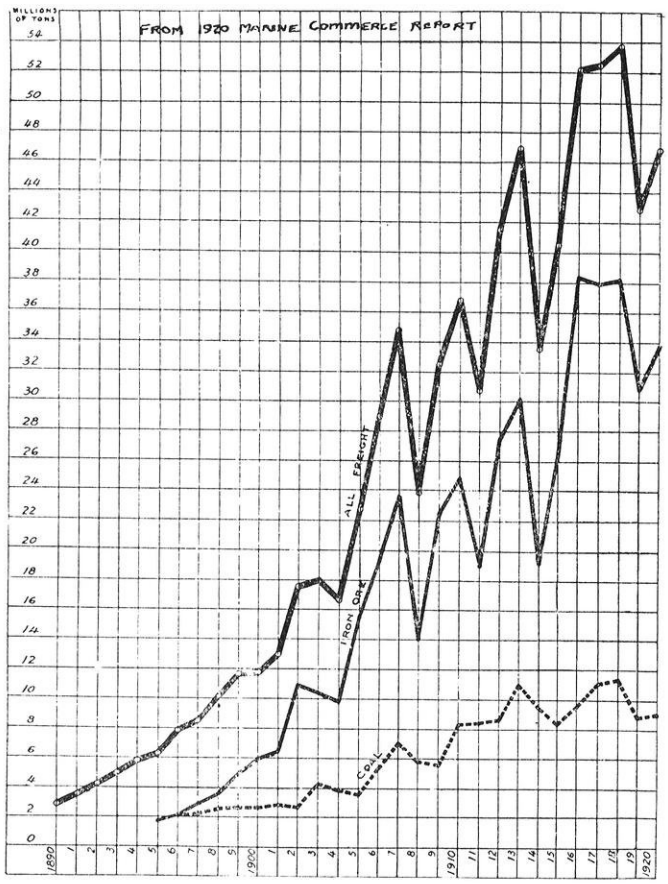



Fig. 1: Vessel Freight Received and Shipped, Duluth-Superior Harbor.

*1890 to 1920*

immediately south of the southern extremity of Grassy Point, thence westward along the most direct course through water not less than eight feet deep eastward of Fisherman's Island, * * * approximately one mile to the deep channel and immediately west of the bar therein, thence with such channel north and west of Big Island up stream to the "Falls".

In accordance with the Supreme Court's decree there was appointed a commission composed of Mr. Samuel S. Gannett, Chief Geographer of the U. S. Geological Survey, Washington, D. C., Mr. William B. Patton, Manager of the Duluth Engineering Company, Duluth, Minnesota, and Mr. John G. D. Mack, State Chief Engineer of Wisconsin at Madison. These commissioners were instructed "to run, locate and designate the boundary line * * * ". The Commissioners held their first meeting on October 29, 1920, at Duluth, Minnesota, and organized by electing Mr. Gannett as chairman.

In 1859-61 Captain George J. Meade, later Gen. Meade, was instructed to make both hydrographic and topographic surveys in the vicinity of the twin ports, for the purpose of making charts containing reliable information for uses of navigation, and permanently establishing a triangulation system on which future surveys could be hung. To accomplish this purpose it was necessary for Captain Meade to establish a base line, which he did on Minnesota Point. The primary base was established for a length of approximately 19,000 feet, this being the greatest length obtainable in one tangent and located on land. This base line was later proven and accepted by the United States Coast and Geodetic Survey. The north end was termed "Minnesota Point North Base," and referenced by latitude and longitude.

In carrying out the decree of the court that the "boundary line must be ascertained upon a consideration of the situation existing in 1846 and accurately described by the Meade chart", the commission made a careful study of the Meade chart filed as Minnesota's exhibit No. 1 and found that the scale of 1:32000 was too small for practical use in determining a line which could be laid out and properly monumented; and that the triangulation points of the original Meade survey, shown on the original Meade map, were omitted from the chart. An attempt was then made to use photographic copies of the original Meade map submitted as exhibits by Wisconsin, but it was found that the process of reproduction had caused unequal shrinkage in the several sheets composing the map, and that no accurate scalings could be made therefrom. It was then necessary to secure an accurate copy of the Meade map, the original of which is on file in the office of the United States Lake Survey at Detroit, Michigan. Under the personal supervision of Mr. Gannett, an accurate copy of this original tracing was made at Detroit and formed the basis of the commission's office records.

The triangulation points heretofore noted as being platted on the original Meade map are located in the records of the U. S. Lake Survey by rectangular co-ordinates, referring to the primary triangulation station designated as Minnesota Point North Base.

The original Meade triangulation points have not been in existence for some years, but the Corps of Engineers, U. S. Army, in later surveys of the St. Louis Bays and River, had established new triangulation points and referred the same by rectangular co-ordinates to the aforesaid Minnesota Point North Base. By securing a copy of the official co-ordinates of these later triangulation points, the commission was able to relocate accurately the original Meade triangulation points, and to show the new ones on the Meade map in their true positions. It was then possible to "tie in" by scale any points or lines on said map to these triangulation points and to transfer said points or lines to the ground by similar measurements from said triangulation points.

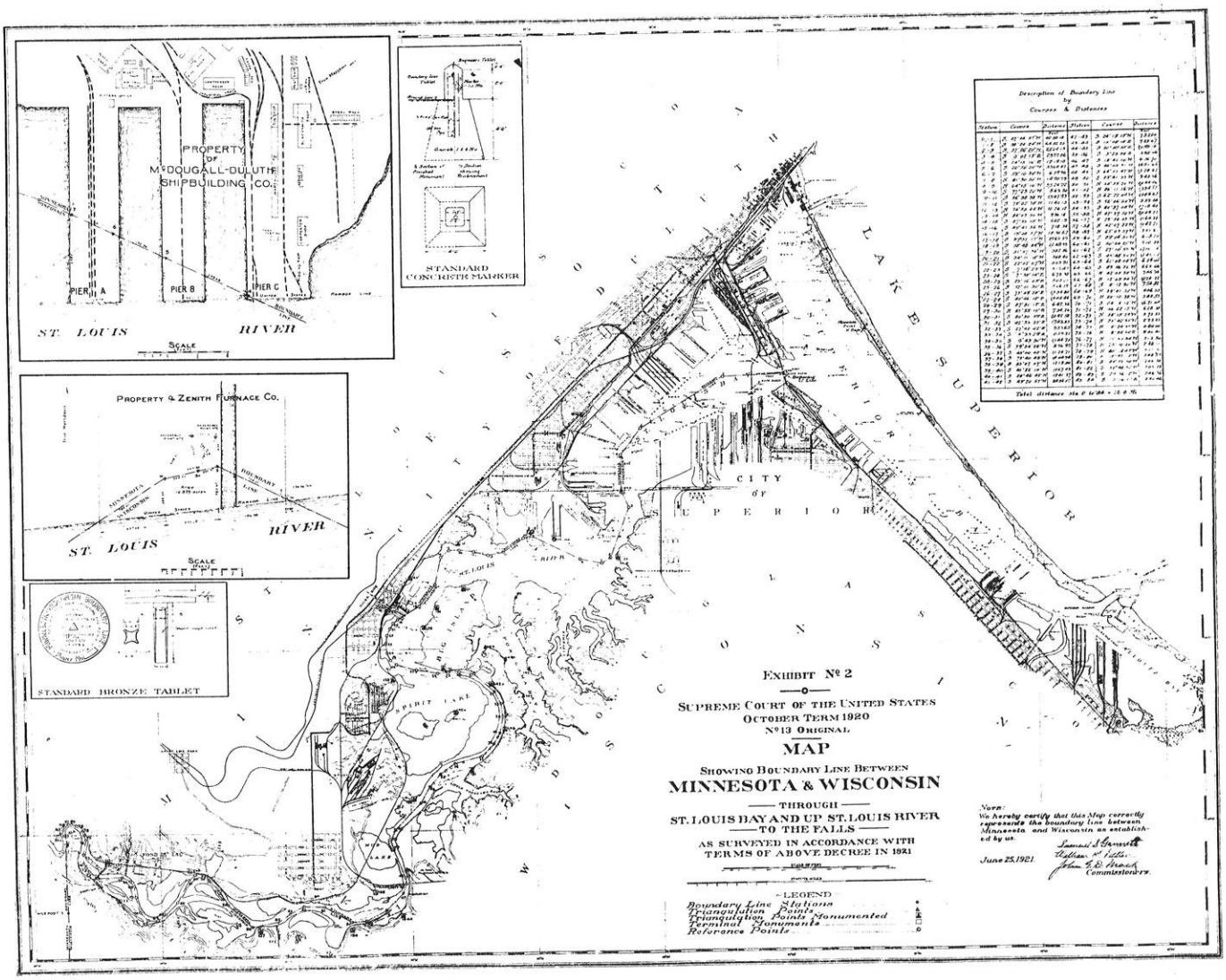
The Commission, with this information at hand, laid down on the tracing of the original Meade map the boundary line between the States of Minnesota and Wis-

consin, in accordance with the decree of the court. The center of the pivot pier of the Interstate bridge between the cities of Superior, Wisconsin, and Duluth, Minnesota, was found to be the point midway between Rice's and Connor's Points and was designated as station No. O. From this point as a beginning, a series of straight lines was laid out to conform with the decree of the Court, special care being taken to have the lines over the deepest continuous channel and yet over water "not less than 8′ deep" as shown by the Meade map. The angle points were numbered consecutively, starting with zero.

From such of these angle points as were convenient, ties were scaled to the best situated triangulation points on the map, and by means of rectangular co-ordinates from every angle point on the lines between the ties, to triangulation points, the lengths and angles of deviation of the several lines were calculated and closed polygons formed. These polygons were then checked as to closure by the method of latitudes and departures and any errors found were balanced so as to secure closure. By this means the commissioners were enabled, with a close approach to accuracy, to determine the length and angles of deviation of the several lines composing the projected boundary line.

The courses and distances thus determined, and the ties to the several triangulation points, were used as preliminay field notes by the surveying party.

For that portion of the St. Louis River, which lies beyond Fond du Lac and extends to the Falls, and which is now shown on the Meade chart or map, the commission established the center line of the river as a medial line between the shore lines, and designated said medial line as the boundary line.




OFFICIAL MAP OF THE MINNESOTA-WISCONSIN BOUNDARY LINE

## *The Survey*

The boundary line, except in a few instances, runs over water from eight feet to over twenty feet in depth, and hence the most convenient time for surveying it was after ice had formed to a safe thickness. The winter proved to be mild and the ice conditions unfavorable, adding greatly to the danger and difficulty of the work and increasing the time necessary to finish it.

The surveying party was organized early in January, 1921, and the necessary equipment was rented or purchased. The party consisted of an engineer, two chain-

men, one flagman, and one general utility man. Starting at Station O. on the Interstate bridge, the approximate position of the boundary line was laid out on the ice in the Bay and River. Such discrepancies due to the curvature of the earth or to errors in scaling from the map, as were shown by measuring the ties, were allowed for and distributed in the angles and distances over all the lines back to the preceding tie. If any great discrepancy was discovered, the lines involved were re-run before any adjustments were made. All bearings were run in azimuth, and direct solar observations were taken at least once every day and at every angle point, except from stations 74 to 84 where the courses are very short. From the final field notes of the adjusted survey, a description of the boundary line by courses and distances was obtained. The field work was completed March 19, 1921.

The instrument used in making the survey was a transit-theodolite with 6½-inch circle and reading to 10 seconds of arc. The measurements were made on the ice with a steel tape 300′ in length under a tension of 20 pounds and corrected to temperature of 62° F. The commission employed as assistants the following named persons: Gordon F. Daggett, Madison, Wisconsin, consulting engineer; Lyonel Ayres, Duluth, Minnesota, consulting engineer; Paul Lillard, Madison, Wis., transitman in charge of field party, and the necessary number of assistants for office and field work.

*Monuments*

Most of the triangulation points established by the Corps of Engineers, U. S. Army, had been marked by iron pipes, 2 inches in diameter and 4 feet long, set in the ground and capped by 3½-inch bronze tablets, cemented in the top thereof and inscribed, "Corps of Engineers, U. S. Army. Do not move without authority of the U. S. Engineer Office, Duluth, Minn.", and also bearing the identification mark of the particular point. With the consent of the U. S. Engineer Office at Duluth, the pipes were removed and concrete monuments constructed in their places by the Boundary Line Commission. The bronze tablet before mentioned was reset in the top surface of the monument, and another bronze tablet 3.9 inches in diameter and inscribed, "Minnesota-Wisconsin Boundary Line. $250 fine for disturbing this point. Set in 1921 under orders of the Supreme Court of the United States. Reference Point Number ———", was cemented into the side of the monument facing the boundary line.

The monuments weigh about two tons each. The base, which is constructed of concrete composed of one part cement, two parts sand, and four parts crushed stone, measures four feet square at the bottom, two feet square at the top and extends four feet below the surface of the ground. This base is surmounted by a prism composed of one part cement and one part sand, said prism being 15 inches square and 2 feet high, with a rounded top into the center of which was set the engineer's bronze tablet and on the side of which was set the boundary line commission's tablet. Each monument was reinforced by iron rods ½ inch in diameter and 4 feet in length.

Owing to the frozen condition of the ground it was not possible to begin the construction of these monuments until the latter part of April, and this branch of the work was not completed until June 15.

The Commission prepared a map drawn on the scale

*(Concluded on page 56)*

TABLE I

Value of Cargoes passed through the Duluth-Superior Harbor in 1919. (1)

| Commodity | Cargo Units Passed Through Harbor | | Value of Cargo |
|---|---|---|---|
| Iron ore | 27,522,198 | Tons | $126,326,889 |
| Coal — hard | 1,795,257 | " | 16,211,171 |
| Coal — soft | 7,079,840 | " | 38,231,136 |
| Manufactured Iron | 76,858 | " | 7,040,192 |
| Oils | 1,848,830 | Bbls. | 20,910,268 |
| Grains (all) | 43,645,325 | Bu. | 80,257,171 |
| Flour | 4,935,494 | Bbls. | 54,290,434 |
| All other commodities (various) | | | 100,770,367 |
| Total | | | $444,037,628 |

TABLE II

Value of Cargoes passed through the Duluth-Superior Harbor in 1920. (1)

| Commodity | Cargo Units Passed Through Harbor | | Value of Cargo |
|---|---|---|---|
| Iron ore | 30,153,198 | Tons | $150,162,926 |
| Coal — hard | 1,637,477 | " | 67,647,954 |
| Coal — soft | 7,393,219 | " | 18,552,614 |
| Manufactured Iron | 50,902 | " | 3,946,432 |
| Oils | 1,951,141 | Bbls. | 26,925,746 |
| Grains (all) | 62,739,557 | Bu. | 130,466,668 |
| Flour | 5,294,576 | Bbls. | 60,887,624 |
| All other commodities (various) | | | 94,310,069 |
| Total | | | $552,900,033 |

TABLE III.

General Statistics for Duluth-Superior Harbor, Years of 1919 and 1920. (1)

| Year | 1919 | 1920 |
|---|---|---|
| Length of Shipping Season | 240 days | 238 days |
| Average Tonnage per boat | 4,076 | 4,111 |
| " " per day | 178,758 | 196,664 |
| Passenger Traffic (persons) | 40,119 | 43,876 |
| Maximum Boat-load (net tons) | 15,355 | 15,833 |

TABLE IV.

Showing the relative standing of the largest six ports, based on total tonnage passing through. (1)

— 1919 —

1. New York
2. Duluth-Superior
2. Philadelphia
4. Norfolk
5. Buffalo
6. Baltimore

(1) From "Statistical Reports of Marine Commerce."

# SLIDE RULE SELECTION

By James Theron Rood,

*Professor of Electrical Engineering*

To the uninitiated in slide rule operation all slide rules are, without distinction, slide rules, but to the experienced user each slide rule belongs to a given type, class or construction, has certain scales or groups of scales peculiar to itself, and is especially adapted to certain types of computation. This knowledge should be in the hands of every one when buying his first slide rule, for, while a well selected rule is sure to be a continuous source of pleasure to one using it, a poorly selected rule is certain to be the opposite.

**So many inquiries have been made of faculty members as to the kind of slide rules engineering students should buy that Prof. Rood, as faculty representative, kindly consented to write this article. It is thought that present freshmen, after reading Prof. Rood's short but complete discussion, will be able to choose their slide rules more wisely than did members of the preceding classes.**

*Shapes*

Slide rules are constructed in the following shapes: (1) Circular or watchcase, (2) cylindrical or drum, and, (3) the common sliding or stick type. The circular type is rarely used, and in its ordinary form is hardly more than a toy. The drum form is an accurate computing machine but is too expensive, bulky, and slow, except for office work. The third type is the one commonly known as the slide rule.

*Lengths*

Slide rules are made in 4, 5, 8, 10, 16, and 20-inch lengths. The 4- and 5-inch lengths are sometimes used as pocket scales by engineers when out on a job, but the accuracy is too low for any except approximation work. The 16- and 20-inch rules are used in office computations where greater accuracy is demanded than is possible with 8- and 10-inch rules; but their operation is much slower, and they are much more liable to warp and get out of line. For all general computation work the 8- or 10-inch length should be used and the 10-inch should be purchased in preference to the 8-inch on account of the greater accuracy of the 10-inch, which more than compensates for its somewhat slower operation.

*Material*

Metals have been tried but have proved unsatisfactory; and wood is the material used. The earliest slide rules were of boxwood with their scales engraved directly upon the wood; and they are still made and sold, but should not be purchased, since, for a slight additional sum, a rule may be had with the scales engraved on white facings. With white-faced rules the woods commonly used are boxwood, cedar and mahogany. For rules not provided with means for adjusting the tightness of the slide, the boxwood scale is the most satisfactory since it does not readily warp and stands rough usage. It is, however, slightly heavier to hold. Most of the more expensive modern rules are provided with slide adjustments and are mostly made of light mahogany or cedar. They are lighter and more attractive but are more easily injured; also more affected by dampness.

*Types*

There are two types or constructions of slide rules. First, the simple or solid-back type, where the slide can be read over its entire length only on the front, the scales on the rear face of the slide being visible only where they project to one side or the other of the rule. This type is called the *Mannheim* rule, after its inventor. Second, the *duplex* or double-face type. Here the sides of the rule are of the same thickness as the slide, which moves between them, and all scales can be read over their entire length, front or back of rule. The Mannheim type is stronger and more rugged than the duplex, but more scales can be engraved on the duplex, which permits faster operation with some types of computation.

*Scales*

I. Mannheim Rules: (a) The simplest form of Mannheim rule has four scales on the front of the rule and three on the rear face of the slide. Those on the front for multiplication and division, squares, cubes, square and cube roots are the A-B and C-D scales, the top or A-B pair being the square of the bottom or C-D scales. On the back of the slide are scales of sines, tangents, and logarithms, or S, T, and L. With this simplest form all calculations can be performed that can be done on any of the more expensive rules with more scales, the only drawback being that a greater number of sets for a given computation may be required with the Mannheim form so that there may be greater possibility for error. On the other hand, the fewer number of scales is less confusing, and there is less liability of reading or setting on the wrong scale. For calculations not involving any considerable number of terms of cubes or cube roots, the simple Mannheim rule is to be recommended, especially to the beginner. (b) The second form of the Mannhim type is *the polyphase rule.* This has on the face of the rule two additional scales, on one edge a K scale of cubes of the C scale, and along the center of the slide a CI scale, an inversion of the C scale, from which recipro-

cals can be read or can be used directly as factors. With these scales fewer sets are required with some types of computations, giving the answer more quickly and with less liability of error. Since the price of this rule is only slightly greater than that of a good Mannheim, the polyphase rule finds wide use.

II. Duplex Rules: Duplex rules are commonly of two forms. *(a) Polyphase duplex rule.* This has the same scales as the polyphase Mannheim form except that they are engraved on the duplex construction. Frequently this rule also has some additional scales, such as CF, DF and CIF, which are folded C, D, and CI scales, engraved so as to bring the values of $\pi$ over the end lines of the C-D scales. On account of these extra scales this rule in the hands of an expert can be operated faster than the Mannheim polyphase. In the hands of a beginner these extra scales are apt to be confusing. *(b) Log log rule.* This is similar to the polyphase duplex rule except that one of the extra scales of the polyphase is replaced by a log log scale. By means of this scale any roots or powers of numbers can be had, commonly over a range of 1 to 22,000. This is the most complete, as well as the most costly of the simple slide rules. If the user cares to devote enough time to become master of this rule, it is, possibly, the most satisfactory of all the slide rules.

III. Special Scale Rules. A number of special slide rules have been developed for particular types of computations. Some of these are the merchant's, stadia, area, sewer, power computing, friction head, chemist's, Roylance electrical rule, and others. These rules, with the exception of the surveyor's or astronomical rule and the Roylance rule, are not adapted for general computation work. Their purchase is not recommended except for the specific use for which they were designed. Their function is to supplement the general rules.

*Cursor or Runner*

The less expensive slide rules are usually provided with cursors or runners of glass, set in a metal frame, generally of aluminum. With higher price rules a "frameless" runner is generally supplied. This has no side frames, the glass being screwed at the corners to top and bottom pieces. The frame form is much stronger and is not so liable to be broken if the rule is let fall. The frame, however, obstructs the full view of the rule, making the scales harder to read, with corresponding chance of mistakes. The frameless form gives a clear vision but the glass is liable to crack across the corner screw holes if the rule is let drop. Frameless runners of celluloid material like Xylonite can be had which are practically unbreakable, but they are not yet transparent enough to be satisfactory. Runners having two parallel "hair lines" or scratches should be avoided, as they are almost certain to produce errors in sets.

*Magnifiers*

Inexpensive magnifiers can be had in the form of cylindrical lenses ready to be slipped over the standard cursor. These increase the accuracy in estimating the subdivisions of the graduations, but they make the reading slower and there is danger of parallax unless the lens is held squarely in front of the eyes. They require a special shape of carrying case. In general these magnifirs are not to be recommended for general use with the 8- or 10- inch rule but are a help with the 16- and 20-inch rules.

*Selection of Rule*

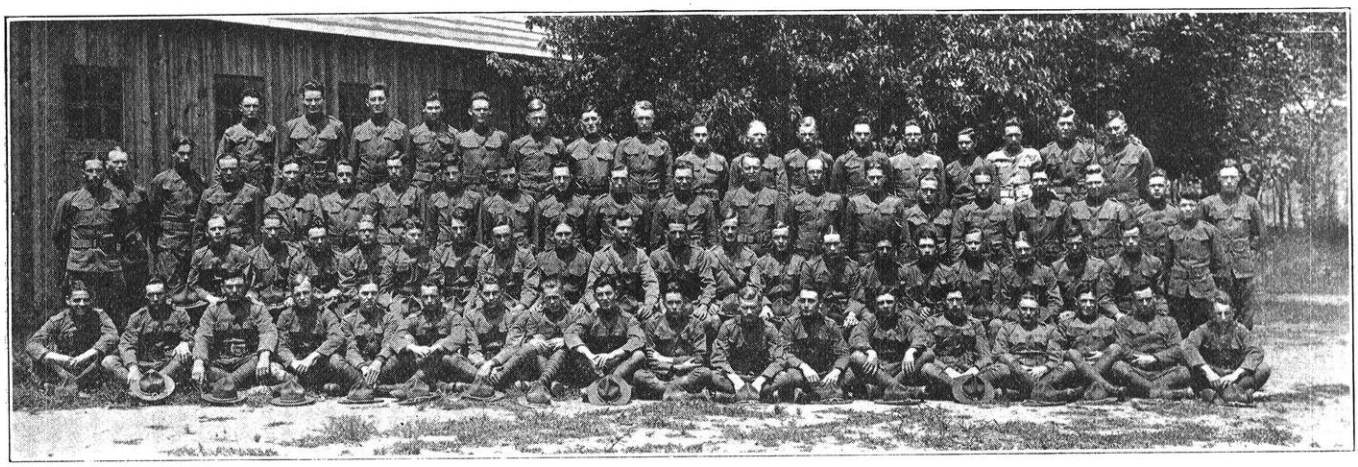
If the least expensive rule is desired,—a rule for general computation, select the simple, non-adjustable Mannheim rule, preferably of boxwood with white facings, costing between four and five dollars. The Mannheim rule in the adjustable form, of lighter wood and with frameless runner can be had for about six or seven dollars. The adjustable Mannheim polyphase rule is usually priced from seven to eight dollars. In many ways this is probably the best general utility rule for most slide rule users. The duplex rules,—polyphase and log log, come at about ten and twelve dollars. If the engineer desires to become expert with the highest form of portable slide rule, he should purchase a rule of this type, but for an ordinary user the simpler forms are fully as satisfactory. The higher prices asked for the more complicated rules should not deter an engineer from obtaining and using some one of the simpler type rules.

Whatever type of rule is determined upon, there are several tests that a rule should be subjected to before it is purchased. For this reason it is always rather questionable to order a slide rule through the mail, unless return privilege is had. *(1) End line test:* Set the slide so that all the end lines at one end of the rule are in exact coincidence; then see if all the end lines at the other end of the rule are precisely in line. Reject the rule if it fails under this test. If the rule is a duplex one, all the end lines on both faces should be in coincidence together. *(2) Center line test:* Set together the 9's on the A-B scales or the 3's on the C-D scales; then, (a) all the other lines should register correctly, and, (b) the end lines should coincide properly. Only a slight departure from these should be allowed. *(3) Cursor line test:* With the scale lines set as in the last test, bring the cursor hair line direct over, say, the 9 of the A scale or the 3 of the D scale; then the cursor line should register correctly over all the corresponding lines of the other scales. If this does not hold, the cursor is skewed, and correct transfer from one scale to another can not be had. With a duplex rule, the cursor lines on both faces should register correctly with the same setting. *(4) Slide working:* The slide, at first, should not move too freely, but should not require any considerable amount of force to move it, as this tends to warp it. *(5) Warps:* See that there is no warping of the edges and faces of the rule. This applies especially to duplex rules. *(6) Crack widths:* Be certain that the crack lines between the slide and the outside sections of the rule are of uniform width throughout their lengths, especially not wider in the center than at the ends. If the separation is not uniform, the slide may be properly tight when in its midposition, but will be loose and wabbly when drawn out at either end. This is one of the most bothersome faults that a slide rule can have.

# THE SIGNAL CORPS CAMP

O. F. LANDKAMER
*Sophomore Electrical*

Camp Vail, New Jersey! To some fifty Wisconsin engineers that phrase contains a world of significance. It brings back pleasant memories of the six weeks' vacation on the Atlantic Coast, which, for wholesome fun and pure enjoyment, they know can never be duplicated. The incentive to write this meager account of their experiences is based upon that fact, for each of those fifty men, through the voice of the Camp Vail Club, wishes to extend a hearty appeal to every Electrical to attend this camp sometime during his undergraduate life.



WISCONSIN ENGINEERS AT CAMP VAIL
*About 50 Electricals Attended the Camp*

Camp Vail is located about fifty miles south of New York, near the Atlantic Coast. It is the only Signal Corps Camp in the United States. During the summer a part of this camp is reserved for the Signal Corps of the R. O. T. C. Men from almost every important college and university in the country assemble there for their training and it was to that place that fifty ambitious Wisconsin students embarked for a summer's adventure.

They left Madison early one morning in June, which might have been the proverbial "fine morning in June" had it not been so unreasonably early. The approach of the train that was to carry them away, was heralded by some as a godsent haven of rest and refuge, for these young gallants, realizing that it would be many weeks before they gazed into "the light that lies and lies in certain eyes", had taken the entire night to say goodby to the fair possessors of those optics. Consequently, recuperation was sorely needed.

### *The Trip East*

The journey to camp took them through a wonderland of beautiful scenery and impressive sights. Sunrise in the Adirondacks, the famous Horseshoe Curve, the belching furnaces of Pittsburgh, were but a small part of the ever-shifting panorama which sixty miles an hour could unfold before their eyes. The entire trip was replete with thrills, but a few members of the party received more than a thrill as they passed through Pittsburgh. The great blast furnaces of that city, when seen at night, suggested an inferno, rather than a great industry. The train happened to pass these furnaces when most of the party were asleep. However, the noise and glare awoke many and the less angelic men immediately thought their day of judgment was at hand. Great was their relief and better their lives, for the next few days at least, when they discovered their mistake. However, these significant impressions, together with the superb service and accommodations of the Pennsylvania Railroad, made the first venture of their summer's experience a success in every detail. They were soon to find that the trip was a fitting introduction to the most enjoyable six weeks of their lives.

### *Camp Life*

The primary purpose at camp was to train for commissions as reserve officers in the Signal Corps. The work, if it could be called such, was both interesting and varied. It covered a wide range of subjects, giving only the essentials of each, without going into monotonous details. The men were made acquainted with radio, airplane communication, codes and ciphers, the organization of the army, and numerous other important subjects, many of which the average individual cannot conceive as being an important part of the army and particularly of the Signal Corps. Prominent army officers, men thoroughly trained in their respective arms of the service, lectured on the more important subjects. It is almost a misnomer to call these talks lectures, for, by no means, did they resemble the cut and dried lectures often heard on the campus. They were brimful of personal experiences and interesting incidents. The members of the camp will not soon forget such men as Majors Brant and Worcester, Mr. Friedman and others. After hearing these men talk one is bound to have a better conception of the size and scope of the army and the important function it plays in our national life. The lectures were

supplemented by copious notes and practical experience whenever possible.

Camp life was as healthful as God and man could make it. The men were housed in semi-permanent army tents which permitted the maximum protection from inclement weather with the minimum resistance to the invigorating ocean breezes of the Atlantic. The food served was plain yet wholesome. However, on numerous occasions such delicacies as clams, choice puddings, roast duck, chicken, and ice cream were included in the menu. The food was prepared by regulars of the army, which obviated any possible K. P. for members of the R. O. T. C.

Aside from the natural entertainment and amusement which the location of the camp afforded, every effort was made by the authorities to furnish good, wholesome recreation. Wednesday afternoons were devoted entirely to supervised athletics. A baseball league was organized and keen competition developed among the companies. Two first class concrete tennis courts were built for the exclusive use of the R. O. T. C. Track, boxing, and wrestling were sports which resulted in strong competition at the annual field day. On this occasion medals were awarded to all men who placed in these events. Wisconsin was well represented at this meet. Gluesing and Seitz were stellar performers, receiving three medals each. The captains of the companies personally coached individuals for this meet. Trenary especially received a great deal of attention. On one occasion he was permitted to train for cross country by leaving the ranks to double time around the Red Cross Hut about a half mile distant under the watchful eyes of the entire company. So well did he perform that he never had to train in a similar manner again. Twice a week an exodus from camp to the beach took place, via army trucks, for a swim in the ocean. The novelty of the sport made those days the gala days of the week. To gently float on an incoming swell one moment, only to be buried under ten feet of salt brine the next, is a sport which every man enjoyed to the utmost. Happiness and surf-bathing are synonomous terms. It was always a happy yet reluctant crowd that answered the whistle signal calling them back to camp.

Socially, the camp was a tremendous success. Weekly dances were held in the Service Club, and it was not unusual to have standing room at a premium on these occasions. Schacht, much to the consternation of some and the surprise of all, proved to be the social lion of the camp. His feats among the women will always be camp tradition. Romances were numerous, many of them being triangular affairs. The most famous of the latter was the Griswold, Wolff, X—— combination. However, ill-feeling with the possible remote catastrophe of the extinction of one of the parties was always averted. D. Schmitt was the lesser half in one of the dual affairs which may later develop into serious complexities.

Several good entertainers were discovered among the rank and file. Extraordinary talent in that line was displayed by many, but Gluesing proved to be the star performer of the camp. His interpretative dances, enhanced by his costumes, were the features of many spare moments' entertainment.

*Touring the East*

The location of the camp afforded excellent opportunity to visit places and cities of importance. New York

EN ROUTE FOR A SWIM
*Twice a week the gang went for a plunge in the Atlantic*

could be reached for the small sum of fifty-five cents, and needless to say, every man availed himself of the opportunity to visit the Wonder City several times. Some became such seasoned sight-seekers that they used the rubber-neck wagons as sleepers. These men, notably Gregg and Rahr, showed their profound contempt for the wealth and majesty of New York by utilizing a ride along Fifth Avenue as a proper time at which to obtain rest, evidently much needed. Although the camp was under military discipline, passes and special privileges were liberally given, and every possible opportunity extended to the men to visit surrounding places.

*The Homeward Journey*

As the time for the closing of camp approached, it was with a feeling of reluctance that the men prepared for the homeward journey. Every day of the six weeks spent at Vail had been filled with a wealth of new ideas and new experiences. Therefore it was only natural that the men should regret to see those wonderful days end. However, no effort was spared to make the return home a fitting climax to this summer of summers. A large number of men chose a route which took them up the Hudson, past the Atlantic fleet and the famous Palisades, to Albany, thence to Buffalo and Niagara Falls with a short sojourn into Canada for good measure. Proceeding onward over Lake Erie, the state of Michigan and Lake Michigan, the weary but happy wayfarers finally reached Milwaukee, poor financially, but rich in experience. So depleted were the coffers of the party that had it not been for the charitable assistance of the citizens of Milwaukee some of the men might have completed the remainder of the journey to their respective homes, by means of their pedal extremities. Paupers were plentiful, but Williams was more pauperized than the rest.

*(Concluded on page 56)*

# THE COMMON PIN

JOHN G. D. MACK,
*State Chief Engineer.*

Some time ago, while visiting my mother, we were looking over some old papers which had been bundled together possibly sixty years before. Upon unpinning a package, my mother said, "There is an old-fashioned pin", the difference having escaped my observation.

Upon examining it closely, being the first one of the kind I had ever seen, it recalled a description of pin making in Adam Smith's "Wealth of Nations" (1775), this being the form which he described, as it was the design then in use.

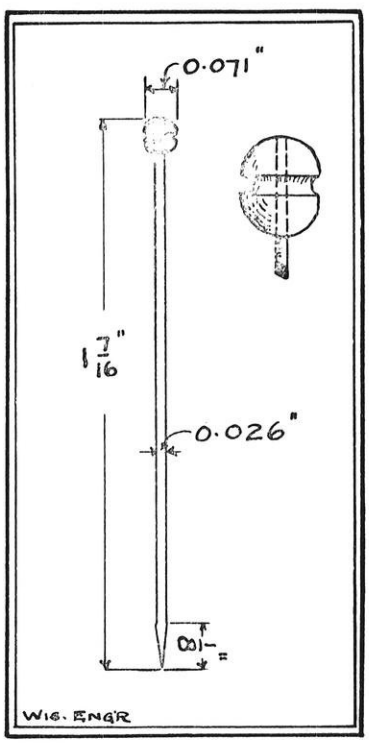
Adam Smith used the making of pins to illustrate the division of labor, the description being in Volume 1, Book 1, Chapter 1, page 2, the subject of Chapter 1 being "Of the Division of Labour". His description of pin manufacture is as follows:

"To take an example, therefore, from a very trifling manufacture; but one in which the division of labour has been very often taken notice of, the trade of the pin-maker; a workman not educated to this busines (which the division of labour has made a distinct trade), nor acquainted with the use of the machinery employed in it (to the invention of which the same division of labour has probably given occasion), could scarce, perhaps, with his utmost industry, make one pin in a day, and certainly could not make twenty. But in the way in which this business is now carried on, not only the whole work is a peculiar trade, but it is divided into a number of branches, of which the greater part are likewise peculiar trades. One man draws out the wire, another straightens it, a third cuts it, a fourth points it, a fifth grinds it at the top for receiving the head; to make the head requires two or three distinct operations; to put it on, is a peculiar business, to whiten the pins is another; it is even a trade by itself to put them into the paper; and the important business of making a pin is, in this manner divided into about eighteen distinct operations, which, in some manufactories, are all performed by distinct hands, though in others the same man will sometimes perform two or three of them. I have seen a small manufactory of this kind where ten men only were employed, and where some of them consequently performed two or three distinct operations. But though they were very poor, and therefore but indifferently accommodated with the necessary machinery, they could, when they exerted themselves, make among them about twelve pounds of pins in a day. There are in a pound upwards of four thousand pins of a middling size. Those ten persons, therefore, could make among them upwards of forty-eight thousand pins in a day. Each person, therefore, making a tenth part of forty-eight thousand pins, might be considered as making four thousand eight hundred pins in a day. But if they had all wrought separately and independently, and without any of them having been educated to this peculiar business, they certainly could not each of them have made twenty, perhaps not one pin in a day; that is, certainly, not the two hundred and fortieth, perhaps not the four thousand eight hundredth part of what they are at present capable of performing, in consequence of a proper division and combination of their different operations."

The specimen which I have is shown in the figure. It is of good workmanship, except the point, the grooved spherical head being highly polished. The pointed end is a little rough, about as would be finished by a fine file. The shank is apparently tapered and roughened on the portion to which the head is fitted, the end of the shank being riveted to keep the head from coming off.

An earlier form of pin had a short close helix of wire for the head, this helix being preferably soldered to the shank.

Upon looking into the history of pins, it appears that this insignificant article, the symbol for the lowest amount of value, has had a large and interesting career, having been the subject of legislation in England before the discovery of America.




THE "PINNE" OF HISTORY
*Its Manufacture Involved 17 Operations*

Again in 1543, an act of Parliament gave careful specifications for "pinnes", relative to the character of the points, requiring the heads to be soldered to the shanks, and many other minute details of construction.

Doubtless the unsoldered head provoked the same feelings three hundred years ago which we moderns experience when the pin of a thumb tack of a certain construction has slipped through the head under pressure of the thumb, the only difference being that we lack the fluent freedom of language of the Elizabethan period to properly express our thoughts.

Although the solid head, hand made pin is of very ancient origin, the solid head pin machine was not well

*(Concluded on page 49)*

# EDITORIALS

**AN ARTIST'S IDEA OF AN ENGINEER**

"The Engineer," as portrayed in marble by Mrs. Harry Payne Whitney, has been declared a masterpiece in the art circles of New York. The statue represents a strong hard-muscled man shoveling dirt. The proportions and the posture are correct and suggestive of great exertion. The muscle development is superb, and to our uncritical eye the work is a wonderful exhibition of the skill of the sculptoress who created it. We want to know, however, wherein and why this shoveler represents an engineer. We will admit that the engineer is frequently a "mover of dirt", but he does not do it with brute strength. He calls to his aid every force, formula, and mechanism that has ever been controlled or developed by human intelligence; and to these he adds his judgment, his ingenuity, and his konwledge of the ways and means of doing great things. In other words, he uses his brains, as well as his hands, and in that point Mrs. Whitney's "Engineer" appears to be a misnomer.

In selecting a type for her model we wonder if Mrs. Whitney had in mind Leonardo de Vinci, a great military and civil engineer and one of the greatest exponents of her own art, or was she thinking of Bacon, Newton, Rankine, Steinmetz, Edison, Hoover, or Westinghouse, or any one of hundreds of other great men that have made life more enjoyable on this planet because of their engineering talent and knowledge.

Mrs. Whitney, would, perhaps, depict "The Lawyer" as a "pen pusher" laboriously tracing a legal document; "The Physician" as an apothecary's clerk, and "The Statesman" as a be-spectacled postmaster at a cross-roads postoffice.

An engineer differs from other men only in his mental attitude and his knowledge of the laws of nature, and we think that it will be necessary for Mrs. Whitney to portray these abstract things in marble form before her work can be accepted as symbolic of "The Engineer".

E. D. Bader

---

*Your best prospect is your present employer.*
*(E. B. Miller in the Professional Engineer).*

---

**FREE SPEECH IN THE UNIVERSITY**

Although our present tendency is away from the extreme radicalism that manifested itself during and immediately following the war, and the American public has exhibited a reassuring steadiness in its opinions, the issue of free speech at the university is still before us with every evidence of continuing to furnish a point of attack for an indefinite period of time. Last year it was Foster who aroused a protest from the conservative group; this year it is Nearing who elicits unkind remarks from the radical group. Because it controls the largest hall in the city, the university is foredoomed to a damning by one side or the other. It must either grant the use of the hall or refuse it; and either action brings denunciation. Under these circumstances the liberal policy would seem to be the best one. In the first place, it is impossible, simply by denying a speaker the use of a university hall, to keep him from influencing students. There are other halls available. In the second place, ignorance does not constitute a defense against the inculcation of unsound ideas. The only defense against foolish teachings is sound judgment, which cannot be developed in a person who is sheltered from all things that call for the use of judgment. The argument of those who oppose the policy of free speech is that the student has not yet developed judgment,—that he is unduly impressionable, does not weigh what he hears, and accepts the specious argument along with the sound argument. There may be ground for this belief,—the student, in all ages, has been the center of revolution, the supporter of many a foolish and hopeless attempt to overthrow the existing order. He is in the idealistic period of his growth, and lacks the soberer viewpoint that comes with a longer knowledge of life. He is not a fool, however. He can be trusted to make a wise decision when he hears both sides of a question. Would it not be a practical policy to arrange to let him hear both sides of disputed questions? When a speaker of extreme tendencies speaks on one side of a question, another speaker should, at another time and place, perhaps, speak on the opposite side. Some such a scheme, apparently, was contemplated last year when the chairman at the Foster meeting announced that Vanderlip would appear at a later date to speak for the Steel interests. Vanderlip hasn't spoken as yet. Something may have been slipped over, who knows? At any rate, if we are to have free speech, we should have plenty of it.

---

*I confess that in my experience with young men the capacity that I have found least often is the capacity to be accurate.* *(Secretary Hughes).*

---

**A LINE ON THE STUDENT - FACULTY COMMITTEE**

The Student - Faculty Committee is so new an institution that it must be considered in the trial period of its existence. It is, therefore, worth while, from time to time, to review its activities. The committee works so silently that there is a well-defined impression in some sections of our body collegiate that it doesn't work at all. This impression is not well founded; the committee has been active and has accom-

plished results which are believed to justify its further existence.

The committee confines itself to "matters pertaining to the relations between the students and the faculty"; it does not attempt to act as an executive committee for the college. It is supposed to afford a channel of communication between the students and the faculty which can be used to straighten out various delicate matters that, without such a readily available channel, might not come to the attention of those in authority until more or less regretable conditions had developed. It is obviously difficult to give publicity to such things; therefore, the committee must work silently.

A review of the minutes of the committee for the past year reveals that many matters of importance came before it. The principle items were complaints in regard to the work of individual instructors and criticisms of and suggestions about the curriculum. The most important item was a recommendation for changes in the electrical engineering course which was presented to the committee by the local section of the A. I. E. E. It was a carefully worked out statement containing 15 points, and was welcomed by the department of electrical engineering which is now going over it with a view to putting part or all of the recommendations into effect.

The A. I. E. E. has led the way in this matter. Other societies in the college should consider the desirability of devoting some time to discussing the scattered complaints of their members, and collecting those that seem to possess merit for presentation to the committee. As a member of the committee has expressed the situation, "The committee can function only through the co-operation of the students; the students must give the committee the work it is to do."

The mere existence of the committee, even though it indulges in no spectacular activity, should be a benefit to the college, for it would remove any excuse for loose criticism of the college and its methods. A grievance looms large when nursed in private; it loses size when its fond parent brings it out for public inspection. The committee gives the man with a grievance a chance to air it. Such an airing should develop criticism of a reasonable and constructive nature, and discourage the knocker.

L. F. V.

---

*Science and industry in their present-day progress are treading paths that converge, until they are now well within each other's sphere of influence. Science is becoming more useful, and industry is becoming more efficient, and this mutual approach means mutual attraction.* *(George Otis Smith).*

---

**TIME SAVING**

If some campus statistician such as the Cardinal occasionally employs to furnish awe-inspiring figures of malted milk consumption, laundry case mailage, etc., should compute the time lost in starting student meetings in our college the results would be no less surprising. There exists an almost common understanding that a meeting called at seven will probably not start until about seven-thirty. It is no wonder that those who are habitually punctual lose that admirable trait in favor of losing valuable minutes. At this early opportunity let's agree to hereafter set a definite time of starting meetings and under any circumstances adhere strictly to that time.

---

*Polite manners are desirable, but, like shellac, they are merely a surface finish and cannot hide dark spots in the character.*

---

**AN INNOVATION IN TEACHING BY CORRESPONDENCE**

Students who were studying electrical engineering by correspondence were given opportunity last summer of getting laboratory experience on the campus. A dynamo laboratory course, which dealt mainly with alternating current machinery, was given during the period from August 8 to 20 by Prof. Kelso assisted by Prof. Batcheler of the Extension Division. The fifteen students who took the course expressed themselves as well pleased with their experience and the prospects are that the course will be well attended when it is repeated next year.

The idea of bringing correspondence students from distant parts of the state to spend a short time in supplementing their theoretical studies with laboratory practice is a development in correspondence study that will undoubtedly, be capable of a much wider application. There are other laboratories on the campus where similar instruction could probably be given. It would seem to be an important step in making correspondence study still more effective.

---

**THE COMMON PIN**

*(Continued from page 47)*

developed until about 1817, the date of the Hunt patent. This form of pin did not become a commercial success until the 1830 decade.

In Adam Smith's time a man by diligent work could make 5,000 pins a day, and the work day was a far longer one then than now. Today a modern automatic pin machine can turn out that number of pins of greatly improved design and finish in ten minutes.

While economists use other manufactures than the pin (as the needle) to illustrate the division of labor, Adam Smith's illustration is still a favorite. I recently noted in a text on economics, published in 1911, a reference to the making of pins of the old style, although we of the present generation would not be likely to grasp the significance of the illustration.

---

**ALUMNI:**—What are you doing? Where are you located? Are you married? If you are, who is your wife, and how much of a family have you got? Are you still "engineering" or have you "switched"? What are some of the big jobs you have been working on? Have you got any tips for undergraduates? These are some of the things that the men of your own and of other classes would like to know, so just drop a card or letter to The Alumni Editor and tell us all about yourself and about any other Wisconsin Engineers that happen to be in your neighborhood.

## AN APPRECIATION

*To the Western Electric Company by the Senior Electricals and Mechanicals of the University of Wisconsin*

(Apologies to K. C. B.)

WHEN the men at the head
* * *
OF a great big plant
* * *
WITH thousands of men and
* * *
THOUSANDS of girls and
* * *
MILES of shops and
* * *
COUNTLESS mills and
* * *
MACHINES and things
* * *
TAKE a great big gang of
* * *
STUDENT visitors
* * *
INTO their hearts and
* * *
TREAT them right and
* * *
GIVE them a guide
* * *
FOR each man or two
* * *
WHO shows them the ins and outs
* * *
AND the ups and downs of
* * *
THE aforesaid plant and
* * *
THEN fills them up on
* * *
GOOD things to eat and
* * *
WISHES them well and
* * *
HOPES that they all
* * *
WILL come back some day
* * *
WE want the world to know
* * *
THAT that plant
* * *
IS the best there is and
* * *
THAT the men at its head
* * *
ARE good sports.
* * *

I thank you. E. D. B.

## STUDENT-FACULTY COMMITTEE

On Tuesday, November 22, the election of nominees for members of the Student-Faculty Committee of the College of Engineering was held. The results were as follows:

### SENIORS

| | |
|---|---|
| CIVIL | P. E. Hanson |
| MECHANICAL | C. W. Bruemmer |
| ELECTRICAL | F. W. Nolte & E. J. Mohr (Tie) |
| CHEMICAL | G. P. Ryan |
| MINING | J. B. Holmes |

### JUNIORS

| | |
|---|---|
| CIVIL | S. B. Green & T. Niles (Tie) |
| MECHANICAL | E. P. Strothman |
| ELECTRICAL | R. E. Onstad |
| CHEMICAL | D. H. Edwards & G. Bennett (Tie) |
| MINING | C. Buchner |

### SOPHOMORES

| | |
|---|---|
| CIVIL | G. Reed |
| MECHANICAL | B K. Breed |
| ELECTRICAL | E. M. Plettner |
| CHEMICAL | E. W. Greene & W. H. Pletke (Tie) |
| MINING | C. C. Holm |

Existing ties in the election will be settled later by lot.

The Student-Faculty Committee was organized two years ago for the purpose of bringing the students into more direct and personal contact with the faculty. It provides a means for the students to offer suggestions concerning their courses, and for a more general exchange of view-point of both students and faculty.

## A. I. E. E., MADISON SECTION

On November 9, the meeting of the Madison Section of A. I. E. E. was held in the Engineering Auditorium. An illustrated talk on the construction and operating features of the new Milwaukee Lakeside power station of the T. M. E. R. & L. Co., was given by the company's chief engineer, Mr. G. G. Post.

## A. I. E. E., STUDENT SECTION

A regular meeting of the Student Section was held on November 2. A. R. Cotton, e '22, described a new automatic substation installation in Milwaukee.

The regular installation of A. I. E. E. was held November 30, at which time sixty-six embryo Teslas were "sicked" through the ropes. The evening was concluded by a party at the Orpheum.

## A. S. M. E. INITIATES

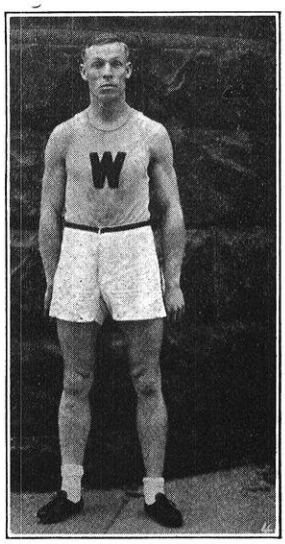
True to the somewhat rough style of former initiations, A. S. M. E. introduced 25 juniors and seniors into their organization Thursday evening, Nov. 10. Reports say that most of the initiates were able to enjoy a feed after the ordeal, and finally to attend a front-row party at the Orph.

# ATHLETICS

H. A. PHILLIPS

## FIRST IN CONFERENCE RUN

To George Finkle, junior electrical engineer goes the greatest honor a Wisconsin harrier can win, by virtue of his wonderful performance in winning the individual honors at the Conference cross-country meet at Bloomington, Indiana, November 19. Running over the toughest five-mile course that any Wisconsin cross-country team ever ran, additionally difficult on account of heavy rains, Finkle led his teammates and competitors to the tape, beating out Rathburn of Ames by ten yards.



GEORGE FINKLE

Finkle is one of the many men developed at Wisconsin who never stepped on the track before being discovered by Tom Jones. In his sophomore year he came out for the distance runs, and by hard work, coupled with his natural strength, earned an enviable place on Wisconsin's 1921 track team. This fall he came out to help Wall, who is conference mile run champion, in building up a strong cross-country team. He developed very rapidly under the able coaching of Meade Burke, and took first in the dual runs with Minnesota and Chicago. The team was also winner in these runs, and took third in the conference. Illinois was first and Ames second.

Finkle will be captain of next year's cross-country team.

---

### CHICAGO 3 — WISCONSIN 0

Chicago won the final contest, 3 to 0, though outplayed by the Badgers. In the first quarter Wisconsin carried the ball for a march of sixty yards, only to fumble on the seven yard line, on a first down. Other drives brought the ball within striking distance, but Wisconsin's field goal attempts went wide. Chicago got the breaks, and in the final period came the break which allowed her to score. From the thirty-yard line Crisler's place kick was not good, but an over-eager Badger tackle was offside, and the Maroons were given five yards and a first down. Failing to gain, Romney tried a dropkick, which was successful.

## ENGINEER HARRIERS WIN

Finishing six men among the first fourteen, the Engineering College cross-country team copped the annual intramural run over a 2.7 mile course on Saturday morning, November 12, defeating the Commerce and Ag runners, by a safe margin. The team was composed of Nelson, captain, Hazen, Trier, Manthy, Greeley, and Fabera. Hazen was the first engineer to finish, taking third place.

These men will form the nucleus of the Engineering College track team, both indoor and outdoor, later in the year. They are winning points toward the Nelson trophy and deserve strong support.

---

### LAW GAME CALLED OFF

Due to poor weather conditions it was found necessary to call off the Engineer-Law School game, which had been scheduled on the challenge of the barristers. With a few star players ineligible for Varsity among their midst, the rivals across the campus grew bold, but such was the turnout for the engineer team that cold feet bothered the challengers.

Great credit is due to the men who turned out for the team, for they certainly had the desire to help. A squad of thirty was on the field nightly for about two weeks, and under the coaching of Mr. Ruble, of the Hydraulics department, was doing great work. Louis Schmidt was largely responsible for the fine turnout of gridsters, and he is to be congratulated on the manner in which the matter was handled.

With this spirit of cooperation, the Engineering College is going to bring back the Nelson trophy. Watch us go.

---

### THE FACULTY BOWLING LEAGUE

Following a practice of several years standing, the engineering faculty has entered two teams in the faculty bowling tournament which opened on November 19. The Mechanical Engineers, winners of last season's tournament, are captained by Professor "Pat" Hyland. Van Hagan, George, Shiels, Dahlberg, and Hitchcock are members of the team. The All-Engineers, captained by Professor "Jimmie" Watson, include Doke, Millar, Lehman, and Keck. The Mechanical Engineers are away to a good start, having taken five of their first six games, two from the Language and three from the English. The All-Engineers have broken even so far, taking two out of three from the Forest Products and losing two out of three to Language.

# ALUMNI NOTES

E. D. BADER

## CIVIL ENGINEERS

Lt. **H. J. Affleck,** ex c '23, is with the 53rd U. S. Infantry, and is stationed at Fort Russell, Wyoming. He expects soon to be transferred to Salt Lake City. He reports wonderful times playing polo and chasing wolves, coyotes, jackrabbits and prairie chickens.

**O. A. Bailey,** c '15, is with the Chicago Bridge and Iron Works.

**J. P. Bendt,** c '12, has moved to 917 South Sixth St., Ironton, Ohio. He is working on the construction of a highway bridge across the Ohio River, that is being built by the Wisconsin Bridge and Iron Company of North Milwaukee, for the Ironton, Russell Bridge Company.

**John Berg,** c '05, CE '10, is state engineer for South Dakota, with offices at Pierre.

**Byron Bird,** CE '15, is in the department of civil engineering, Texas A. & M. College, Box 147, College Station.

Lt. **K. B. Bragg,** CE '15, after almost three years as project manager of the Aviation section with the Bureau of Yards and Docks, Navy Department, has been assigned additional duty with the newly created Bureau of Naval Aeronautics.

**Harold E. Crider,** c '21, who was laid off for a time and was working temporarily with the South Penn Oil Co., is back in the drafting room of the McClintic-Marshall Co., at Wilkinsburg, Pa. He writes: "Last evening (Nov. 3) I dropped in on Morley and Burton James who live but a few blocks from my room. We had quite a chat about Wisconsin. We all had received our 'Engineer' and were deeply interested in what our college and our class mates were doing. * * * I have been following the football scores and it looks as if old Wisconsin might grab the bacon this year."

**Erwin Dames,** c '20, with Benham & Mullergren, consulting engineers, Kansas City, Missouri, has been made resident engineer for the firm at Duncan, Oklahoma, where pavement and water works improvements costing about $1,000,000 will be installed.

**Paul S. Egbert,** c '16, is county engineer for three counties in South Dakota. His headquarters are at Aberdeen.

**R. L. Filtzer,** c '17, is mixing professional work with football coaching in the Hawaiian Islands. "Swede" was a member of the Varsity in his day.

**Finley L. Fisbeck,** c '19, former manager of the WISCONSIN ENGINEER, is in business with his brother at Terre Haute, Indiana.

**Henry M. Ford,** c '21, is with W. G. Kirchoffer, consulting engineer, Madison, Wis. He is working on the construction of a water supply and sewage disposal system at Cedarburg, Wisconsin.

**"Gene" Gingrich,** c '10, is with the Riter-Conley Company, Pittsburg, Pa.

**Lieut. W. T. Hopkins,** c '13, formerly an instructor in the department of railway engineering, spent the latter part of November visiting his mother in Madison. He has been assigned to duty at the Puget Sound Navy Yard, where he will be assistant supply officer.

**E. E. Hunner,** c '00, CE '07, EM' 17, manager of the iron mines for the M. A. Hanna Company, has written the department of mining and metallurgy that his company is donating a model headframe and shaft timbering installation to the department.

**Frank Kaiser,** c '18, is in charge of the engineering work of the Harbor and River Improvements Commission of Milwaukee.

**Charles P. Kidder,** c '20, is with the Lupton Company at 225 So. 46th Street, Philadelphia.

**L. A. Kirch,** c '18, was in Madison on Thanksgiving Day. He continues in the employment of the Peoples' Gas and Light Company of Chicago.

**A. L. Luedke,** c '10, CE '13, who is connected with the U. S. Bureau of Public Roads, has been transferred from Washington, D. C., to St. Paul, Minn., 86 W. Avenue N.

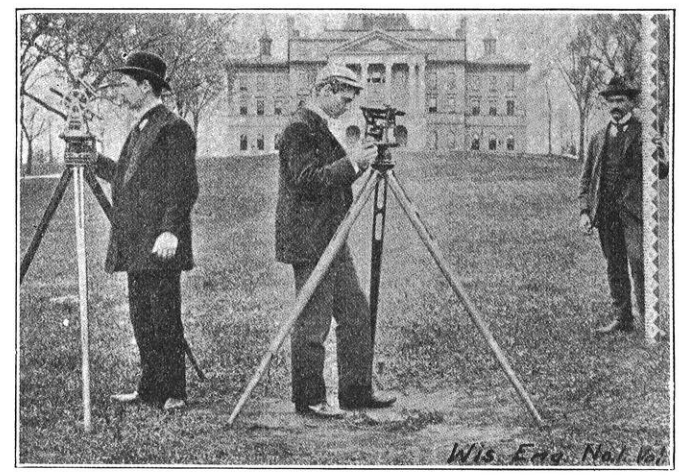
**Richard Merkel,** c '13, may be addressed at 2308 Monroe Avenue, Norwood, O.

**W. J. Rheingans,** c '20, showed a group of seniors around the Allis-Chalmers plant on the recent senior trip. Bill is working in the hydraulics department.

**I. I. Rotter,** c '21, is with the Chicago Bridge & Iron Works, at 37 W. Van Buren Street, Chicago, Ill.

**Francis H. Schmitt,** c '21, is engaged in civil engineering at 430 Farwell Avenue, Milwaukee.

**Herbert C. Schmitt,** c '14, is with the Henkle Construction Company at Mason City, Iowa.




SHADES OF 1896

Fellows, this is the way the upper campus looked before a lot of us were born. Clothes have evidently changed in style at a more rapid rate than have instruments. On the left is Bernard F. Knauer, who was a special student in civil engineering; the gentleman who is setting the vernier is R. F. Schuchardt, e '97, who is now Electrical Engineer for the Commonwealth Edison Company of Chicago, and the fellow with the stadia rod is Max Spindler, c '98, who is Senior Structural Engineer with the Interstate Commerce Commission at Chattanooga, Tenn.

**J. R. Vernon,** c '18, is assistant division engineer, with the Wisconsin Highway Commission at Lancaster.

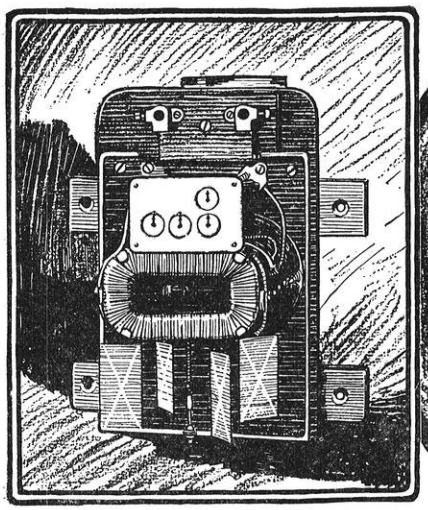
**John Wilson,** c '03, has been appointed by the St. Louis County Minnesota Commission to estimate and prepare a report and also to assume general supervision of land clearing done in that county, in accordance with laws passed by the last Minnesota legislature.

**J. P. Woodson,** c '16, is with the Dixie Construction Company at Verbena, Alabama.

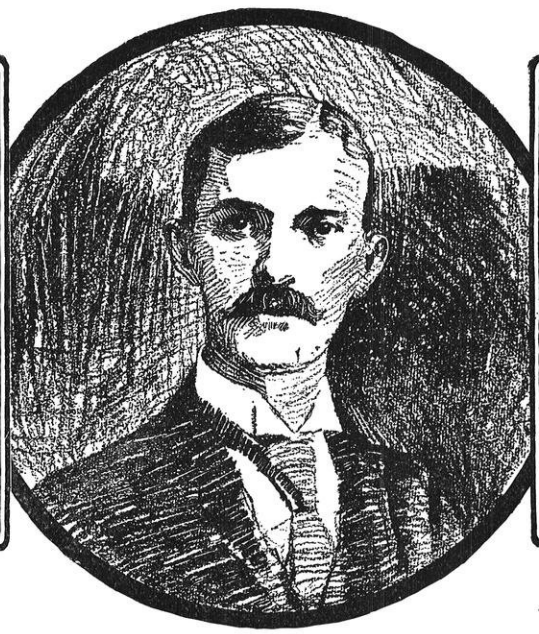
**George E. Youngberg,** c '14, returned for the Michigan game. He is a member of the firm of Youngberg and Redman, of Aberdeen, S. Dak., which is engaged in constructing concrete bridges. He recently completed a 176-ft. concrete viaduct at Stratford. Youngberg married Helen Gordon, a Wisconsin Home Ec. of the class of '18. They have two children, Doris Helen, aged 4, and George Edward, aged 1½ years.

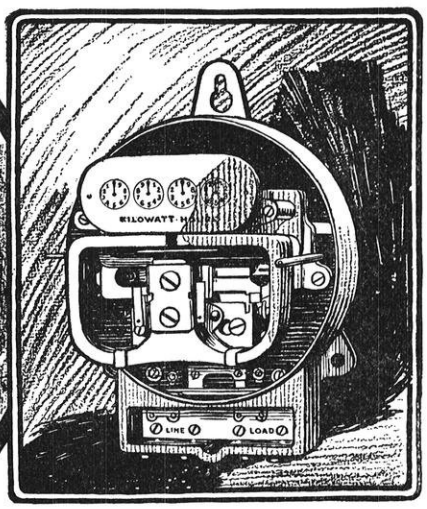
## ELECTRICALS

**J. N. Cadby,** e '03, EE '07, consulting engineer, Washington Building, Madison, was recently selected as executive manager of the Wisconsin Electrical association by the executive committee at a meeting in Milwaukee. Mr. Cadby will retain his offices in Madison and continue his practice. The position has been created by the establishment of a new department to make the state electrical association of greater service to the public by making it more useful to its members. Mr. Cadby will give part of his time now to the new work and until March when he expects to officially assume full charge. His appointment was made because it was felt



*Shallenberger's Meter—1888*





*Single-Phase Meter—1921*

# Oliver B. Shallenberger

IT IS ONE THING to produce a new idea that is simply of theoretical interest. It is another to make the new idea into a commercial success.

This is the story of Oliver B. Shallenberger, and how in 1888 he discovered the principle that led him to invent the watt-hour meter, the familiar little device that makes practicable the commercial distribution of alternating current, which means 95% of all the electricity that is distributed.

Shallenberger, who resigned a Naval commission to take up his work with Westinghouse, made his discovery while experimenting with a newly devised alternating current arc lamp. His attention was attracted by the behavior of a small spring which had fallen upon the main magnet of the lamp, into such a position that the forces proceeding from both the magnet coil and the extended soft iron core affected it. And the simple little thing that he noticed was merely that the spring was slowly rotating! But to the intelligently curious observer, that was enough.

Further experiments having satisfied him that the action was caused by alternating electric currents, he set to work, encouraged by his knowledge of Westinghouse policies, to make practical the newly found principle. Three weeks of almost uninterrupted toil, and he had produced the first practical alternating current meter of the induction type—the universal type of the present time.

Thus for the first time the measurement of the quantity of alternating current passing through a line was made commercially practicable and its distribution became possible from an economic as well as an engineering point of view. In fact, the whole structure of our great power systems depends upon the accurate measurement, by millions of such meters, of the electricity used in the homes and industries of the nation. So well was Shallenberger's work done, and so complete was his conception of the possibilities of his discovery, that for more than thirty years his fundamental idea has been in use in many and various forms.

The encouragement which Westinghouse has always given to new ideas, and the judgment with which they have been evaluated, are nowhere better exemplified than in this story of the alternating current meter.

## SHOP LIGHTING.

In an address delivered before the members of the Western Pennsylvania Division of the National Safety Council, Pittsburg, Pa., March, 1918, by C. W. Price, the importance of good lighting in industrial establishments was discussed, and the disadvantages of poor lighting were clearly shown by some figures mentioned by Mr. Price.

A large insurance company analyzed 91,000 accident reports, for the purpose of discovering the causes of these mishaps. It was found that 10% was directly traceable to inadequate lighting and in 13.8% the same cause was a contributory factor. The British Government in a report of the investigation of causes of accidents determined a close parallel to the findings of the insurance company above quoted. The British investigators found that by comparing the four winter months with the four summer months, there were 39.5% more men injured by stumbling and falling in winter than in summer.

Mr. John Calder, a pioneer in safety work, made an investigation of accident statistics covering 80,000 industrial plants. His analysis covered 700 accidental deaths, and of these 45% more occurred during the four winter months than during the four summer months.

Mr. C. L. Eschleman, in a paper published in the proceedings of the American Institute of Electrical Engineers several years ago, reported the result of an investigation of a large number of plants in which efficient lighting had been installed. He found that in such plants as steel mills, where the work is of a coarse nature, efficient lighting increased the total output 2%; in plants, such as textile mills and shoe factories, the output was increased 10%.

In an investigation of the causes of eye fatigue, made by the Industrial Commission of Wisconsin, it was found that in a large percentage of industries, such as shoe, clothing and textile factories, the lack of proper lighting (both natural and artificial) resulted in eye fatigue and loss of efficiency. At one knitting mill, where a girl was doing close work under improper lighting conditions, her efficiency dropped 50% every day during the hours from 2:30 to 5:30 P. M.

The above mentioned incidents indicate how important a factor lighting is in the operation of the industrial plant. It has been well said, "Light is a tool, which increases the efficiency of every tool in the plant." Glare or too much light is as harmful as not enough lighting, and in no case should the eyes of the workers be exposed to direct rays, either of sun or electric light.

Windows and reflectors should always be kept clean; that is, cleaning them at least once a week, for where dust and dirt are allowed to collect, efficiency of the light is decreased as much as 25%.

Good lighting, in addition to its other marked advantages, is a strong incentive towards keeping working places clean, for it clearly exposes any place where dirt or other material has been allowed to collect. White walls and clean windows glazed with Factrolite Glass will eliminate the sun glare and increase the illumination 25 to 50 feet from the window from 38% to 72% as compared with plain glass.

Lighting is of primary importance to every employer and fully warrants a careful investigation of the subject, for there is no substitute for good lighting, and if it is not supplied the efficiency of the entire working force must suffer a serious reduction.

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. 5.

that his wide experience will be valuable in public utility problems anywhere in the state.

**B. L. Conley,** e '18, 1733 E. 116th Place, Cleveland, Ohio.

**Kenneth H. Cope,** e '16, has requested that future copies of the WISCONSIN ENGINEER be sent to him at 1901 D. St. N. W. Tempo Building, Washington, D. C.

**Chase Donaldson,** e '20, is employed by the American Gas and Electric Company, 30 Church St., New York City.

**R. C. Grimstad,** e '21, was in Madison for the homecoming game. He has entered the meter department of the Stoughton Municipal Electric system.

**Ralph Hantzsch,** e '20, is with the Western Electric Company, 463 West St., New York City.

**R. J. Hardacker,** e '06, is buyer of automobile parts at 469 N. Waller Avenue, Chicago.

**Morris D. Jackson,** e '21, and **Philip D. Reed,** e '21, are engaged in patent law work with the firm of Pennie, Davis, Marvin and Edmonds, 165 Broadway, New York. "Phil" Reed is married to Miss Lillian Hanan of Oregon, Wis.

**Clarence Johnson,** e '09, is an engineer with the Berkshire Electric Company, 77 Eagle St., Pittsfield, Mass.

**"Rudy" Knoerr,** e '20, recently sent in a check to cover his subscription to the WISCONSIN ENGINEER. He wants fellow alumni to drop him a line occasionally. He is head of the department of physics, Drexel Institute, Philadelphia.

**Hermann Kranz,** e '14, EE '17, is manufacturing methods engineer, Western Electric Company, Chicago, Illinois.

**George McCollum,** e '21, is an engineer with the Joslyn Manufacturing & Supply Company, 3700 S. Morgan St., Chicago.

**Paul T. Norton,** e '17, sales manager for the Case Crane & Engineering Co., Columbus, Ohio, returned for the Wisconsin-Michigan game. Paul has a daughter, Carolyn Darrach, born July 2, 1921.

**G. G. Post,** e '04, electrical engineer of the T. M. E. R. & L. Co., recently described the new Lakeside Station at Milwaukee, to a group of interested students at the Engineering Building. This plant is of especial interest because of the use of powdered coal as fuel, because of the unique system of control, and because of its high overall efficiency.

**J. C. Potter,** e '04, EE '09, is transmission and protection engineer with the Ohio Bell Telephone Company, Cleveland.

**Ross Rogers,** e '21, is at 211 Burr Oak Avenue, Blue Islands, Illinois.

**Axel Sjoblom,** e '10, is an engineer at 604 Lumber Exchange Building, Minneapolis, Minn.

**Philip Smith,** e '98, is a construction engineer at 111 Woodward Terrace, Detroit, Michigan.

**W. H. Snider,** e '20, formerly with Nash Motors Company, is now in the technical training department of the Western Electric Company at Hawthorne, Illinois. He plans on entering the "Engineering Methods" department of this company.

**R. A. Switzer,** ex e '20, was married at Clinton, Wis., May 25, 1921, to Miss Mabel E. Jensen. They are at home in Beloit for the present. Mr. Switzer was in Madison for the Homecoming.

**J. C. Taylor,** e '01, is representing the Denver Rock Drill Manufacturing Company in Peru and Bolivia.

**W. H. Tolhurst,** e '14, resides at 1031 S. Wolcott St., Casper, Wyoming.

**C. D. Willison** e' 05, is an oil operator located at 9 Price Building, Bowling Green, Ky.

## MECHANICALS

**R. E. Baus,** m '00, has asked the circulation manager to change his address from 171 McLean Avenue, Highland Park, Michigan, to 972 Westchester Road, Grosse Pointe Park, Michigan. He is connected with the Studebaker Corporation of Detroit.

**R. S. Dewey,** m '14, lives at 1449 Detroit St., Denver, Colorado.

**J. H. Geisse,** m '17, has left McCook Field and is now at 21 W. Dayton St., Ridgewood, N. J.

**J. W. Harris,** Jr., m '14, has recently moved to 6418 N. Fairchild Avenue, Rogers Park, Chicago.

**Richard F. Knott,** Jr., m '17, was here for the Michigan game. His card indicates that he is treasurer for the Crescent Paper Company, Marseilles, Illinois.

**George B. Kuebler,** m '20, is in the engineering department of the Nekoosa-Edwards Paper Company at Port Edwards, Wis.

**E. D. Maurer,** m '20, may be addressed at 70 Morningside Drive, New York.

**J. A. Peachey,** m '18, is sales engineer with the Worthington Pump and Machine Corporation, 115 Broadway, N. Y.

**C. W. Peterson,** m '21, visited school a few hours November 25 and renewed his subscription to the WISCONSIN ENGINEER. "Pete" is employed by the Illinois Highway Commission, and at present has headquarters with the district engineer, New Clifton Hotel Building, Ottawa, Illinois.

**P. A. Royer,** m '21, helped to enlarge the Wisconsin rooters' section at the Chicago game. His present address is Dixon Illinois.

**J. B. Wilkinson,** m '16, ME '17, lives at 230 W. 15th Place, Chicago Heights, Illinois.

## CHEMICALS

**P. D. Holmes,** ch '19, is located with the Washburn Crosby Company in Minneapolis, Minn.

**Herman Legried,** ch '08, engineer and salesman, may be addressed at 1431 Orchard Avenue, Cleveland, O.

**Frederick Pope,** ch '21, is a chemical engineer at Ableman.

## MINERS

**H. J. Hirschheimer,** m '91, may be addressed at 52 Kirkland St., Cambridge, Mass.

**K. L. Hussissian,** min '18, EM '21, has returned from the prospecting trip he made with **M. W. Link,** min '21, in Idaho last summer. "Huss" doesn't report any gold, but does report a profitable summer and the discovery of copper in quantities warranting further examination.

**W. A. Knoll,** min '14, underground superintendent at the Anvil-Palms Wire, Steel and Tube Company of America at Bessemer, Michigan, has secured a leave of absence and is enrolled as a graduate in Mining Engineering.

**M. Lake,** min '14, Consulting Geologist for the M. A. Hanna Company at Wilkes-Barre, Pa., called on the mining department at Homecoming.

**Magnus Swenson,** met '80, MS '82, ME '98, engineer and capitalist recently addressed the Technical Club at the Woman's Building, Madison. The subject of his talk was "The Commercial Relations of the Proposed St. Lawrence River Improvement".

**H. L. Rau,** min '16, attended the Michigan game Nov. 12.

## ENGAGEMENTS

Miss Laura Kreitzman, Beloit, to **Joseph Dresen,** m '20, assistant engineer with the Streator Brick Company, Streator, Illinois. The marriage will take place during the Christmas holidays.

Miss Ann Maude Porter to **Milton J. Shoemaker,** ch '21. Miss Porter is a senior in the College of Letters and Science. Her home is in Evansville. Mr. Shoemaker is with the Viscose company of Marcus Hook, Pa.

## MARRIAGES

Miss Katherine Kemp to **Chase Donaldson,** e '20, Sept. 24. They are at home at 32 Nassau Road, Great Neck, Long Island.

Miss Mabel Smith, Chicago, Illinois, to **Philip D. Reed,** e '21, Milwaukee, July 16.

Miss Helen Gardner, Huron, S. D., to **Arthur Tooman,** ch '21, Sept. 13.

## BIRTHS

To Mr. and Mrs. **Clifford A. Betts,** 2335 Hudson St., Denver, Colorado, a daughter, Edith, July 28. Mr. Betts received his master degree in civil engineering in 1913.

To Mr. and Mrs. **F. F. Farnham,** a son, Frederick Foster, Jr., Nov. 4. Mr. Farnham graduated as a chemical engineer with the class of '09.

To Mr. and Mrs. **A. B. Foster,** a son, Oct. 9. Mr. Foster is an electrical of the class of '17, and is with the Doherty Gas and Electric Company, New York City.

To Mr. and Mrs. **E. S. Heningsen,** e '12, a daughter, Norma Jane. Mr. Heningsen is connected with the General Electric Co., at Schenectady.

To Mr. and Mrs. **O. W. Melin,** River Forest, Illinois, a daughter, Marjorie Jane, Sept. 22. Mr. Melin is a 1910 Civil.

To Mr. and Mrs. **L. C. Newton,** m '17, Duluth, Minnesota, a daughter, Marie Belleville Oct. 12.

To Mr. and Mrs. **Bryan Reid,** min '13, Riverside, Illinois, a daughter, Joan Seaborne, Sept. 15.

To Mr. and Mrs. **Willis Woolrich,** e '11, Knoxville Tennessee, a son, George Dean, on August 18.

## DEATHS

**Lynn Lillesand,** '20, died of tuberculosis at the home of his parents in Stoughton, Oct. 25. After graduating from the high school in Stoughton he attended Texas University at Austin, completing his course at Wisconsin. About a year ago he married Miss Avis Hurd of Madison, who survives him.

# CAMPUS NOTES

R. B. BOHMAN

Soon we shall have Xmas, and then, shortly, Xams. Hurray!

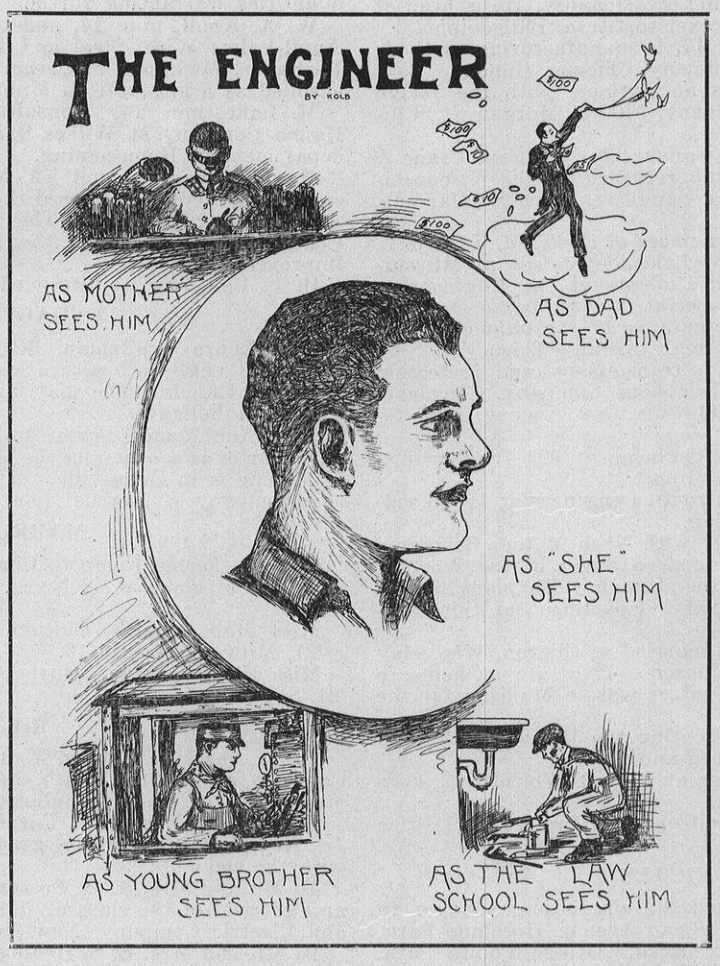
THE ELECTRICAL SHOW

Come on, electricals, get signed up for a part in that Electrical Show to be held the first week of the new semester. The Show will be held under direction of the Student Section of A. I. E. E. Assignments to the various groups are now being made. Get acquainted with your class and course - mates, the E. E. Faculty and the Electric Lab. Don't wait for an engraved invitation — we're not distributing any. Talk to any member of A. I. E. E.— tell him you want to work on an exhibit. *BUT GET SIGNED UP NOW.*

Heard in a stationer's store on State St.:

"I want to buy a slide rule, and I want one that reads in centimeters and not in inches."

We have a pretty good hunch that quite a few Engineers took advantage of Armistice Day to clean up a lot of back work, and thereby declare a truce with their Profs.




LET IT BE SPREAD UPON THE RECORDS: Some of the wives of the faculty members of the College of Engineering had met for the purpose of planning an organization to take the lead in the social activities of the college. The discussion had reached the point where a name for the organization must be selected. Spoke up Mrs. Danny Mead, right off, just like that ,"Let us be known as the Hen-gineers." R.

Our idea of infinity—the number of people the Madison Railways Company can crowd into one of their "roaring rompers of the road".

THE BRAVEST ARE THE TENDEREST: A faculty wife parked the baby buggy at the steps of E. B. and went in to drag hubby away from his work. Junior, objecting to the absent treatment, lifted his voice in a protest that sounded like the wail of a distressed kitten. Three chilled, though leather - bound civils, who had spent Armistice Day chasing the elusive fore - sight over the campus, stopped at the buggy and gently soothed its occupant into a contented silence, until mother came to their relief. Verily, its a strange bird, this engineer, who can lull a babe, or stand on those same steps and hurl mighty defiance at the Laws across the way. R.

Now that engineers are more generally beginning to realize the important of good English, we expect the graduate's song to contain the following:

"I took a course in Van's Seminar,
And that's what made me what I are."

DEVELOPMENT OF THE ENGINEER-LAW YELLS: Original yell, introduced during the dark ages —"Well, well, well! Is that the Law School? Oh, Hell!" Response, worked out about 1920—"Pull in your necks, you plumbers." Come-back, evolved after the adoption of the lawyers' canes in 1921—"Lean on your canes, you cripples." NEXT! R

If the seniors should teach E. E. 143, we would learn that the coils of a T-connected Scott transformation are located at right angles to each other.

---

Prof. Terry, in the Department of Physics, reports that he has received many notices from radio stations as far away as Vermont and New Jersey to the effect that they have been able to "listen in" very satisfactorily on the concerts sent out over the Department of Physics radio station.

---

The senior mechanicals report that they are exposed to a course in E. E. that knows of no depth. This sounds like some of the credits given out in Prof. McCaffery's department. We are prompted to speculate if, after being white-washed in a quiz, any of the above overworked sect refer to their study as Kelsomining.

---

The University of Washington, at Seattle, is considering publishing an engineering magazine. It will probably be a quarterly magazine called "The Washington Engineer".

---

Prof. Anderson, in Steam and Gas: "That makes the Carnot cycle very attenuated." (Class laughs) "That is a new word I got so I like to show I can use big words."

---

## FAMILIAR SOUNDS

(The Engineers are out on an inspection trip)

Br-r-r-n-n-n-g! Br-r-r-n-n-n-g! Br-r-r-n-n-n-g!

What that h———! "#$%—& ()* ——HELLO (real rough)

Sweet voice greets rough neck engineer, then——

Oh-h-h! Yes, uh-huh, good morning—thank you-u-u. (real sweet and nice).

Hey, Bill! Wake up, it's six o'clock, and we gotta get up!

Oh d——n! I don' wanna inspect,—I wanna sleep—z-z-z-z-z.

Oh! Heck, do we have to walk some more?

Where do we eat?

How far is it?

Oh! My feet!

I don't wanna walk no more,—I wanna go home.

Didja break any windows in that plant?

Gimme a smoke—Gimme a match—Gimme some tobac.

Say, didja see anything of my gang going by here?

I'll call you. What have you got?

Lemme borrow your notes when we get back, will ya?

---

## IMPRESSIONS OF A STEEL MILL

ROAR - rattle - racket - ring - bang - grind - groan - grim - bang - scream - screech - squeel - bang - sparks - hot - hiss - heat - wheels - black - dirt - clink - clank - clunk - smoke - smell - noise - BANG.

Why do some of the Profs. insist on writing on the doors and molding when there is plenty of blackboard space?

---

Cheer up, Seniors, there are plenty of jobs waiting for you. For instance, on the recent inspection trip, the gang came across a man who confessed being at one time exposed to Steam and Gas under Prof. Berggren, and that man — yes sir, — that man — was working in a creamery, packing little one-pound bricks of butter.

And again, Seniors, think of the engineer who did such a big job in his career that after his death the people worshipped him as a god. Go west, young man, if such be your ambitions, for such is the direction of China.

In any case, Seniors, let your ideals be high. Plan on at least, say a salary in five figures, three of which are to the right of the decimal point.

---

News that the Home Ecs. are designing bungalows — one apiece — causes us to think that a course in architecture isn't so necessary after all, — providing, of course, they save the plans.

---

Our estimation of the bird who rates the steam-heated slide rule is the Engineer who carries a porcelain insulator with him when at a dance, in order to protect himself from meeting with any possible live wires.

---

Mr. Sloan in Structures 3: "This distance is 84 inches. Do you all see where it comes from?"

Zervas: "Yes! Seven feet."

---

Answer to question in Physics lab:

"The second condition of equilibrium is necessary because of the fact that the magnitude of the motion caused by a force or the motion which the force tends to cause is limited by the leverage by which the force is augmented."

---

## FLAY — FLEE — FLY — FLOW — FLUM

A fly met a flea in a flue,
It was hotter'n hell for the two.
At both ends was smoke,
You'd think that they'd choke.
They were both in a terrible stew.

Now they both spied a flaw in that flue.
Right away they got wise what to do.
Said the fly, "let us flee".
Said the flea, "let us fly".
So they flew through that flaw in the flue.

---

The Atlantic Monthly kindly requests the Wisconsin Engineer's office boy to see that their November copy of the Atlantic is delivered to the office without delay. Huh? We aren't no local mail carrier. We're only the "fourth broom" in Van's office.

Pi Tau Sigma announces the election of the following: seniors, R. H. Bruce, T. G. Glenn, C. E. Huntziker, W. D. O'Connor; juniors, R. P. Anderson, A. J. Nerad, W. H. Porth, W. I. Senger, I. L. Wade.

---

Eta Kappa Nu announces the election of the following men: Louis Adam '23, Stannard J. Baker, '22, H. H. Beck '22, Philip G. Bowman '22, Theron A. Brown '23, Newell E. French '23, Leslie H. Garber '22, J. Rudolph Heins '22, Casey V. Loomis '22, Hugo J. Rusch '23.

---

The Engineers-Laws scheduled football game failed to be realized due to several bad breaks handed down by the weather man. But that should not discourage us. With winter almost with us, we might extend an invitation to our horn-rimmed brethren across the mound to a real-honest-to-goodness snow ball fight. Or if that is too rough for them, one might still suggest a marshmallow roast at the Barnard parlors.

---

## THE MINNESOTA - WISCONSIN BOUNDARY SURVEY

*(Continued from page 42)*

of 1:24000 to accompany its report. This map definitely showed the present harbor conditions, improvements along the harbor front, the U. S. government harbor lines and channels, and the relative position of the boundary line between the states of Minnesota and Wisconsin. There were also shown, as insert sub-maps on a larger scale, improved or partly improved properties which are crossed by the boundary line.

*Cost*

The Commission, immediately after completing its organization, made an estimate of the cost of the proposed work in order that the money could be provided jointly by the states of Minnesota and Wisconsin. The estimate was made by the commission in November, 1920, and the states of Minnesota and Wisconsin each provided the sum of $12,500, or a total of $25,000 for the project. The survey and work in conjunction thereto was completed, however, for $15,626.06. The total length of line run was 18.4 miles so that the cost was $849.24 a mile. This cost covered all work including the report.

Upon completion of this work, the commission filed a detailed report with the Supreme Court of the United States, which court will undoubtedly act upon the report during the fall term of 1921. Should the report be accepted by the Supreme Court the boundary line between the states of Minnesota and Wisconsin from the port of entry to the north and south state line, will then be in existence as established by the commission. From the monuments placed, it will be an easy matter to rerun any portion of the line, especially since the latitude and longitude of each monument and angle point is shown in the report of the commission. Copies of the report were filed with the Attorney General of each state.

## DEPARTMENT OF HYDRAULIC AND SANITARY ENGINEERING

The Allis-Chalmers Manufacturing Company has recently sent the Hydraulic Laboratory a centrifugal pump runner for demonstration purposes. It is from the company's three-inch model.

William J. Rheingans, c '20, who is in charge of the Allis-Chalmers hydraulic testing plant had this impeller and a number of other interesting pump and turbine parts laid out and placarded as an exhibit for the seniors who visited the plant on their inspection trip recently.

Professor C. W. Ward and Mr. Gumprecht, instructor in Hydraulics, are conducting a series of experiments at the Capitol heating plant on air orifices in connection with their work on air-lift pumps.

An experiment on pipe friction has been introduced in the Hydraulics II laboratory course this fall. The data taken up to the present time indicates that the loss of head due to flow through galvanized pipe is considerably greater than that through black pipe of the same size.

---

**Coming,** in the January issue: "Thomas Eddie—Conduit Snake", written by Morley, e '21, author of the famed "Frapped Fireman", and illustrated by Kolb, originator of "The Engineer", page 54.

---

Work has been begun on the extension to the main floor in the ore dressing department of the Mining Laboratory. This addition will allow the grouping of the ore dressing equipment so that complete milling operations may be studied and large size lots of ores tested.

---

## THE SIGNAL CORPS CAMP

*(Continued from page 46)*

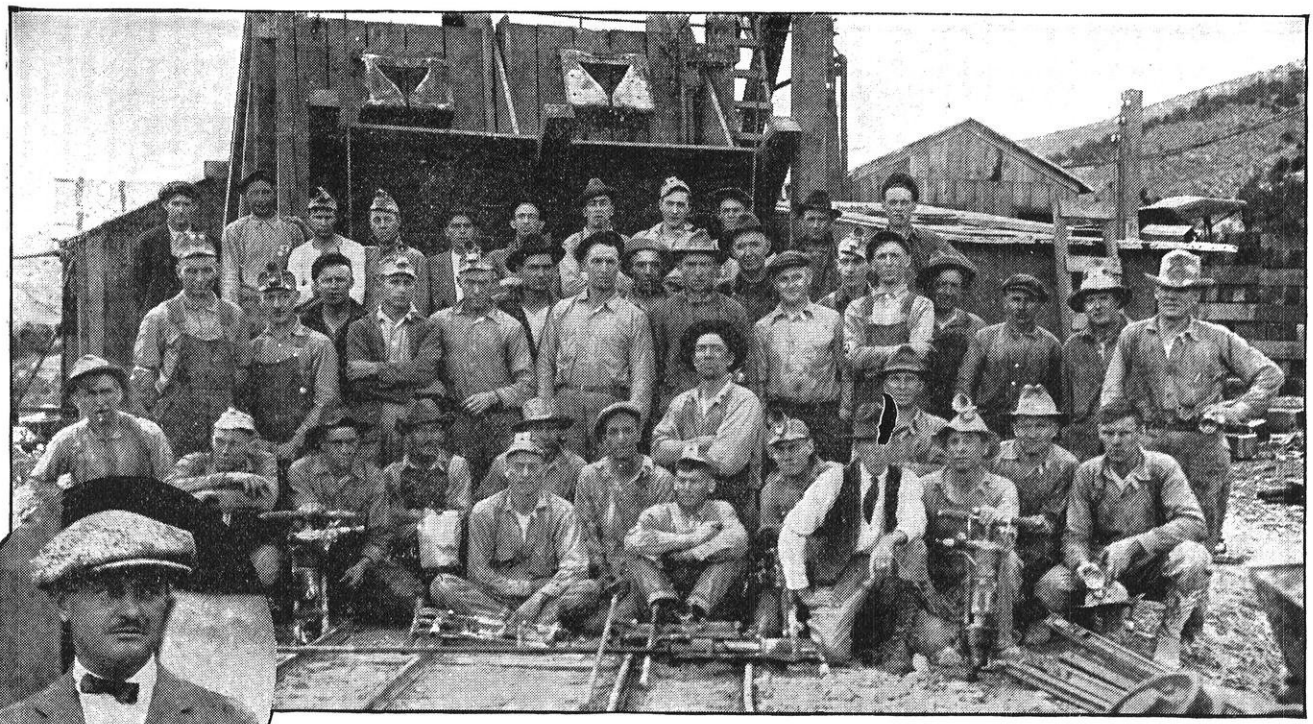
His resources, not counting the clothes which a respectable citizen is obliged to wear, consisted of one-half of a hard and dry biscuit which he had thoughtfully saved from a former breakfast, and this soon found its way to his internal organs where sustenance was greatly needed, for the turbulent waters of Lake Michigan had left his stomach in a rather empty condition.

As the men shook hands with their comrades in a final farewell they all agreed that the time spent at Camp Vail had been the most profitable and most enjoyable part of their lives. All felt that they were indeed fortunate to have been privileged to attend this camp even though the time had been altogether too short.

The same opportunity that was enjoyed by those fifty men is extended to all electrical engineers by the Signal Corps of the R. O. T. C. The camp is a requirement, or rather a privilege, of a three-fifths course given jointly in the military and electrical engineering departments paying a government allowance of about twelve dollars per month and lasting over a period of two years.

---

As for the half-baked lump of human clay who deposits his wad of gum in the bubbler, Gawd help him if he is ever discovered. We have already picked out the stump where he *gets his fitting* punishment.



**The Men Who Made the World's Shaft Record**

*J. D. Matheson, General Foreman (fourth from right in front row, kneeling), attributes the success of this undertaking largely to the efficiency of these men.*

*WALTER FITCH, JR.*
*President Walter Fitch, Jr. Co.*

# Another World's Record

**The Same Contractor - Walter Fitch, Jr. Co.**
**The Same Powder - - Hercules**
**The New Shaft Record 427½ Feet in 31 Days**

In 1916, Walter Fitch, Jr., Co. sank a shaft 261 feet in 31 days for the Chief Consolidated Mining Co., Eureka, Utah, a world's record at that time.

Hercules Dynamite was used.

On August 15, 1921, the same contracting company, sinking another shaft for the same mining company, completed a record of 427½ feet in 31 days. This exceeds, by 117½ feet, the best previous distance ever made.

Again, all of the dynamite used was Hercules.

What greater confidence in the reliability of Hercules Dynamite could be shown? What better demonstration of its performance?

The Fitch Company's continued choice of Hercules for this undertaking, which demanded the utmost efficiency from men and materials, is a significant fact worth remembering.

Write for our book—Hercules Products.

## Condensed Data

Size of Shaft – 5'9" x 15'6" (outside dimensions)
Distance Sunk—427½ feet in 31 days.
Explosives Used—Hercules Gelatin L. F. 35%—1" x 8"
Blasting Caps Used—Hercules No. 8
Average Dynamite Consumption per foot—15¼ lbs.
Average Footage per day—13.8 feet
Labor—Average of 5.7 shaftsmen per shift.
Drilling—Average of 23.9 holes drilled per round. Three rounds drilled per 24 hours.
Hoisting—Average of 72½ buckets of 17 cu. ft. capacity hoisted per shift.
Timbering—Average of 2.8 sets per day by an average of 4.8 timbermen.
Nature of rock—Porphyry and close grained limestone.
Total Delay During Month—13 hours due to failure of power and repairing head frame.

# HERCULES POWDER CO.

Allentown, Pa.
Birmingham, Ala.
Buffalo, N.Y.
Chattanooga, Tenn.
Chicago, Ill.
Denver, Col.
Duluth, Minn.
Hazleton, Pa.
Huntington, W. Va.
Joplin, Mo.
Los Angeles, Cal.
Louisville, Ky.
New York City
Norristown, Pa.
Pittsburg, Kansas
Pittsburgh, Pa.
Pottsville, Pa.
St. Louis, Mo.
Salt Lake City, Utah
San Francisco, Cal.
Wilkesbarre, Pa.
Wilmington, Del.

*Kindly mention The Wisconsin Engineer when you write.*