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The
**WISCONSIN
ENGINEER**

Published by the Engineering Students of
THE UNIVERSITY OF WISCONSIN

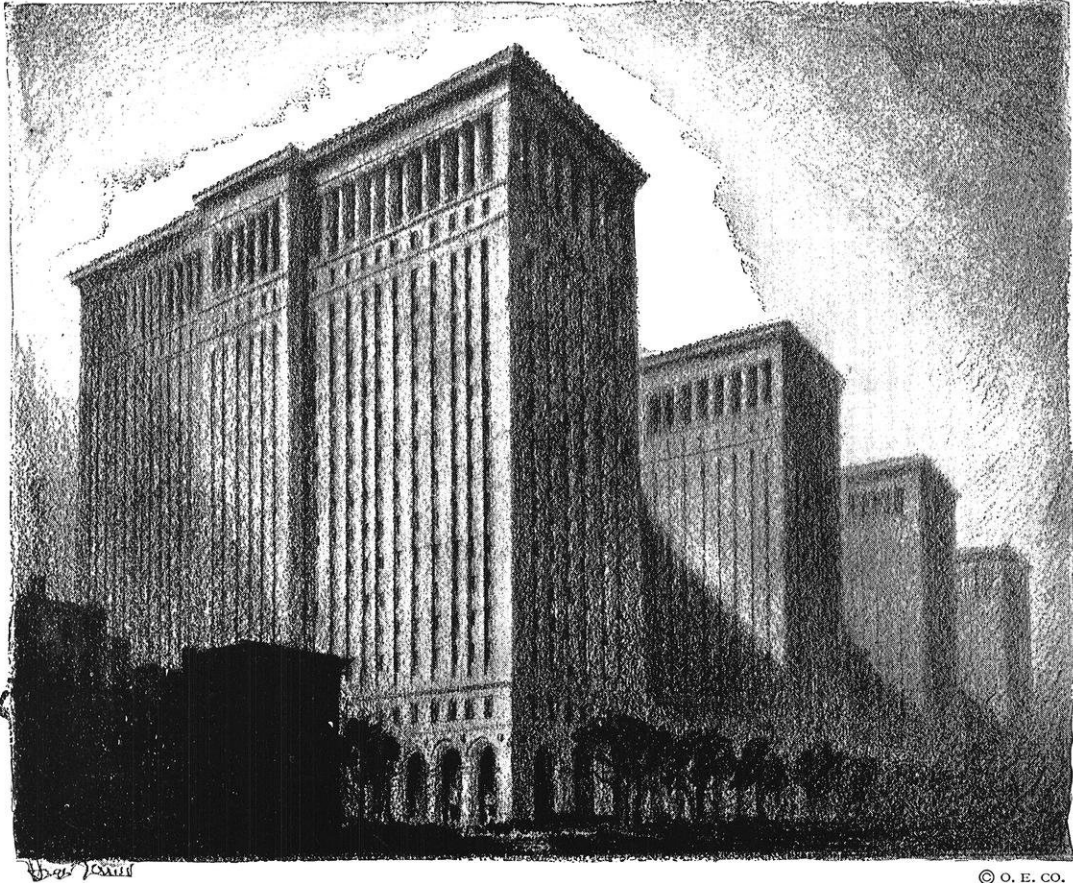
VOL. XXVIII

MADISON, WISCONSIN, FEBRUARY, 1924

NO. 5

Member Engineering College Magazines, Associated





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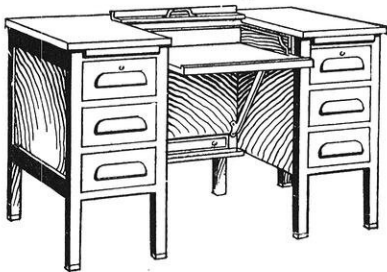
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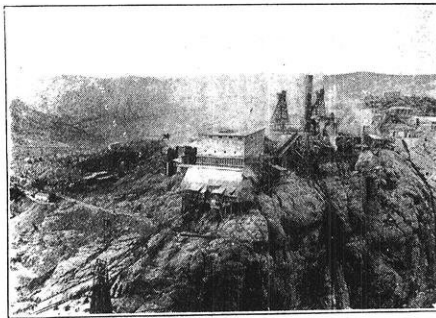
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UNIVERSITY OF WISCONSIN

VOL. XXVIII NO. 5

MADISON, WIS.

FEBRUARY, 1924

SOME MEMORIES OF THE CIVIL ENGINEERS' CAMPS FROM 1896 TO 1919.

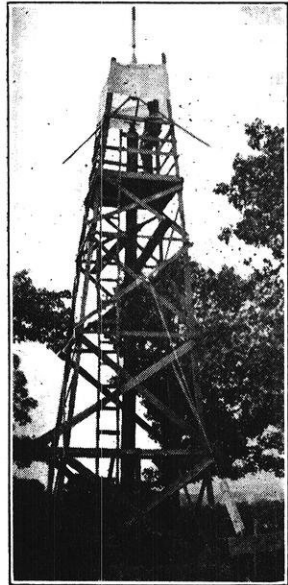
BY LEONARD S. SMITH

Professor of Highway Engineering and City Planning

The memories of these twenty-four camps are many and varied and, with but very few exceptions, exceedingly pleasant. These camps furnished the very best opportunity of securing the mutual understanding between instructor and student so necessary to high grade work. It is truly remarkable how uniformly excellent has been the work done at these camps. As a result

of this intensive field and office work of a single month, inexperienced boys have been trained to take responsible positions in the topographic parties of the U. S. Geological Survey, the Corps of Engineers, U. S. Army, and other equally high class organizations. As a result of the reputation which these young men made for themselves and for the University, it was quite usual for the writer to offer positions at the close of the camp to all members who desired employment.

The first civil engineers summer survey was organized in 1896. My memory is not very clear on this point,



A TRIANGULATION
TOWER

but I believe the credit for suggesting the organization should be given to Professor Turneure. He had experienced the advantages of a survey camp in his undergraduate days at Cornell University and thought Wisconsin should have a similar course.

For the first few years only two weeks were required,—commencement week and the week following. During this period, 1896-1900, topographic and hydrographic surveys of Lakes Mendota and Monona were made and later published by the Wisconsin Geological and Natural History Survey. These maps have been of much assistance to President Birge in his elaborate and long continued investigation of plant and fish life.

These maps were controlled by a triangulation covering the entire region and expanded from a base line located on the university farm.

The only incident connected with this work worthy

of repetition that I now remember was an unfortunate accident to one of our few first class transits. It happened this way: The topographic party was in camp at West Point on the north shore of Lake Mendota. The very first day of this camp I noted that there were many cows in the adjacent pasture, so I cautioned the party that when they returned to camp they were to be sure to put the transits back into the cases to avoid any possible injury. Instead of following these directions, they left the transit on the tripod and made a bee line for the pump at a distant farm house. The cows grazing in the near-by pasture noticed the reflections from the new transit, and were curious to discover this new attraction to their pasture. One cow, bolder than the others, and perhaps resenting the intrusion of this stranger, tested its horns on the supporting tripod with the result that it fell over and bent the plates and axis so it had to be sent to the maker for repairs.. As it had always been my policy to teach not only the technical use of the surveying instruments, but also the importance of properly caring for all property intrusted to one, the student responsible for the transit was reminded that the two-dollar fee did not cover such abuses as this, and that he would have to pay the repair bill of \$50.00. This he did only when informed by the president of the University that unless he did pay the bill, the University would neither re-admit nor graduate him.

The work of surveying the nearby lakes was completed in 1900. The nearness of the University and the resulting social interruptions proved a heavy handicap to the work, so the faculty, consisting at this time of Professor Turneure, Professor N. O. Whitney, and myself, concluded that the interest of the work demanded that a more favorable environment for the camp should be selected. After careful consideration, the city of Portage was selected because of its diversified topography and the proximity of the Wisconsin river with a June flow of from 8000 to 15000 second-feet. Here also were located many bench marks whose elevations had been accurately determined by the U. S. Geological Survey and the State Levee Commission, also one U. S. Coast and Geodetic triangulation station near enough for a connection.

As yet the University did not possess a camping outfit, so the entire party of about forty had to be

quartered in one of the hotels, which at that time was run as a temperance place by two old rustics whose grey beards reached to their waists. The basement of the hotel, formerly a saloon, was then used as a drafting room.

The course of study had now been extended to four weeks, equally divided between the sophomore and the junior years. The policy of allowing the students to elect their own chief engineer was started and John F. Icke, later city engineer of Madison, was elected to the above position of responsibility. Mr. Icke proved an excellent executive, and some important improvements were introduced. Mr. Clifford Older, at present chief engineer of the Illinois Highway Commission, was a member of this party.

The billeting of so many boys at a single hotel was not conducive to quietness, so in the following years at Portage the writer found rooms for the students in private homes. No difficulty, after the first year, was experienced in finding good rooms and board. In fact, it was very common for the landladies to request that I send them the same boys they had sheltered the previous year,—a well-merited compliment.

Portage Was Hospitable

In the summer of 1904, R. G. Walter, now with the Southern Wisconsin Power Company, was elected chief engineer by his fellow students. The following statements are taken from his recent letter to the writer:

"It was my pleasure to attend the summer school at Portage in 1903 and 1904. The one outstanding feature of this summer school work was the fact that it brought the students into very intimate contact with each other, with a resulting unity of purpose on the part of the students. I recall that there were twelve of us boarding and rooming at one place. We were thus thrown together a good deal and great friendships sprung up in that particular group of students.

You will recall Adolph Meyer, who, when he would unbend, would probably measure six feet four inches, and on the other hand you will remember Forbes Cronk who probably did not measure more than five feet five inches. Now Meyer and Cronk were bed-fellows, and there was always a question in our minds as to whether Meyer would occupy the section of the bed from one corner diagonally to the other corner, thus leaving a small triangle of the bed for friend Cronk."

The friendships and lessons of team play which these civil engineers learned in the summer school were afterwards very noticeably used during the school year and resulted commonly in the civil candidates to class offices being elected by large majorities.

That these yearly outings were not without exciting moments will be seen from this additional quotation from Mr. Walter's letter:

"Perhaps the most exciting incident occurred during the second year I was at Portage. It was customary when the engineers arrived in Portage for the young ladies to cease attentions to their local beaux and devote themselves instead to the university visitors. Naturally some of the local boys resented this sudden eclipse, and one particular night one discarded beau made a rather insulting remark to one of the students, who resented it and slapped the offending boy in the face. The police were called and the university boy was taken to the police station, where he was later joined by his adversary to remain until the following day. I got out the Chief of Police and the Justice of the Peace in the middle of the night, and a trial was held at four a. m. The verdict of the court was a fine of ten dollars to each offender. As a result, each of the forty students contributed twenty-five cents, and our university boy was allowed to go home."

During the last seven years that we were in Portage, the mayor directed that a large part of the fine city hall be given over to the party for our headquarters. In general, letters from old students, all speak of the friendly and tolerant attitude which the Portage cit-



PORTAGE DAYS This group of old timers with their mixture of the rakish sombrero and the saucy derby made things lively for the Portage maidens of 1906.

izens always showed the students. I quote one letter as follows:

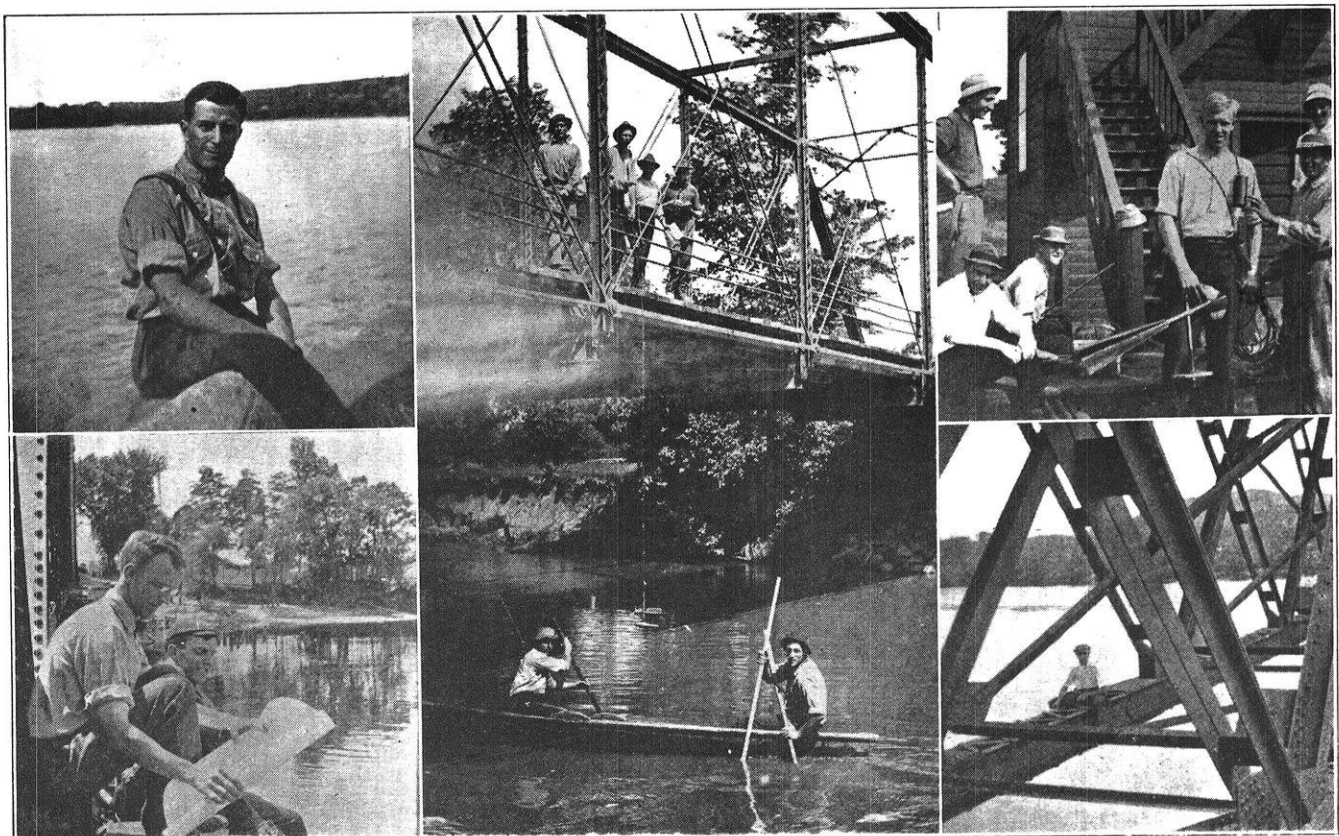
"The young ladies certainly did all they could to make it entertaining for us, and I often wonder whether under present circumstances the girls have not missed the annual pilgrimage of the students to their city."

Professor Turneure's part in this summer school was taken in 1907 by instructors Ray Owen and William Penn, while W. C. Buetow, now bridge engineer of the Wisconsin Highway Commission, was elected chief engineer.

spirit. Prof. L. S. Smith acted as toastmaster and kept something doing all the time."

"The flower laden tables were set in the form of a capital E. All about the dining hall were blossoms and potted plants. The joyous spirit of the occasion could not reserve itself altogether to post-prandial display, but bubbled forth unceremoniously in impromptu stunts. Between courses college songs rang forth in lusty choruses. These were interspersed by the varsity toast drunk standing."

"The speakers and hints of what they said, may be seen from the following list:



EARLY DAYS. Upper left, C. Scudder, chief engineer of the first camp at the lake in 1910. Upper right, C. Wiskocil, chief engineer of 1912, who left his mark on many camp activities. Lower left, B. S. Pease and Jack Reed at Portage. Lower right, stream gaging from the big bridge across the Wisconsin River at Merrimac. Center, stream gaging at Baraboo.

The Banquet Becomes a Tradition

This year's camp was made memorable by the initiation of a new social function, the first annual banquet, a function which was destined to be repeated at every camp thereafter.

I quote the following account of this first annual banquet from the Portage Democrat of June 1907:

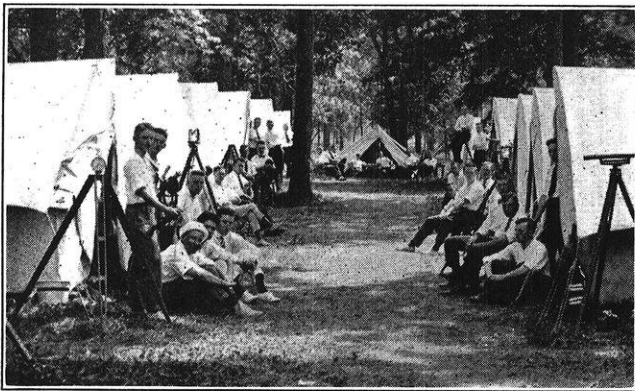
"Sixty U. W. Engineering students at the Tremont hotel last evening divided their attention between what the waiters had to offer and the speaker's responses to the toasts. It certainly was a bully good feed, thanks to the landlord, and a jolly good time, thanks to the fellows who set off the rhetorical fireworks. The instructors joined in with the fun with true democratic

- Mr. Howson ----- The Portage Girls.
- Mr. Cunningham ----- Why the Astronomical Party Don't Work.
- Mr. Owen ----- Stories, Choice and Otherwise.
- Chief Engineer Buetow ----- The 1907 Summer School Bunch.
- Mr. Foster ----- Success to the Varsity Crew.
- Mr. Kruell ----- Look Before You Leap—into the Wisconsin River.
- Mr. Kaulfuss ----- The Varsity Ball Club.
- Mr. Stecker ----- What happened at Kilbourn.
- Senor Gomez ----- The Philippines.
- Mr. Shorey ----- U. W. Engineers in Actual Practice.

"It is interesting to note that a purse of six dollars was raised to send a telegram of encouragement to the varsity crew at Poughkeepsie and for telegraphic details of the results of the race."

From the above descriptions, one who had never been a member of the party might conclude that social activities usurped an undue proportion of the student's attention. Perhaps this may have been true of a few cases, but in general the serious work of the party claimed and secured the entire attention of the students for ten hours in the field besides several hours in the office each evening. *

The faculty felt, however, that such summer work would be more effective if the students lived in tents. Accordingly the plan was made to purchase the necessary equipment for holding the camp at Devils Lake during the summer of 1909. In some way the prospective students got wind of this plan, and so much opposition to leaving Portage developed that it seemed wise to delay the change until the following year. By the way, it was a noticeable fact that those students



A STREET IN THE CAMP DURING SUMMER OF 1915

who most prized the social attractions at Portage, were the ones who at Madison seemed entirely indifferent to such opportunities. It has been suggested that this change of heart was due to the fact that the Portage girls went more than half way in overcoming the boy's indifference, which after all was not deep seated.

At any rate a camping outfit was purchased and the first summer camp was held at Devils Lake in 1910. The party included forty-eight students who elected Charles Scudder as chief engineer. We boarded at the hotel and lived in tents pitched a few hundred feet away near the bank of this beautiful lake. This camp as well as all succeeding ones proved a great improvement over all preceding ones. Nor did the denial of the ladies' society bring any of the dire consequences that had been predicted.

A base line nearly a mile in length was laid out and

*For a complete description of the summer school work see the writer's article in Vol. XIII, Proceedings of the Society for Promotion of Engineering Education. See also vol. XLIII, Transactions Am. Soc. C. E. for methods of base-line measurements.

measured on the flat plain between Devils Lake and Merrimac, and an excellent triangulation was expanded to cover the neighboring region.

Burmeister Gets the Goods

At this base line an incident occurred that illustrates well the advantage of initiative,—a quality altogether too rarely found in the university student. Posts 4 by 4 inches were used at the end of each tape length, the exact point being transferred to a brass strip firmly nailed to the top of the post. When the base line was half completed and measured it was found that we would lack eight metal strips to complete the measurement. I sent one of the party, Burmeister by name, to the village nearly two miles away with directions to purchase the necessary strips from the hardware store and to return post haste to our party. Burmeister promptly disappeared in a cloud of dust raised by the lumber wagon we had with us and in due time returned with strips which had been cut from tin cans, but which answered every purpose. It appeared that when he got to Merrimac he found the only hardware store locked and the owner away on some visit. Most boys, I fear, would have returned at this point and reported that they could get no strips, but not so with our young friend. He knew that the day's work of the entire base line party would be a failure if he did not bring back some substitute. Accordingly, with rare initiative, he searched the backyard of the only boarding house or hotel in the village, and was rewarded by finding the usual generous supply of tin cans. With an old ax he cut out of the tin cans the much needed strips of bright tin and returned to us in time to use them in completing the accurate measurement of the base. All honor to a young man who knew how "to carry a letter to Garcia". At the end of the camp I rewarded him by getting him an excellent position on the U. S. Great Lakes Survey, which he filled with much credit to himself.

It has often appeared to me that in these days of well equipped laboratories and carefully described experiments, we may be offering to our students too much instruction and too little opportunity for real education. In our summer camps the students are frequently left to their own devices in meeting the numerous unexpected conditions, and for this reason the field work should prove of double advantage.

The work of the summer school at Devils Lake showed a marked improvement over the work at Portage. The maximum development in efficiency was reached in 1912. Under the inspiration of Clement T. Wiskocil, chief engineer, a topographic map of the entire region was surveyed, mapped, and assembled so that blue prints were available for future classes. Mr. Wiskocil also prepared a type-written report of the camp's work and results, including many valuable suggestions for future improvements, which will long stand as a model of its kind seldom to be equaled. It

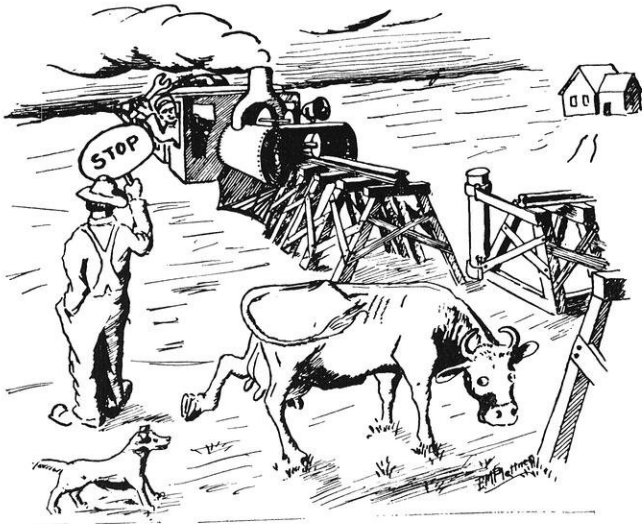
(Concluded on Page 110)

SOME REMARKABLE RAILWAYS OF THE WORLD

By EARL RAIMON STIVERS

Instructor in Railway Engineering

Perhaps one of the most curious railways in the world is a comparatively short monorail line in Ireland between Killarney and Bally Bunion. The track is carried on "A" frames about 3½ to 4 ft. high and the coaches are hung on each side of these. Road crossings are carried over the track by means of lift bridges and farm entrances are easily made by hinging a portion of the track and "A" frames so that in effect it becomes a gate.



TRAFFIC DELAYS IN IRELAND

Another type of construction that is rarely seen in this country is in use on the Sao Paulo Railway of Brazil, where a raise of 2600 feet is accomplished in 6.2 miles by means of cable inclines. This railway, which runs from Santos on the Atlantic Ocean to Sao Paulo (49 miles) at an elevation of 2600 feet and Jundiahy (86 miles) at the same elevation, was originally constructed in 1867 at the unusual cost of \$497,000 a mile. In 1901 it was relocated and double tracked. Notwithstanding the high cost of construction and the fact that its maintenance expenses were \$39,820 a mile in 1913, the net earnings in this same year were \$46,400 a mile, which probably makes it the most profitable railway in the world. There are five of the doubletrack cable inclines on 8 per cent grades, and all operate simultaneously with one train each way on each incline. The largest train consists of six loaded cars or 145 tons, and in 10 hours 5000 tons can be hauled in each direction.

Recently, thru the instrumentality of the city of Denver, construction was started on a six mile tunnel under the Rocky Mountains. This, however, when completed will only be one half as long as the Simplon tunnel under the Alps between Switzerland and Italy, the longest railway tunnel in the world. In fact there are really two tunnels, 17 meters center to center,

identical in all respects, with a grade of 2 per cent on the Swiss end and a grade of 7 per cent on the Italian end.

Difficulties of another nature were offered the engineers who located the Ax-les-Thermes-Ripoll Railway between France and Spain. Here the rock walls were so steep that the engineers had to be lowered by cables in order to take topography. A spiral tunnel 5579 feet long also had to be resorted to in gaining an elevation of 207 feet.

Another remarkable physical feature is on the railway line from Port Augusta to Kalgoorlie, connecting eastern and western Australia,—a tangent 330 miles long,—the longest piece of straight railroad track in the world. But there was nothing to prevent its construction as there were no hills, valleys, rivers, trees, nor was there any water for 500 miles of line. However, these very features made the work of construction extremely difficult; there were no inhabitants for four-fifths of the route and water and all the materials of construction had to be carried in some cases for more than 300 miles. The line opened in November 1917 after five years of construction work. Such difficulties of construction, on the other hand, are not



TOPOGRAPHICAL WORK IN SPAIN

(Concluded on Page 108)

CENTRAL HOUSE HEATING BY GAS FIRED BOILERS

BY GROVER C. MOORE

Assistant Superintendent of Fitting Department, Washington (D. C.) Gas Light Company. Extension Student in Mechanical Engineering.

The time has come when nearly all of the gas companies in the country must give serious thought to the advisability of meeting house heating requirements in the matter of gas fuel.

This has been brought about by the fluctuating condition of the coal market, prevailing high prices and the danger of coal shortage due to labor difficulties. These factors have been the cause of numerous inquiries to this company from consumers to determine the practicability and comparative cost of gas fuel.

In order to be able to supply information to consumers making these inquiries this Company decided

to conduct a service test on the available types of plants designed for this purpose, and to this end, installed plants of varied construction and exposure conditions in six residences. A record was kept for the winter 1922-23.

The gas used was a carbureted water gas, with a heat content of 600 B. T. U. per cubic foot and a specific gravity of 0.65. It was metered under a pressure of 6 inches of water. The meter rate was \$1.00 per thousand cubic feet.

An estimate of the available B. T. U. per ton on
(Continued on Page 109)

TEST DATA OBTAINED

Plant	Type	Actual Direct Radiation	Boiler Rating Sq. Ft.	Coal Cost 1921-22	Gas Cost 1922-23	% increase	Description
A	Steam	800 sq. ft.	1500	\$415.00	\$465.52	*12.17	N. & S. Exposure well built stone, brick, lath, plaster completely weather stripped.
B	Hot Water	470	600	91.50	168.00	83.61	Exp. N. S. E. brick, lath and plaster.
C	Steam	1200	3020	426.00	758.35	78.02	Exp. N. S. E. W. 5 story brick, lath, and plaster radiation inadequate. Weather stripped.
D	Hot Water	1500	3000	482.50	762.55	58.04	2 exp. N. S. 5 story brick, lath, and plaster. Weather stripped.
E	Hot Water	1800	2925	418.50	752.97	79.82	Exp. E & W. 4 story stone, brick, lath, plaster. Weather stripped.
F	Hot Water	686	1625	272.50	419.03	53.77	Exp. N. E. S. W. clapboard, lath, and plaster. Not weather stripped.

Average outdoor temperatures (U. S. Weather Bureau)

Winter 1921-22	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.
	56.9	47.5	37.9	32.0	38.6	45.4	55.6	66.8
Winter 1922-23	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.
	59.4	47.9	37.6	36.8	32.6	45.4	53.6	63.4

Cubic Feet of gas per sq. ft. actual direct radiation per season (Steam) 650.

Cubic Feet of gas per sq. ft. actual direct radiation per season (Hot Water) 470.

*This case looks inaccurate in view of the other cases but the gas consumed per square foot of radiation compares favorably to the other cases; therefore the discrepancy may be assumed due to inaccurate coal figures or very inefficient use of the coal apparatus.

These coal figures were statements by tenants in each case and a certain degree of error must be expected.

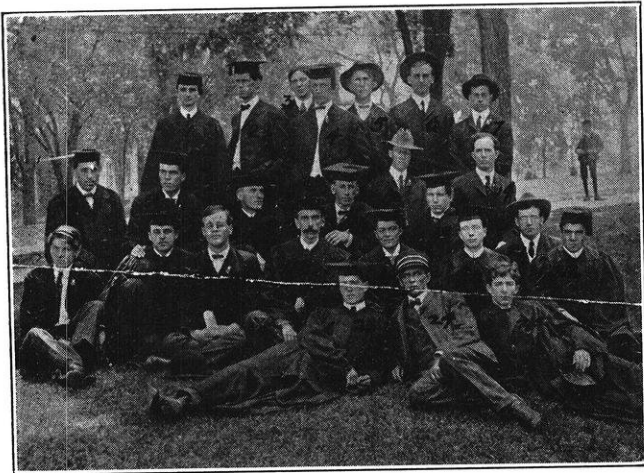
G. E. Moore.

ALUMNI NOTES

F. D. BLANCH

CIVILS TWENTY YEARS AFTER

Just twenty years ago this coming June, the group of senior civils shown in the accompanying picture gathered on the campus in front of the Engineering Building prior to marching to the Commencement exercises in the Gymnasium. They are 1. A. J. Bleser, 2. C. T. Watson, 3. A. W. Nicolaus, 4. J. G. Staack, 5. H. Gardner, 6. R. J. Coon, 7. E. J. Fisher, 8. M. G. Hall, 9. C. V. Hopper, 10. G. W. Garvens, 11. W. R. Whitby, 12. A. W. Andrews, 13. E. A. Moritz, 14. E. E. Terrell, 15. W. S. Kinne, 16. G. E. Kahn, 17. M. W. Torkelson, 18. C. F. Graff, 19. J. I. Bingham, 20. J. M. Gilman, 21. W. B. Bennett, 22. J. H. Neef, 23. R. S. Owen, 24. John Babcock, janitor of E. B. for many years, 25. E. H. Omara.



SENIOR CIVILS OF THE CLASS OF 1904

Just what will twenty years do to a crowd like this? Well, one man, Garvens, is dead; two of the group are farmers,—Bleser and Nicolaus; two are merchants,—Coon deals in hardware at Ladysmith and Whitby deals in the same commodity at Estevan, Sask.; Omara is with his father in the Omara Parlor Frame Co., Chicago; Hopper is sales agent with the Nitrate Agencies Co., Lakeland, Fla.; there are three professors,—Kinne and Owen at Wisconsin and Gardner at the Colorado School of Mines, Golden, Colo.; two men are with railroads,—Andrews is office engineer with the C. B. & Q., Lines West, at Lincoln, Neb., and Gilman is structural engineer with the C. M. & St. P. at Seattle, Wash.; Graff is president and general manager of the American Nitrogen Products Co., Seattle, Wash.—an interesting account of his career appeared in the Wisconsin Engineer for May, 1920; Staack is with the U. S. Geological Survey and teaches topography at Devils Lake each summer; Kahn is engineer and contractor at Milwaukee, and Neef is doing the same sort of thing at Salem, Ore.; Moritz is consulting irrigation engineer at Effingham, Ill.; Hall is consulting engineer and president of the Fisher Lumber Co. at Centerville, Iowa; Bingham is in private practice at Elmira, N. Y.; Terrell is assistant

county highway engineer at Minneapolis; Torkelson is engineer-secretary for the Wisconsin Highway Com.; Bennett is engineer with the street railway company of St. Louis; Fisher is engineer with the Truscon Co. at Minneapolis; Watson is in Washington, D. C., business unknown.

Louis S. Davis, c '10, is assistant city engineer of Madison, Wisconsin.

Robert L. Filtzer, c '17, visited the college on January 25 with a rare tale of adventure during his seven years out in practice. Bob, who used to play football in his day and came back from the famous 54 to 0 massacre at Minneapolis with a broken leg, is still adventuring his way through life. He has just returned from working for the State Planning Commission of Russia. He went in March, 1923, by way of China and reached Moscow in May of that year, remaining until last November. His wife, who accompanied him and is now working in a government office, will remain in Russia for the present. Filtzer made a number of studies and investigations for proposed hydro-electric developments, the most important one being for a dam and power plant at Alexandrovsk at the head of navigation on the Dnieper River. There is no immediate prospect of actual construction, he says, because the government is unable to raise the necessary capital.

Filtzer's travels since leaving college have taken him steadily westward. He spent a couple of years — until May, 1919 — with the U. S. Geological Survey on land classification and hydro-electric investigations. He was in the Park Service at Yellowstone from May to November, 1919. From November, 1919, to August, 1920, he did location work for the California Highway Commission. From that position he jumped to Los Angeles where he was employed by the consulting firm of Quinton, Code, and Hill from October, 1920, to May, 1921. A business depression drove him to the Arizona oil fields for a short time, but he soon left for Hawaii where he worked with the Highway Commission from September, 1921, to June, 1922, on location, construction, and office work.

His next move was to Japan where he attempted to organize a construction company for road work, but ran into another business depression that stopped construction. In Japan he met a soviet official who induced him to go into Russia.

Bob is now looking for new worlds to explore. He says that he has volunteered for the proposed flight across the North Polar Sea, which is scheduled to take place next summer.

G. M. Hoe, c '21, is engaged in construction work in Milwaukee, Wis.

Elmore Klement, c '22, was married recently to Miss Ella Olson of Dodgeville.

Clarence M. Larson, c '05, chief engineer for the Wisconsin Railroad Commission, has been elected president of the Technical Club of Madison, which includes in its membership two hundred and fifty of the engineers and architects of Madison.

Robert Light, c '20, is with the West Virginia State Road Commission at Charleston, W. Va.

James E. Mackie, c '23, is in the building department of the city at Long Beach, California.

F. M. McCullough, c '03, has been appointed head of the civil engineering department at Carnegie Institute of Technology.

Virgil L. Minear, c '23, is assistant engineer with the Reclamation Service at American Falls, Idaho.

William F. Moehlman, c '22, is with the Oliver Iron Mining Co., at Coleraine, Minn.

Archibald O. Powell, c '80, C. E. '90, died at his home in Seattle, Washington, on November 18, 1923. Colonel Powell was a member of the engineering firm of Powell and Jacobs. He was one of the prominent consulting engineers of the Northwest, where he was connected with many large projects. One of these was the construction of the Lake Washington Canal.

Philip K. Schuyler, c '21, assistant engineer with the North Carolina Highway Commission, is the author of an article which appears in the January number of the North Carolina Highway Bulletin on Pee Dee River Bridge Survey. The bridge will span the Pee Dee River on the Wilmington-Asheville-Charlotte Highway, Route 20, between Rockingham and Wadesboro. The article discusses methods of making borings at the site and their cost.

Walter C. Thiel, c '22, who gives his address as 405 West Fourth St., Long Beach, Calif., writes, "I left Minot, North Dakota, on June 20 via auto, bound for California. After a very pleasant and scenic trip we arrived in Los Angeles on July 6. On July 11 I went to work for the City of Alhambra as assistant designing engineer. Alhambra has a population of 23,000 and is just outside the Los Angeles on July 6. On July 11, I went to work for the position of assistant sanitation engineer at Long Beach."

Oscar W. Torgeson, who finished the civil course in February, is with the Forest Service at Ogden, Utah. Mail will reach him at that address. He was married recently to Mary Louisa Malan of Ogden.

Lionel C. Tschudy, c '23, reports that he contracted a case of malaria in Mexico, where he was working, and that he resigned his position and came north. He gives his address on January 3 as 28 Cornelia Avenue, Mill Valley, Calif. "I noticed in the A. Lietz Engineering Supplies Company of San Francisco," he writes, "that they were selling some of Hool and Kinne's new books. It always makes me feel good to see texts that were written by some of our home profs, — Turneure & Maurer's Reinforced Concrete, Danny's Water Power, Smith's Surveying, and Hool & Kinne's books are all known in most any part of the U. S."

James P. Woodson, c '16, is an engineer with the Dixie Construction Company at Birmingham, Alabama.

ELECTRICALS

G. L. Bostwick, e '17, is a sales engineer for the U. S. Gypsum Company, at Cleveland, Ohio.

Robert N. Falge, e '16, is an automatic lighting specialist, Cleveland, Ohio. He gives his address as 14403 Potomac Ave.

Carl Findeisen, e '13, is a traffic engineer with the Illinois Bell Telephone Company.

R. R. Knoerr, e '20, is in the electrical contracting business in Milwaukee, Wisconsin. He gives his address as 1009 Richards St.

Carl F. Kottler e '18, is secretary of the Wisconsin Mat Co. at Milwaukee Wis. His home address is 373 Royal Place.

Norman Lee, e '04, who has been living for many years in France, recently returned to the U. S. and is now employed with Allis-Chalmers Company. His address is 1504 Grand Avenue, Milwaukee.

J. A. Potts, e '23, was married on December 22 to Miss Lillian Snell. Potts is with the Milwaukee Electric Railway and Light Company.

John W. Reed, e '15, is district sales manager of the Peerless Electric Company, at Detroit, Michigan.

A. S. Rufsvold, e '23, who is with the Westinghouse Company at East Pittsburg, was at the university as an employment representative on January 26, 28, and 29.

CHEMICALS

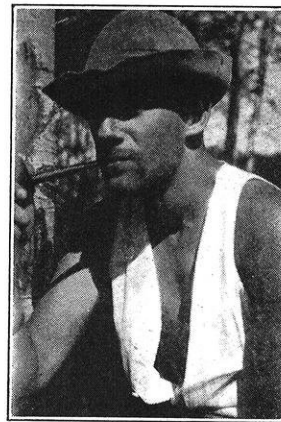
Terence A. Gill ch. '17, was married on Sept. 26, 1923, to Miss Marjorie Christie of Chicago.

Charles S. Nason, ch. '22, was married on December 22, 1923, to Miss Katherine Fishburn, of Madison, Wis. Nason is with the Street Railway and Light Co. at Ashland, Wis.

Mr. and Mrs. **Roman A. Schmid** announce the birth of a son, Roman Arthur, on December 26, 1923. Schmid, ch. '15, is a chemical engineer with the Kimberly-Clark Paper Co., Kimberly, Wis.

MECHANICALS

Einar Isdahl and **Eiler Schjalberg**, both m '23, send word under date of January 10 that they are rooming together at the home of Tom Norberg Schultz, m '22, at 386 Alcatraz Ave., Oakland, Calif.



EINAR ISDAHL

Isdahl is working with the Hall-Scott Motor Car Co. as assistant tester. He writes, "Since I left Wisconsin last August I have tried my hand as farmer and cowboy in Canada, sailed on the Pacific for a short time, and now been at anchor here the last four months. I am getting valuable experience, and even tho I miss snow and skiing once in a while, think California is a very attractive place to live. People seem to have more time out here to enjoy life. The influence of the culture the Spanish invaders brought to California is still evident in many respects, and the realization that it is "not what we have, but what we enjoy that makes us happy" seems to be more common here than back east.. I do believe the climate in general,—the constant sunshine, the flowers you always see here inspire the people to thinking of matters not necessarily connected with the "daily bread".

Edward J. McEachran, m '04, has recently moved to Wausau, Wisconsin, where he plans to establish a plant to manufacture dry batteries. "Mac" will be greatly missed by his many friends in Madison, where he has lived for many years, and where he has been active in university affairs.

Rudolph Michel, m '16, is teaching at the University of Illinois.

D. F. Stalker, m '23, is with the General Electric Company, and has recently been transferred to the Pittsburg office.

MINERS

Lawrence Hahn, min. '21, is a sales engineer for the Sivyer Steel Casting Company, Milwaukee..

Gustaf Lundberg, min. '21, M. S. '22, died on January 10, at Bloomington, Illinois, of Bright's disease.

EXTENSION NOTES

Dean Louis E. Reber has been named as the Wisconsin delegate to the sesqui-centennial fair, an international exposition to be held at Philadelphia in 1926 to celebrate the one-hundred-fiftieth anniversary of the Declaration of Independence.

A short class course in "Fuels and Combustion" is to be offered in Madison by the University Extension Division. It is hoped that this work will be of material help to engineers and firemen in their efforts to meet the requirements of the new smoke ordinance.

A talk on the city manager plan was given by Professor F. H. MacGregor before the Technical Club of Madison at its meeting on February 4.

The Extension Division's new text on "Storage Batteries" by Professors Jansky and Wood has been adopted by the electrical engineering department of the Pennsylvania State College.

Stanley M. Holiday, draftsman in the Navy Yard at Portsmouth, New Hampshire, has made a remarkable record in the Extension Division course in Mechanics. He received a grade of 100 on 8 assignments out of 20, and on two others a grade of 99. His average grade on the twenty assignments was 96. The final examination comprises twelve representative problems, and on this he obtained a grade of 100. His grade for the entire course was 97.3. We believe that this record has not been surpassed or even equaled.

University Extension texts have been adopted by one-hundred and fifty-seven colleges.

On the evening of January 16 Professor W. E. Wines of the mechanical engineering department gave a radio broadcast on the "Management of the Home Furnace". Several complimentary letters have been received from interested listeners, many of them requesting copies of the talk.

The McGraw-Hill Book Company reports that Professor Wines' book on "Strength of Materials" has been adopted as a text in the Sophomore Administrative Engineering course in Materials at Yale University. This makes the third adoption; the other two are by Drexel Institute and the University Extension Division of Massachusetts.

Among the students recently registered in the Civil and Structural Engineering Department are the following:

Hans A. Christensen, hydraulic designer for the Electric Bond and Share Company of New York.

Arthur O. Peterson, draftsman with the Corrugated Bar Company of Buffalo, New York.

Sterling G. Thomas, with Stone and Webster, Inc., Boston, Massachusetts.

William F. Moehlman, with the Oliver Iron Mining Company, at Coleraine, Minnesota.

A. J. Ackerman, with the Fargo Engineering Company at Jackson, Michigan.

Benjamin J. Baskin, assistant engineer with the Bridge Division, Bureau of Highways, City of Philadelphia.

Richard M. Hodges, with the Tunnel Division, Board of Estimates and Apportionment, New York City.



STUDENTS IN ELECTRIC METER SHORT COURSE. *This course is conducted at Madison by the University Extension Division.*



To all forwards who are playing center

“THE little fellow hasn’t got the reach. Why don’t they put him at forward where he belongs?” You have heard comment like that about some mis-positioned player.

Just look out they don’t talk that way about you – not in athletics but in your field of work after college.

The world is full of doctors who should have been lawyers, and lawyers who should have been writers—men who can’t do their best work because they haven’t got the reach.

You still can avoid their haphazard choice of a career. Some earnest thinking on the subject, “What do I really want to do in life?” will help you decide right.

That’s a real problem. Get all the advice you can—from the faculty, from alumni, from men in business. If you find you have made a false start, change now and save yourself a lot of grief—for once you graduate into a profession, the chances are you’ll stay in it.

*Published in
the interest of Elec-
trical Development by
an Institution that will
be helped by what-
ever helps the
Industry.*

Western Electric Company

*Wherever people look to electricity for the
comforts and conveniences of life today, the
Western Electric Company offers a service as
broad as the functions of electricity itself.*

Number 35 of a series

Kindly mention The Wisconsin Engineer when you write.

EDITORIALS

L. T. SOGARD

LEAD US NOT INTO TEMPTATION John Procrastinator Jones, sophomore by the grace of the faculty, sits in examination facing a crisis. He is on the ragged edge, scholastically; if he flunks this exam he will surely be asked to withdraw from the university. A vision of himself facing the home folks after dismissal floods his soul for one sickening instant, and as he takes his first glance at the list of questions he realizes that only a miracle will enable him to pass that examination. The miracle presents itself: He is given an opportunity to "crib" a little. But this is an "honor examination"! John P. Jones is up against a real ordeal. To crib or not to crib? If he does not crib he knows that he will be in disgrace. He will have to return home and either hang his head in shame or lie to people about having a "nervous breakdown". No encomiums will come his way in recognition of a noble stand against temptation. He can never offer that victory over temptation in extenuation of his failure. On the other hand, if he does crib, probably no one will know it except himself; his standing in the community will still be good.

Cast about you, you who read this; look over your friends and acquaintances and estimate the number who could pass the ordeal facing John P. Jones with credit to their souls. Go further; examine yourself, and unless you have actually been confronted with such a temptation do not be too sure of how you would act. Stewart Edward White, in writing of big game hunting, says that a man's reactions under stress of danger are practically beyond his control and do not indicate courage or cowardice.

"No man," says he, "knows what he will do in a tight place or in the face of potentially dangerous game until he tries himself, — no man. It is not a question of courage at all. It is a question solely and simply of nerve reactions, which are mechanical and only very slightly within the personal control."

The same law applies to such tests of character as that which John P. Jones must undergo. Those of us who have never faced an examination in other than a confident frame of mind are quite positive that we would react nobly, push aside temptation, and immolate ourselves upon the altar of honesty in a blaze of glory. Let us hope that we are correct; but — let us be extremely modest about our own virtue, and charitable to the weakness of others until we have actually passed the test with credit.

The student who is confident of his ability to pass examinations as they come has nothing to win or lose

by the honor system; it should be a matter of complete indifference to him whether or not there is a proctor in the room. The student who is doubtful of his ability and unscrupulous in his methods might be expected to agitate for the honor system, which would make easier his dishonest practices. The student who is doubtful of his ability and honest in his intentions should find comfort and moral support in the proctor system. Christ did not teach us to pray "Make us strong against temptation"; in His wisdom He taught "Lead us not into temptation", for the best and strongest among us is ever likely to stumble and fall.

Every calling has its ethics, indeed, its standard of right and wrong, its outlook upon action and upon the varied relationships of society.

WOODROW WILSON

THE PRICE OF A BADGER PAGE A reduction in the price of space in the Badger from \$40 to \$25 a page, the reduction to apply only to honorary fraternities and sororities, was announced on January 24. This was interesting news to those who have watched the price of a Badger page mount from year to year, for we have been curious as to the limit. Here is the record of increase as shown by entries in the books of THE WISCONSIN ENGINEER: In January, 1918, we paid \$16; in May, 1919, \$20; in February, 1920, \$25; in January, 1921, \$25; in February, 1922, \$35; in January, 1923, \$35; and this year we are asked to pay \$40.

It is a dizzy climb in price which has puzzled and irritated us, and for which, so far as we know, no Badger management has made any explanation. We could understand the increase up to \$25, for it occurred at the time of mounting prices in every commodity, but the increase to \$35 was made the year that the ENGINEER had been able to secure reductions in prices on its own printing and engraving contracts. The increase this year to \$40 is wholly inexplicable except upon the theory that the management of the Badger, having a monopoly of year-book publicity, feels that it can charge any price it sees fit,—a "public-be-damned" theory that was supposed to be as extinct as the railroad baron who evolved it.

Space in the Badger should not be in the luxury class. The various organizations want to be represented in the Badger, not only for the sake of the immediate benefits, but, likewise, for the historical record. Furthermore, the value of the Badger is in direct propor-

tion to its degree of completeness. There is every reason for the management of the Badger to make it possible for the greatest number of organizations to be represented. But the price has risen to a point where it has become a serious question with organizations whether they can afford to be represented. Small groups, in which the individual's share of the expense is high, are practically barred. Even large groups find the price a burden.

The time seems to have come to cry halt to these increases. They have gone unchallenged year after year chiefly because no one in the various organizations has remembered what the price was the previous year. The organizations have not realized how the prices have soared until they are now 250 per cent of what they were in 1918. We recommend that the secretaries of the organizations clip the list of prices that appear at the beginning of this editorial and put it where it will surely be found next year when the subject again arises.

It goes without saying that we all want to see a Badger this year that will be a credit to the junior class and to the University. Likewise, we want it to be successful financially and leave a good balance for the treasury of the junior class. We think that both objectives can be attained without increasing the expense of publication. The only excuse that we can see for increased expense would be caused by an increase in the size of the book, and we fail to thrill to the slogan of "A Bigger Badger". The distance between the covers of the Badger is of less importance than the quality of the material between the covers, and quality is a matter of brains more than dollars.

"The value of technical training lies not in the accumulation of a great store of detailed information, but in the acquisition of the power to observe accurately, to reason correctly, and to act quickly and truly."

PROF. A. B. MCDANIEL

GET THAT JOB EARLY

Senior: In a few brief months your connections with this institution will be severed; you will begin a new life as different from the present as college was from the school days back home; you will probably be bereft of any further financial aid from parental sources. In other words, the proverbially "cold, cruel world" will take you unto itself.

Have you meditated at all upon the future? From now on it behooves you to keep your eyes open. Opportunities for employment will present themselves this spring right here at your doorstep. Several large concerns will send representatives to stimulate interest in their companies and to interview those who desire to pursue their lines of work. See these men and learn all you can about the student-apprentice courses which they offer. The Engineering Jobs bulletin board in the lower hall of the Engineering Building is generally filled with letters of request to the dean for

engineering graduates. Watch this bulletin board and when you find something of interest write a letter to the advertiser.

Engineers from the University of Wisconsin have established a good reputation in the profession. The fact that you are from this school carries a certain prestige. It may help you in landing a job, but of course, that is as far as you can ride on it.

Your life work is vital to your well-being and happiness. Like marriage, it is something to be approached with caution. Do some investigating this spring; don't wait until after Commencement.

"Censure and criticism never hurt anybody. If false they can't hurt you unless you are wanting in manly character; and if true, they show a man his weak points, and forewarn him against failure and trouble."

— GLADSTONE

HERE COMES THE PARADE

As the official organ of Wisconsin engineers, THE WISCONSIN ENGINEER here and now takes it upon itself to sound the annual war-cry, "On with the Engineers' Parade."

Saint Patrick's Day, celebrated alike by the Irish and the engineers, draws nigh. With its approach the whole school looks forward to the parade with more enthusiasm than it does to a Sunday morning. Humor and wit, pathos and mud trip down State Street hand-in-hand to the amusement and embarrassment of the whole school. It is the plumbers' gala-day; it is then that they show the rest of the world that they can do something else besides write reports and juggle a slip-stick. For years to come the parade of 1923 will live in the minds of all who were connected with it. It was funnier than the whole year's publications of the Octopus and it caused more excitement than a tenement fire.

However, all the editorial-enthusiasm of a dozen writers cannot, alone, put on this parade. An organization with the co-operation of every engineer is necessary. The quickest solution is a committee composed of two members from each of our engineering societies. The time for action is now. Let's go!

PAY DAY

A nice crisp check arrived today. Once every month for the past four years this same kind of check, bearing the outstanding figure of \$30 and the signature of the treasurer of the state of Wisconsin, has saved me from being thrown bodily into the street by my landlord.

There may be well-founded reasons for some ex-service men to complain of the penurious attitude of the country for which they so willingly fought, but certainly those of us who received no injuries nor contracted any diseases while in the service, and have had the benefit of the educational bonus, will agree that Wisconsin did not fail us. —H. C. A.

ENGINEERING REVIEW

H. C. WOLFE

THE NEW MOORE SCHOOL OF ELECTRICAL ENGINEERING AT THE UNIVERSITY OF PENNSYLVANIA

A new school, known as The Moore School of Electrical Engineering, has been established at the University of Pennsylvania under the provisions of the will of the late Alfred Fittler Moore of Philadelphia. By the terms of Mr. Moore's will, his estate will be used for the purpose of founding a school of electrical engineering as a memorial to his parents.

The Department of Electrical Engineering was formerly one of the four departments of the Towne Scientific School. The space and laboratory equipment used by this department are now available for the new school and are, for the present, very adequate. The income from the Moore fund of \$1,500,000 will be used to meet the yearly expenditures of the school and for the purpose of research. The Provost of the University in his formal announcement stated, "Additions will be made to the teaching staff to make it possible to give each student individual and personal attention".

Dr. Harold Pender has been appointed first dean of the Moore School. Dean Pender is well known in the field of electrical engineering. His practical experience and investigations, coupled with his teaching experience, make him well fitted for his new position.

The Moore School, the thirteenth in the University, has an enrollment for the year 1923 - 24 of 139 students, 20 of whom are seniors.

SCHOLARSHIPS IN MINERAL ECONOMICS

Through the co-operation of Washington University of St. Louis, the Institute of Economics of Washington, D. C., and the United States Bureau of Mines, arrangements have been perfected for scholarships in mineral economics which will cover two years' work in the national capital under the guidance of Bureau of Mines engineers.

Each student securing one of these scholarships is to be furnished board and room, tuition to the extent of \$700 a year, books and other facilities for the pursuit of the work. The scholarships are valued at \$1,500 each, annually. The scholarships are open to graduate mining engineers who have done some work in economics. Application blanks are to be secured from E. D. Swanson, assistant to the Director of the Bureau of Mines, Washington, D. C.

RECLAMATION OF BLAST FURNACE DUST

The Ford company has announced that it has begun the reclamation of the 50,000 ton "mountain of dust", three year's accumulation of dust from the blast furnace. The dust, which is blown from the furnace in the blast, consists of 50% iron ore and 50% coke. A sintering plant has been built for the reclamation of this ore.

In the reclamation process the furnace dust is carried by suction conveyors to the sintering plant where it is mixed with cast iron borings gathered from the various plants. A gas flame of intense heat is passed over this mixture, and the action of the coke under this heat and the suction draft, fuses the mixture into chunks of size and weight for use in the furnace.

HIGHEST AND LOWEST POINTS IN THE WORLD

The maximum difference in elevation of land in the United States is 14,777 feet, according to the Geological Survey, of the Department of Interior. Mount Whitney, the highest point, is 14,501 feet above sea level, and a point in Death Valley is 276 feet below sea level. These two points, which are both in California, are less than 90 miles apart. The difference is small, however, as compared with the figures for Asia. Mount Everest is 29,002 feet above sea level, whereas the shores of the Dead Sea are 1,270 feet below sea level, making a total difference in land heights of 30,292 feet. Mount Everest has never been climbed, but the British Government is at the present time equipping a new expedition for this purpose.

The greatest ocean depth yet found is 32,088 feet, at a point about 40 miles north of the Island of Mindanao, in the Philippine Islands. The ocean bottom at this point is therefore more than 11½ miles below the summit of Mount Everest.

THE CALIFORNIA MEMORIAL STADIUM

The California Memorial Stadium, at the University of California was dedicated on November 23, 1923, having been constructed in six months. The stadium is in the form of an ellipse with axes 759 feet and 567 feet between walls. There are 32 entrances, including six tunnels connecting with the playing field. There are 48 sections with 72 rows each, and 72,609 numbered seats. The total cost of the stadium will be about \$1,-

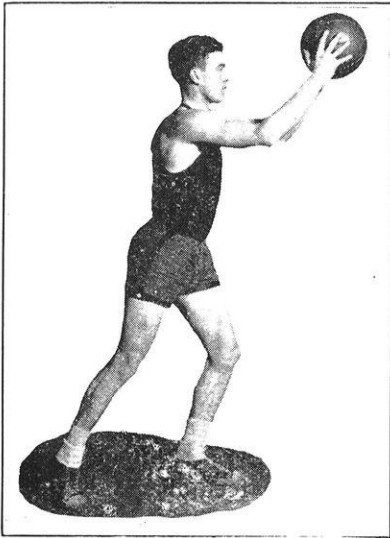
(Continued on Page 107)

ATHLETICS

E. R. SUMMERS

BASKETBALL

Northwestern ran true to form and lost another game to the Badgers. There is nothing unusual about that, of course, but the details must be mentioned in the course of events. The 25 to 10 score would indicate that the Meanwell squad was going fine if Northwestern is to be given any credit at all.



K. D. FARWELL c'24

The game with Northwestern did not make the Wisconsin boys overconfident at all because they knew that Indiana was coming back. The very thoughts of Indiana were enough to cast a spirit of awe about the gymnasium on the eve of the eventful battle. In the first half of the game, the Hoosiers uncorked a multitude of superior tricks. They seemed to run circles around the Badger guards. The enthusiasm of the crowd rose and fell intermittently. Wisconsin stock fell below par before the first half was over. The spirit of gloom was so thick that you could cut it with a knife. Even the radio broadcaster cried so much that the waves were damped.

Then the second half,—just think of it. Of all the thrills ever experienced on the local floor, this one is in a class by itself. Wisconsin was eight points in the hole; there were eleven minutes left to play; the impossible,—could it be done? A whirlwind of an attack followed; the net on the basket swished repeatedly. A frenzied crowd called for another, and another,—just one more now! Swish! Bang! It was all over. Wisconsin wins 28 to 27, and the crowd leaves hurriedly to buy cough drops for cracked voices. Ace high,—1000 per cent,—Wisconsin was on top of the conference basketball world.

Such a delightful trance could be only momentary though. Chicago came out of the darkness like a comet and made our 1000 per cent look like a bargain counter,—half off.. There is still all kinds of hopes for a conference championship, nevertheless. The dope bucket may be spilled so many times that the bottom

will drop out of it entirely. You can never tell what is going to happen.—Northwestern might win a couple of games.

WRESTLING

Coach Hitchcock announces another winning year. The same announcement generally precedes the season in any branch of athletics. However, Coach Hitchcock's prediction is different. He has always managed to finish in or above the .500 per cent class. But there is even a better reason why the season should be a successful one, — more than half of the squad is composed of ENGINEERS.

Several of last year's varsity men are back at their old posts again. Zodtner, ch '26, and Brackett, m '25, both of whom won their numerals last year, are rounding into form rapidly. The early tryouts revealed a good supply of very promising new material. There are 11 promising frosh working at present. With consistent training, Coach Hitchcock has developed a few good men in each class. The plumber's classification of the present aspirants is: 115 pounds — Shoreman, e'27, and Meenwsen, c'27; 135 pounds, — Kirby, e'27, and Le May, m'27; 145 pounds, — Scheil, e'27, Thomas, e'25, and Zodtner, ch'26; 158 pounds, — Marquardt, ch'27, Peterson, e'25, and Breitrick, e'27; 175 pounds, — Brackett, m'25, Plettner, e'24, Splees, e'27, and McNellis, ch'27. Eliminations were held for the varsity team on January 14 and 15. A large squad was chosen this year.

The conference schedule includes Chicago, Minnesota, Michigan, Iowa, and Northwestern. The individual championships will be decided at the conference meet that is to be held at Chicago on March 14 and 15.

The first meet of the season was dropped to Chicago



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E. J. GRADY, Mgr.

IT'S NEEDLESS TO TELL AN ENGINEER

That the place to bring the girl after a dance is The Chocolate Shop, --that is, it is needless to tell the men who have been in school a semester or more. To the freshmen though, it might be news. Our advice is to follow the ways of your upper-classmen.



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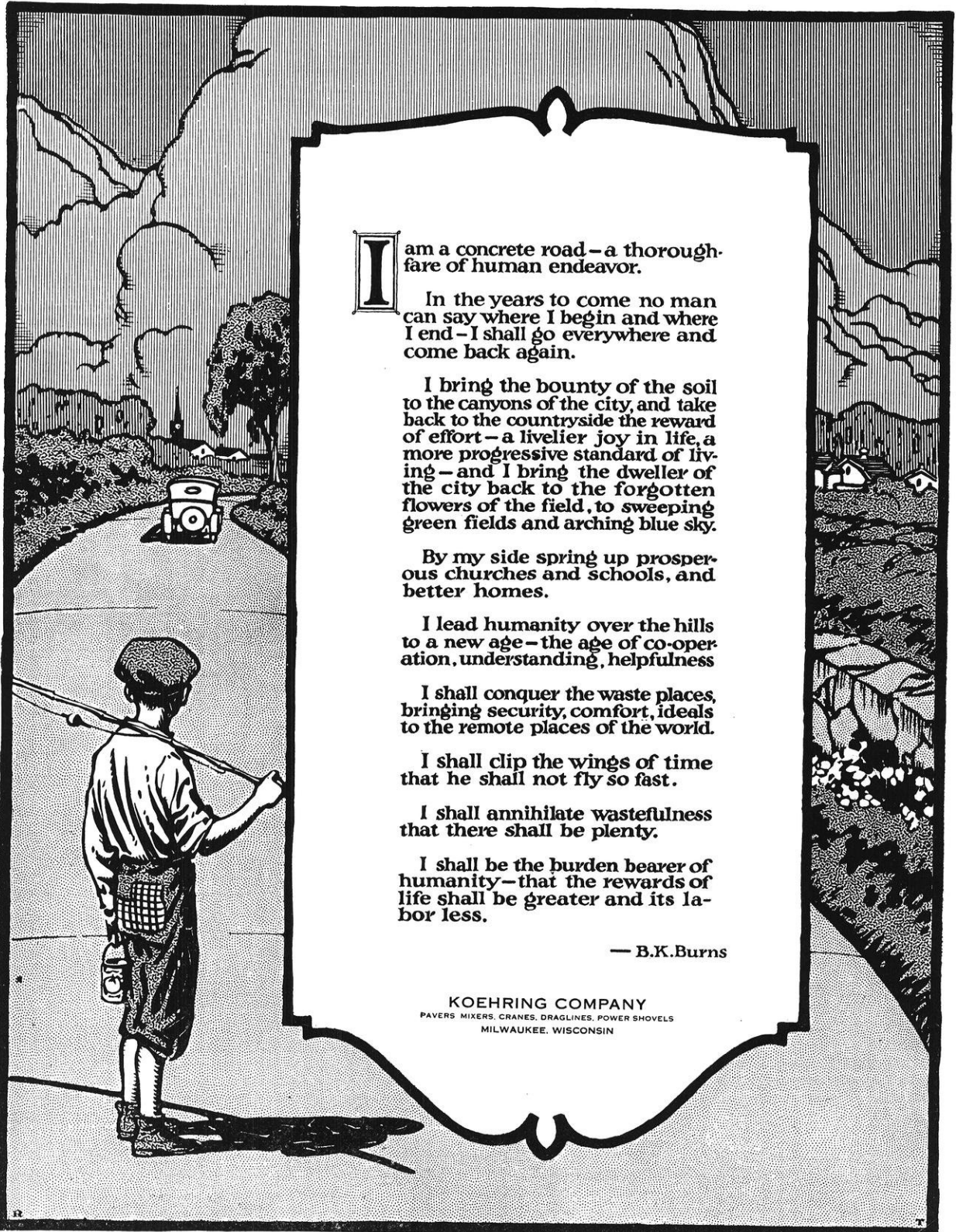
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I bring the bounty of the soil to the canyons of the city, and take back to the countryside the reward of effort—a livelier joy in life, a more progressive standard of living—and I bring the dweller of the city back to the forgotten flowers of the field, to sweeping green fields and arching blue sky.

By my side spring up prosperous churches and schools, and better homes.

I lead humanity over the hills to a new age—the age of co-operation, understanding, helpfulness

I shall conquer the waste places, bringing security, comfort, ideals to the remote places of the world.

I shall clip the wings of time that he shall not fly so fast.

I shall annihilate wastefulness that there shall be plenty.

I shall be the burden bearer of humanity—that the rewards of life shall be greater and its labor less.

— B.K. Burns

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by a 12 to 8 count. Wisconsin, although she was not able to score a fall, succeeded in bringing home some bacon in the form of four decisions. The Maroon grapplers cinched the meet by winning two falls.

Due to a change in the mat rules, only two points are to be allowed on a decision this year. Formerly three points were allowed for a decision. Since a fall counts five points, three decisions are necessary to beat a fall. The purpose of the new ruling is to speed up the sport and make it more interesting.

Zodtner, ch '26, won his first event in intercollegiate competition at Chicago. He was the outstanding feature of the Badger squad. After two extra periods, he succeeded in winning a decision over Schimberg, his Maroon opponet in the 145 pound class.

There is plenty of time left to avenge the defeat at Chicago. The squad is not an inferior outfit by any means. The first conference meet showed up some weak points, of course, but many of these can be overcome as the season progresses. After the struggles with the Maroons and the final examinations, the matmen are ready to grapple with anything.

Earl M. Plettner, e '24, the art editor of The Wisconsin Engineer, has been forced to withdraw from the squad temporarily due to an injury which he received while working out with Bieberstein. After spending a week in "The House of Iodine" on Warren street, our art editor came back a rejuvenated man in many respects.

The popularity of wrestling has increased rapidly ever since Hitchcock has been at the helm. Three years ago, only 18 men answered the call to the mats; last year 100 turned out. This year, the most promising in the history of the sport, 125 men have shown up for trials. This increase of popularity during the last four years can no doubt be traced directly to the influence of George Hitchcock, coach. Mr. Hitchcock, also an instructor in the shops, has acted in the capacity of coach for four years. During that time he has brought wrestling to its "own" at Wisconsin. An abundance of practical experience well fitted him for the task. Coach Hitchcock has worked with wrestlers of world fame such as "Farmer" Burns, Frank Gotch, and Earl Caddock. Coach Hitchcock was formerly an instructor in wrestling at the Business Mens' Athletic Club of Waterloo, Iowa.

HOCKEY

After a prolonged, searching stare into the very depths of the proverbial dope bucket, we feel skeptical about forecasting a winning hockey season. The weather preceding the holiday recess was quite averse to the development of winter sports. After many dubious surveys of the weather forecasts, we were convinced that the weather was lagging the calendar by a phase angle of 180 degrees. Just when preparations were about to be made for the purchase of enough liquid air to transform the swimming tank into a skating rink, the weather man got his orders mixed and almost

froze heaven and earth together. The one problem was solved only at the expense of the creation of another, — how could the water in the hose be kept above 0 degrees while the rink was being flooded? This was not a question in Steam and Gas or L. and S. chemistry, but it was a question of "Here, take the hose; if you don't freeze, I will". However, after facing many raw deals (from the northwest wind and otherwise) the task was finally completed.

Johnson, a senior electrical, is captain of the squad this year. He formerly attended the Michigan School of Mines. This is his second year on the varsity hockey team. He plays the wing position and is no doubt the leading man on the team. Fisk, a senior mechanical, is a two letter man who is working at his old position. Harris, a junior chemical, is a fast defense man who can give the opponets' wing men lots of trouble. Haugh, a junior electrical, played four games with the team last year. He has a permanent berth on the squad this year.



THE HOCKEY RINK

Dr. A. K. Viner, who has coached the sport for the last two years was unable to take the position this year. Bob Blodgett, a former hockey star of Wisconsin, was secured as coach. Coach Blodgett has a well earned reputation as a good, all around athlete. In addition to playing two years on the varsity hockey team, he has made two W's in track. He has also won the annual skate across Lake Mendota two successive times.

So far the hockey team has had all kinds of luck,—both good and bad. Marquette lived up to its reputation and hung quite a bit of crepe on our enthusiasm by stealing a 4 to 1 win in the first game of the season. Harris, ch' 25, was the only man on the Badger squad that was able to score.

The first game with Michigan was a story about a goose egg and a 3. Guess who had the goose egg. Don't be too sure of your guesses though, because the Badger puck chasers came to life and played the Maize and Blue to a draw in the next game. That game

gave the Wisconsin players some confidence, and confidence is a wonderful thing,—at times.

With this feeling of confidence, the puck chasers were all set for the tilt with Minnesota, but they received a setback instead by way of a 0 to 5 count,—another addition to the egg market.

The rink is slightly larger this year than it was last. Every effort is being made to keep the rink in the best possible condition. "Only" hockey players are to use the rink. All others must content themselves with Lake Mendota. Electric lights are provided so that the men can practice evenings. Bring on some more winter!

SKIING

The ski season was brought sharply to the fore when six Badgers won the Marshall Foch trophy in the college competition that was held at Lake Placid, New York, on New Year's day. In order to make the team complete it was necessary for one of the six men to be an adopted son of St. Pat. Morris Waterman, a junior mechanical, filled this responsible position.

The Marshall Foch trophy was presented to the Lake Placid Club by Marshall Foch. It is a travelling trophy that is competed for every year.

The big ski tournament in Madison was held on Saturday afternoon, February 9.

GYMNASIUM

The varsity gym team is somewhat below par this year. The frosh squad took the regulars into camp in the first meet between the varsity and the frosh squad. Coach Schlatter feels keenly the loss of 7 engineers by graduation last year. Seven more engineers are ready to take the places of those who graduated, but it will take a little time for them to round into form.

The varsity team lost the opening meet of the season to the Milwaukee "Y" on December 15 by a very small margin. The Badgers had a thirty point lead when Koch was severely injured by a fall from the flying rings. Norman Koch, a senior mechanical, is one of the most consistent point getters on the team. After he was taken from the floor, the Milwaukee team shot into the lead and was never headed. Koch has recovered from his injury, and he will no doubt cause his future opponents lots of trouble.

The squad is unusually small this year. Only six men were used in the first Milwaukee meet. A few second string men may be used before the end of the season. The engineers on the varsity squad at present are: Bremer, c'26, Hiemke, ch'26, Koch, m'24, H. Schmidt, m'25, and Wingender, ch'26. Parsons, c'26 is the lone plumber representative on the varsity fencing team.

Conference meets are to be held with Northwestern, Illinois, Chicago, and Minnesota. The all conference meet will be held at Chicago on March 14 and 15.

TRACK

At present the squad is well blessed with sprinters and distance men. More men are needed, however, for the dashes and the shot put. Because of the large number of meets on the schedule, it will be necessary to have several men for each event.

The meets this year are to be quite scattered, — only three of the thirteen meets will be held at home. This means that a lot of time will be lost on the trips. As a result it will be quite hard for the members of the squad to keep eligible.

FOOTBALL

For a while our prospective 1924 football schedule was too sad for tears. The idea of no home games was too much of a shock for even the calmest inhabitants of the "hill" to endure. The vision of our new stadium being as silent as a deserted village, the vision of the gridiron where our heroes once played growing up as a cow pasture in the wilderness, the thoughts of the sickening contrast between the low murmur of the shepherd and the lurid blasts of the referee, the thoughts of the moss-covered goal posts pointing mournfully into the repulsive atmosphere of decay and solitude, — it was incredulous, unreal, and intolerable. As we raised our voices in unison to wail pitifully in opposition to the cold deal of the Big Ten officials at Chicago, Tom Jones came forward with the familiar consolation: "Don't Worry". Even that was far from a consolation, but it was a conclusive proof that there was one man who had not given up all hope of a readjustment.

In the first deal Tom Jones did not get a single face card; in the second he drew three aces, — home games with Minnesota, Iowa, and Notre Dame. Over night the 1924 Badger football schedule was transformed from a nightmare into a dream. The credit should be placed exactly where it belongs, — upon the shoulders of Tom Jones. He came through with a real schedule when all of the odds were against him. No other man in his position could have given us a better schedule, and it is to be doubted if any other man could have given us as good a schedule. The climax of the Michigan game last fall brought Wisconsin slightly into disrepute in the eyes of the Big Ten officials. These are the odds against which Tom Jones had to work.

How was Minnesota induced to come to Madison? How was a game secured with Iowa after the Hawkeyes had left Chicago with their schedule complete? How was Knute Rockne induced to bring his eleven to Madison for the first time? The answers to these questions can be found only in the honesty, thoughtfulness, and perseverance of Tom Jones.

The preliminary games will be played with North Dakota, Ames, and Coe. The Homecoming game will be played with Iowa on November 15. The 1924 football schedule will be ushered out by playing the last game of the five year contract with Chicago.

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."

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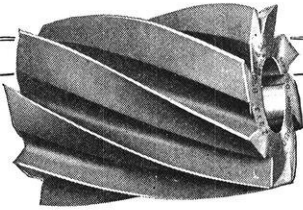
No. 5.

Effect of Variations in Design of Milling Cutters on Power Requirements and Capacity

BY
JAMES A. SHARP
AND
BENJAMIN F. GRAY



Reprinted from Mechanical Engineering, 46 March 1923, the monthly journal of The American Society of Mechanical Engineers, 29 West 40th Street, New York, N. Y.



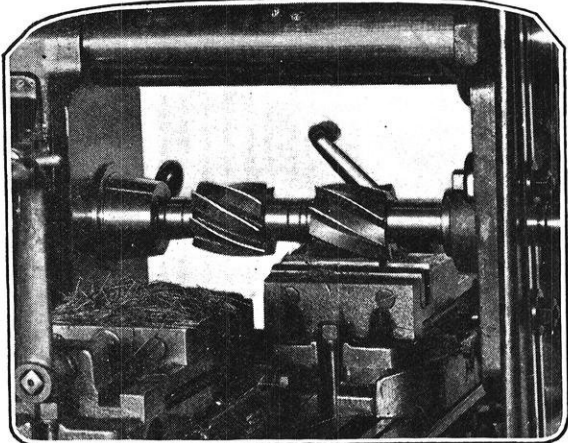
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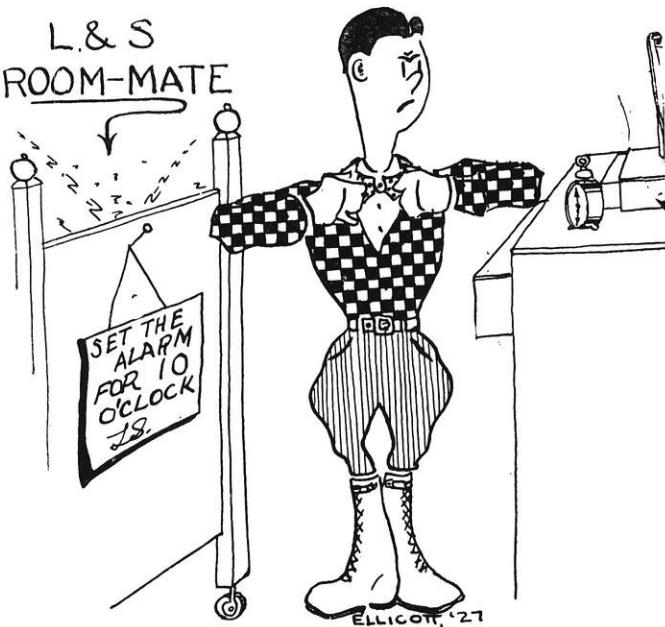
CAMPUS NOTES

L. C. CREW

KAPPA ETA KAPPA INSTALLATION

Delta chapter of Kappa Eta Kappa, a national professional electrical engineering fraternity, was formally installed Saturday, February 9, at the Madison Club. Twenty-one men constitute the charter membership of the fraternity. The faculty members include Professors J. T. Rood and E. Bennett and Mr. K. L. Scott. A house will be leased by the fraternity next semester.

L & S
ROOM-MATE



SUCH IS LIFE!
'T WAS EVER THUS

AT A. I. E. E. MEETING

1st Frosh E. E. (in whisper) "Is that professor Rood?"
2nd ditto "He never acted that way to me."

Roy Dowling, e'24 and Miss Schuman of the Chemistry Department were married January 26 at Rockford Illinois.

Mr. and Mrs. Lewis H. Kessler announce the arrival of little Miss Gwendolyn Lucile, January 30.

A year course in GIRLS 1 and 2 wouldn't look so bad in the catalogue at that.

AND THEY CALL IT SYMPATHY

An aching tooth recently forced Professor McCaffery to discontinue a class recitation in Iron and Steel. In deep sympathy for their afflicted instructor, the class offered a sky rocket for the tooth.

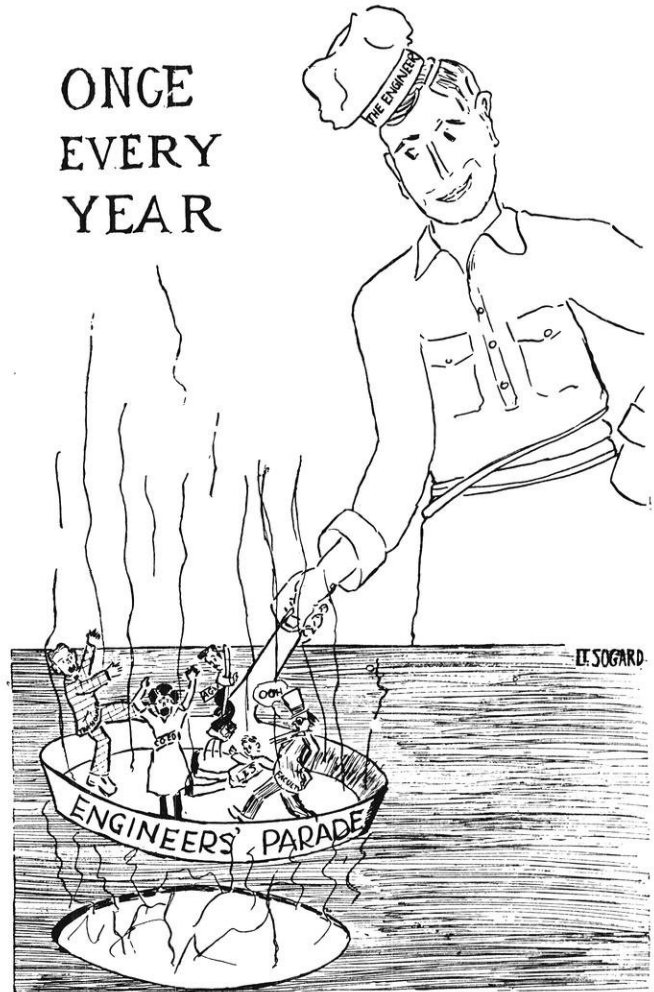
OBITUARY

Among the lamented events on the campus was the passing of the old Cummers engine from the machine shops. It veritably died of old age after some 20 or 30 years of faithful service, though there is no doubt that adiabatic complications hastened the end. It can hardly be said to have passed out quietly, for metal will clank; but it went with perfect resignation. Pall bearers were not announced. Sans flowers or cortege or any prospects of a monument, it went its way. Ashes to ashes, dust to dust. R. I. P.

WHAT'S IN A NAME

Professor Woy's cognomen frequently is a source of confusion as to his race. Recently a delegation awaited upon his son for the purpose of inviting him to attend a conference of Chinese students.

ONCE
EVERY
YEAR



E. SOGARD

A series of experiments, in connection with the Dix River project, have been completed in the Hydraulic Laboratory, the purpose of which was to determine the form of spillway channel that would meet the special conditions encountered and at the same time yield the largest capacity with the minimum yardage.

A 280 foot rock fill dam, the highest of its type in the United States, is being constructed on the Dix river at a point about three miles above the junction of the Dix and Kentucky rivers. The Kentucky Hydro-Electric Company, of Burgin, Kentucky, is responsible for the project which is expected to develop 35,000 horsepower.

The design and construction is under the direction of Mr. L. F. Harza, Hydro-Electric Engineer, Chicago. Mr. Harza is a Wisconsin alumnus of the class of 1906. He received his graduate C. E. degree here in 1908.

The Hydraulic Laboratory experiments were conducted by Mr. Paul C. Gillette who received his graduate C. E. degree here in 1918.

It takes a bird of an engineer to lay a concrete pavement.



HE KNEW HIS TRACK

A set of monkey-motion tandem-compound bed springs has been awarded to the civil engineer who claims he has been to Milwaukee so many times that he can wake up in the night enroute, and tell by the way the pullman takes the curves, the degree of the curve and how far from Milwaukee the train is.

TRY PAINTING IT WITH ECLAT, GEORGE.

"Don't start to paint your car with enthusiasm," says Professor George Barker of the Mining Department, who has been whiling away the mid-semester hours painting his five-passenger. "Don't start to paint your car with enthusiasm, for the enthusiasm soon wears off."

Permission to do graduate work in metallurgy under the direction of this college, but in their own laboratories in Milwaukee, has been requested by a group of engineers in responsible positions in Milwaukee industries. The group numbers about seven members and includes graduates of various institutions. The unusual request is being given consideration by the graduate faculty.

A HINT FOR SEMINAR

"If you'd be wise", Van Hagan said,
 "As wise as wise can be,
 Ne'er miss a chance — make it a point —
 To build vocab'lary."
 I've followed since this simple rule
 And pass it on to thee:
 Imprimis, permeate your nous
 With philologic lore
 Until your eager entity
 Assimilates no more.
 Eviscerate the lexicon
 And lubricate your tongue.
 Plenipotent your speech shall be
 Till some one knocks you dumb.

Adapted

O. F. Landkamer e'24 and Miss Helen Minch were married February 7 at Saint Paul's Chapel.

The chemistry shark was impressing his engineer friend with the stupendous originality and skill which he had displayed in determining the thickness of a coat of tin amalgam on the back of a mirror. He emphasized the delicacy—the extreme delicacy—of his technique in weighing the glass and dissolving the amalgam.

"Of course," remarked the engineer, innocently, "you perform this operation in a dark room, don't you?"

"Why," inquired the chemist with surprise, "should I do it in a dark room, my dear fellow?"

"So that the weight of the image in the mirror shall not vitiate the results," snapped the unimpressed engineer.

Thirteen engineers were elected to the Student-Faculty committee. The seniors are: C. E. Robb, B. K. Breed, F. D. Johnson, P. A. Nichols, W. W. Boley. Juniors: M. A. Thomas, E. Sindt, H. C. Weiss, A. R. Wienke tied with E. G. Plautz and R. C. Whitten tied with A. T. Muehlenbruch. Sophomores: F. J. Hebda, K. H. Read, C. E. Johnson, W. S. Walter and E. D. McNeil.

RESERVE HIM A SEAT IN THE S. E. SPECIAL.

A special January award consisting of a fifty-foot tape of pure para rubber has been awarded to a freshman civil for his solution of the following problem: In taping down a uniform slope of six feet in a hundred, how far from the zero of the tape, and which way, should the pin be placed to make the horizontal distance one hundred feet? His answer was: The pin should be placed 22 feet from the zero and up hill.

HOME-EC STUFF

"A student who gets pickled," says President Birge, "should be canned."

"Dad", said young Van Hagan, "what relation is a loaf of bread to a locomotive?"

"Haw, m'lud," answered the professor, "I fail to perceive any relationship whatsoever between a loaf of bread and a locomotive."

"Well, father", comes back Sonny, "a loaf of bread is a necessity, and a locomotive is an invention, and you know that necessity is the mother of invention".

PROFESSOR G. L. LARSON has been elected to the board of directors of the Technical Club of Madison.

Because only four new yells were offered in the prize contest conducted by A. S. C. E., the contest has been suspended until the such time as Spring rouses the exuberance of our front step sloganeers. The box labeled, "Drop your yells in here", will be open again at that time, according to Emil White, chairman of the Yell Contest Committee, and the quick wits will have another chance to get the big money.

Instructor in Drawing (looking over registration of student in drawing course), "This man offers a course in embalming as a prerequisite for drawing".

Second Instructor: "That must have been a stiff course".

I had been told that according to Mechanics a car would skid less if when it began skidding, the throttle were closed and the car permitted to drift without braking, but I sought out Professor Smith who has had experience in such matters.

Q: What would you do, Professor Smith, if your car started skidding?

A: "I'd begin saying my prayers."



A ONE MAX TOP

PROFESSOR ORTH has been made chairman of the department of Mechanical Drawing and Descriptive Geometry. He succeeds Professor Millar who is assistant dean.

The cellulose Bunsen burner goes to the electrical who, on the eastern trip, asked the guide at the Carborundum plant what the composition of carbon was.

Young Kinne was trying to get the basket ball returns on the radio, but didn't have much luck. "Open the window, Billie," suggested his mother, with feminine intuition, "and perhaps you will get the gym."

"Open that window, young man," interjected Professor Kinne, with a quick thought for his coal pile, "and you'll get Hell."

ENGINEERING REVIEW

(Continued from Page 101)

350,000, of which only 5.5% was used for campaign and office expense.

A novel means was used to obtain the necessary funds. Cash was raised by the sale of 10,000 unit subscriptions of \$100, each giving to the investor possessory rights to two selected seats for a period of ten years. The stadium is one of the finest and largest of its kind. California is to be congratulated for her success in constructing such a fitting Memorial.

RESEARCH WORK ON OIL SHALE

Research work on oil shale is now being conducted by the Department of the Interior, through the Bureau of Mines, in co-operation with the State of Colorado, the University of Utah, and the Department of Conservation of the State of Indiana. The object of this work is two-fold: First, to determine the conditions of retorting that produce the highest yields of the best oil from various shales, and, second, to make a thorough study of methods of refining shale oil.

Research was conducted by the Bureau of Mines at the Boulder laboratory, in co-operation with the state of Colorado, for the past year with an experimental vertical retort, a large horizontal retort, and a small assay retort.

The experimental retort is so designed that it gives results which might be comparable to those obtained from commercial retorts of this type. Experiments are being made to determine the effects of time and temperature of preliminary heating, holding at various temperatures, use of steam in the retort, etc. A complete analysis is made of all the products obtained.

The results obtained from the horizontal type of retort have not been very satisfactory as it gives a lower yield of oil of a poorer grade than that obtained from the other retorts.

—The Mining Congress Journal.

ENGINEERING ENROLLMENT HAS LITTLE CHANGE

The predicted falling off in the attendance of engineering schools during the year 1923-1924 has been very small, according to the preliminary report of the U. S. Commissioner of Education covering statistics from 68 of the 130 engineering schools in the country. The report classifies the schools according to their attendance—over 500 and under 500—and although individual schools in each group show some increase or decrease, in no case more than 20 per cent over last year, the totals for the two years are surprisingly

similar; 11,078 as against 11,065 for the small schools last year, and 21,122 as against 21,374 for the large schools.

The average attendance per school year for the last four years is as follows:

	1923-24	1922-23	1921-22	1920-21
Large schools -----	1,005.8	1,017.8	1,103.7	1,102.6
Small schools -----	235.7	235.4	228.5	208.7

This shows a decrease in the large schools over the post-war years and an increase in the small schools.

Only a few schools show any notable progressive decrease in attendance. They are the University of Michigan, Case School of Applied Science, Stevens Institute of Technology, the University of Washington, and possibly Cornell University, although the latter has shown a slight increase this year.

Engineering News Record

AIRSHIP BALLAST FROM ENGINE EXHAUST

A device has been invented which makes it possible for an airship to burn up its store of gasoline without loss of weight and without increase of buoyancy. This will result in the saving of many thousands of dollars' worth of the expensive helium gas that lifts the ship, and which otherwise would have to be released and wasted in the air to keep it from rising to dangerous heights. The principle involves the condensation of the water-vapor, resulting from the burning of the gasoline, and the retaining of it in the craft as ballast. Gasoline is composed of carbon and hydrogen. When burned, the products are carbon dioxide, carbon monoxide, and water-vapor. The first two gases escape. The last is condensed. Since gasoline requires more than three times its weight of oxygen for complete combustion, and since about a third of that goes to form water, the weight of the condensed water is somewhat greater than that of the original gasoline. This keeps the weight of the airship constant and makes unnecessary a loss of the lifting gas, which heretofore has been a feature of long flights. In an airship without the condensing device, the craft grows lighter as the voyage progresses, owing to the consumption of the liquid fuel. This results in the airship rising higher and higher, until some of the buoyant gas has to be liberated. Airships of the future equipped with the compensating water-condensation device will be able to carry up fuel in quantity only limited by the buoyancy of the craft and the requirements of space, and will be able to burn it without releasing a compensating quantity of the precious helium gas. Water-condensation apparatus will be installed on the *Shenandoah*, formerly the Z R-1, before long flights through the polar regions or elsewhere are attempted, according to present plans of the government experts. If the airship of commercial type, the ZR-3, that is now being built for the United States by the German Government, is successfully delivered to this country, it will also be equipped with the new invention.

SOME REMARKABLE RAILWAYS OF THE WORLD

(Concluded from Page 93)

peculiar to Australia. In building the Union-Central Pacific Railway, the first transcontinental railroad in the United States, the engineers were faced with the same problems. This line, built in less than five years, 1864 to 1869, with a total length of 1889 miles between Omaha and San Francisco, passed through country which at that time was unknown and unexplored. It crossed two continental mountain ranges. Feeble centers of population were 500 miles apart; for distances of 200 to 500 miles there was no timber available for ties; for distances of 50 to 200 miles there was no drinking water, and all iron had to be shipped either across the country from Pennsylvania or around Cape Horn and across the country from San Francisco.

But perhaps even more remarkable from an engineering standpoint is the story of the Murman Railway in Russia, built in 1915 to 1916 by American engineers to give Russia a new outlet to the sea when the Dardanelles were closed to her. The railway, 650 miles long, extends from Petrograd to Ekaterina on the Arctic Ocean and 30 per cent of it is within the Arctic Circle. It is, in fact, the most northern railroad in the world. Not only was the country unexplored and unknown and the population sparse, but the engineers and surveyors were forced to live in tents with the



SURVEYING IN RUSSIA

temperature as low as -23 degrees Fahrenheit. Two hundred miles of the line is over swamps that, though snow covered, never freeze. To handle the earthwork alone over 100,000 workmen, 15,000 horses, and 30 steam shovels were required. One advantage of the lack of towns or villages from an engineering standpoint was that stations and sidings could be located where theoretically needed.

The romance is not all gone from railway engineering. These few examples show that even today there remains much pioneer work involving untold adventure, and demanding considerable ingenuity. South America, Alaska, Africa, and Asia all await the touch of the American railway engineer.

CENTRAL HOUSE HEATING BY GAS FIRED BOILERS

(Continued from Page 94)

anthracite coal showed that, with an efficiency rating of 80 per cent for the gas fired boilers, it should require about 35 thousand cubic feet of gas to equal one ton of coal. At that time, coal was selling at about \$16.50 per ton, indicating that the cost of operation of the gas plant should about double that of the coal plant in an installation considering fuel alone. There was, however, a priming fuel cost and labor cost to be considered in the coal fired installation. This labor cost included the firing and cartage of ashes. The space occupied by coal and ashes was disregarded. The figures on the coal costs for the preceding winter (1921-22) were obtained from consumers in order that a comparison might be made.

All these installations were equipped with automatic heat regulators that were connected to the boilers; they governed the fuel delivery either by a snap action valve or a diaphragm valve, according to the equipment on the boiler. Recording thermometers were installed and the average indoor temperature on all the installations was maintained at 71 degrees Fahrenheit between the hours of 8:00 A. M. and 10:00 P. M. The night temperatures averaged about 65 degrees Fahrenheit. A regular inspection service was maintained on all equipment at all times. It developed that the plants were remarkably free from cause for complaint in the majority of cases, in spite of the fact that the average consumer viewed the experiment from a critical angle, causing him to be more exacting than usual.

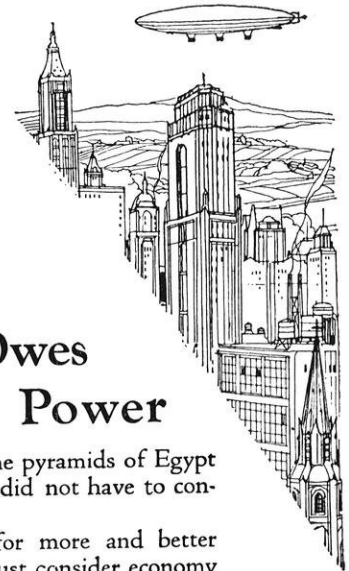
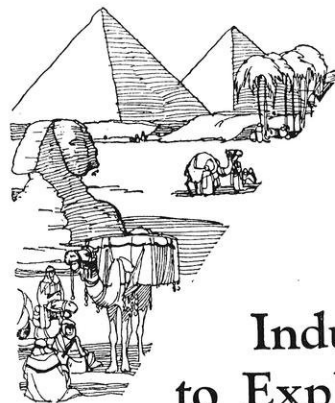
It will be noted in the table that the ratio of boiler rating to actual direct radiation varies considerably. This is due to the fact that the manufacturers' ratings were not standardized. One required 100 per cent additional to the actual direct radiation and the other required an additional 25 per cent for exposed piping plus 25 per cent overload factor,—a total of 50 per cent. In all these installations the plants were installed on the existing systems, merely displacing the old boilers.

There are many factors that will be of future importance that were not considered at the time installations were made. It is expected that the galvanized flue pipes and breechings will have to be replaced in two or three years due to rusting out, as considerable condensation is formed in the use of gaseous fuel. Some companies are replacing these flues with sheet lead, terra cotta, or sheet aluminum. It is

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What Industry Owes to Explosives Power

THE ENGINEERS who built the pyramids of Egypt and dug the canals of Babylon did not have to consider costs.

The modern engineer strives for more and better work at lower expense—and he must consider economy as well as accomplishment.

The economical production and distribution of wealth are made possible today through the use of explosives. And the enormous consumption of explosives throughout the world is an index of the influence they exert in our economic life.

The du Pont Company produces 120 million pounds of dynamite and from 85 to 100 million pounds of blasting powder a year. Twenty-four du Pont mills are scattered over the country at strategic points for better service to our industry. Five research laboratories are maintained for constant improvement of the product. An expert technical field staff offers counsel in employing the most scientific blasting practice.

And while du Pont is the largest single manufacturer of explosives and is the leader in the industry, this company makes only about one-third of the total quantity consumed in the United States.

The history of the du Pont Company is the history of explosives evolution. Du Pont has been privileged to lead the way in the development of explosives power.

E. I. DU PONT DE NEMOURS & CO., Inc.
Explosives Department, Wilmington, Delaware



thought that some similar practice will be adopted by this company when necessary. At the beginning of the heating season each boiler is thoroughly cleaned and overhauled so as to insure proper service. This cleaning is accomplished by the use of compressed air, sprayed through the sections with a small flexible copper tube, the end of which is slightly closed to form a fan like spray.

From the standpoint of the gas company this class of business is viewed from a slightly different angle in the case of manufactured gas. It happens that the load of the gas-fired house heating plants occurs just when the gas company is putting out its peak load due to other causes, which in the case of numerous installations would necessitate increased manufacturing capacity that would lie idle during the summer months unless some means are devised to increase the summer load proportionately.

The heating plants as tested were considered successful. They seemed to be ideal heating plants. They required no attention other than the winding of a clock on a thermostat every eight days. They were free from dirt, dust, and ashes. For this one pays approximately 75 per cent more than one does for heating with a coal fired plant under the climatic conditions and with gas at the quality and price mentioned in this paper.

SOME MEMORIES OF THE CIVIL ENGINEERS' CAMPS FROM 1896 TO 1919

(Concluded from Page 92)

was during this camp, if my memory serves me right, that the first annual camp dance was organized. This social affair proved to be a very successful one, due to the efficient assistance of the landlord's wife in securing an adequate supply of Baraboo's choicest daughters. The dance was held in the hotel dining room, which was gayly decorated with ferns and wild flowers. Mr. Wiskocil closes his report on this camp with the following statement:

"The feeling between the students and the instructors was excellent. As the time went on each man began to realize that it was *his* camp and meant for *his* benefit; and he got just as much out of the work as he put in. Because of the fact that the fellows were away from camp most of the time and left to their own resources, they developed confidence in themselves and in their work.

"The boys were very enthusiastic about the banquet and the dance, making both a success. The ball game and "crew" race were good sport.

"On the whole there is much to commend on the general organization and method of conducting the entire survey. And I feel proud to have been the chief of a party that showed such eagerness to excel in both work and play; and I doubt whether any party can acquire any more technical information or derive as much enjoyment out of the summer survey as the party this year has done."

Another social function which had its origin at

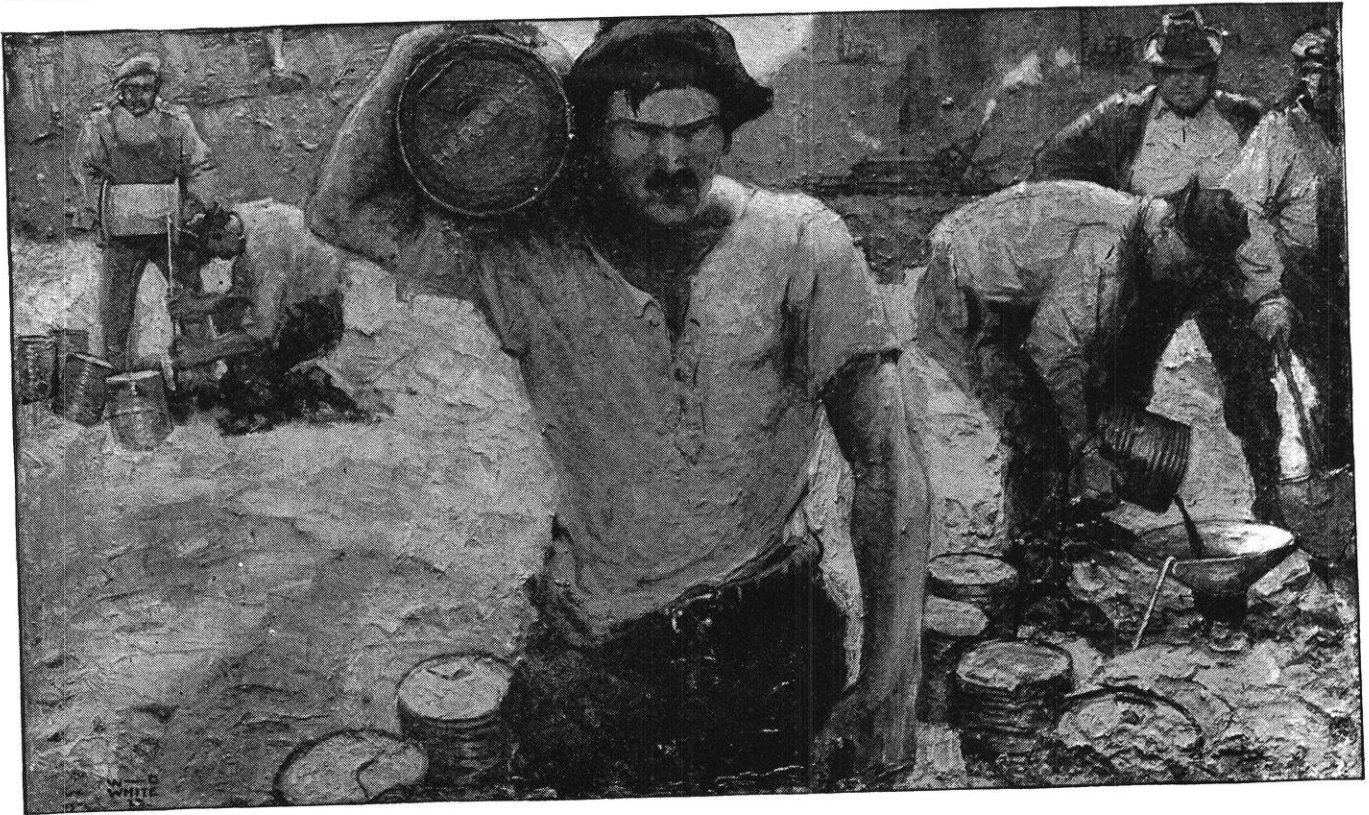
Devils Lake was the annual camp fire on the last night in camp. Sandwiches and coffee were served as we sat around a big fire, while we told stories and sang college songs.

The Frosh Spills the Beans

The writer has reason to remember the camp fire held at his last camp in 1918. The evening was about half over when we missed some of our party, but did not know what had become of them until the next morning at breakfast. For the first time a freshman had been allowed to take the summer work that year. He turned out to be a lawless daredevil and during the evening he stole "The Texas"—the hotel launch—and with his invited guests spent the evening cruising on the lake until the supply of gasoline gave out. This happened at the north end of the lake where the launch was left, instead of being returned to the hotel pier. At breakfast time, the owner missed his launch and jumped to the conclusion that the students had sunk the boat to the bottom of the lake, and that I knew all about it. Having a temper in proportion to the length of his body (6 ft. 4 in.) he telephoned for the sheriff who arrived on the scene by the same train that was to take the party back to Madison. The entire party including the sheriff got on board the train where the officer attempted to serve a "John Doe" warrant on the writer. Fortunately a lawyer friend was in the car, and threatened the sheriff with dire reprisals, so that as the train moved on the sheriff, with rare good sense, jumped off, and happiness reigned supreme. The launch was, of course, quickly found with all its furnishings intact (except gasoline) and this was the last we heard of the affair. The landlord was a retired locomotive engineer, who proved each year that he knew more about running a locomotive than he did a hotel. The fact that he was very unpopular with the boys was the real reason why the adventuresome students played this prank on him. Fortunately for our comfort and happiness, the landlord's wife was his exact opposite and was accordingly much admired and respected by the entire camp.

Not one story, but a series of articles, would be required to tell the many interesting events of these twenty-four camps, but already the limits for this article have been exceeded. In these twenty-four years a course of study has been built up that with few and minor changes will continue to arouse the interest of the engineering students for many years to come. The fact that the camp life brought the writer in very close contact with his students and thus brought about a mutual understanding that added much to the effectiveness of his teaching, made it hard to give up this work to younger men.

To the members of these twenty-four camps, numbering nine hundred or more, most of whom it was my pleasure to help start in their engineering work. I send my greeting and best wishes for continuing success. No one in the faculty has watched your success with greater interest or pride than have I.



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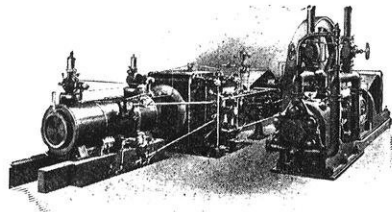
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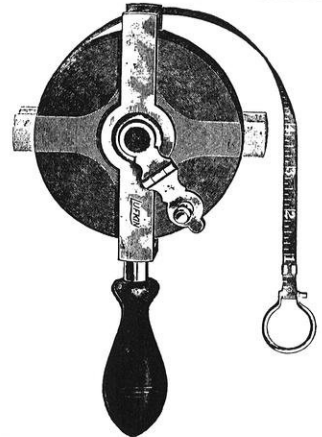
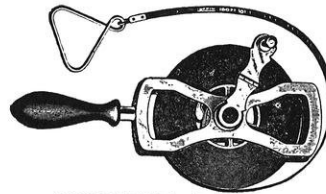
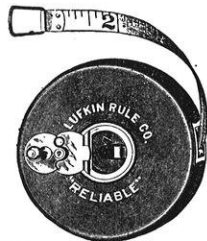
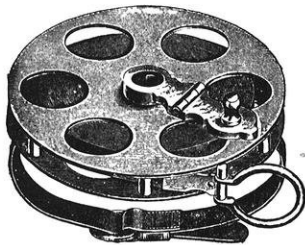
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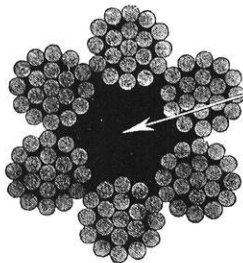
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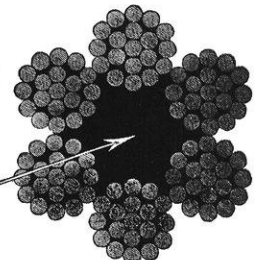
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Something Happened in 1891



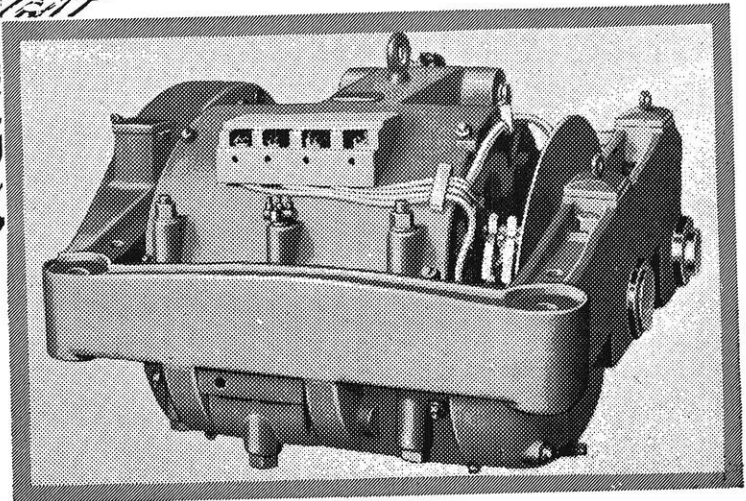
What Engineering Owes To Sound Principles

PERHAPS no phase of electrical development is more fascinating than the events leading up to the practical use of electricity as the motive power for street railway transportation.

It is a story of "midnight oil", hard thinking, extreme perseverance. No better example of the value of sound principles to present day engineering could be cited than the Westinghouse No. 3 Motor, as introduced in 1891.

Its design was so fundamentally correct and the details were so soundly worked out that subsequent developments of railway motors all followed the principles embodied in it. Now let's see what bearing this has had on modern transportation.

In 1700 the first permanently fixed rails made their appearance. In 1831, in New York, horse cars began operation. In 1834, after fruitless attempts to apply steam, compressed air, gas, etc., to these cars, a Vermont blacksmith, one Thomas Davenport, sug-



Westinghouse Motor, No. 3, the Progenitor of the Present Universally-Adopted D. C. Railway Motor.

gested that electricity be used as the motive power.

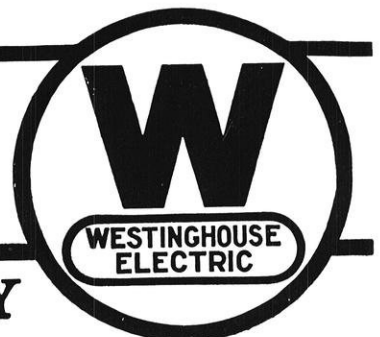
The very first practical commercial dynamo, built by Gramme, in 1862, made this suggestion a possibility.

It was natural that George Westinghouse, with his intense interest in transportation, should take up this problem. From 1889 to 1891, he, with his organization, worked continuously to perfect a commercially practicable railway motor, and the famous No. 3, daddy of all street railway motors, was the result.

As mentioned before, the principles embodied in the No. 3, thirty-two years ago, are still in use, and at least ten prominent features of this remarkable motor are to be found in present-day types. A number of these early motors are still in operation—a tribute to sound engineering principles.

Westinghouse

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ROGER BACON
1214-1294

English philosopher and man of science. Studied at Oxford and the University of Paris. Wrote the *Opus Majus*, *Opus Minus*, *Opus Tertium*, and many other treatises.

For this he was sent to prison

Roger Bacon may not have invented gunpowder, as has been claimed by some biographers of the famous Franciscan friar, but he exploded some of the outstanding errors of thirteenth century thought. Because of his advanced teachings, Bacon spent many years of his life in prison.

In an age of abstract speculation he boldly asserted the mathematical basis of all the sciences. But even mathematical calculation, he showed, must be verified by experiment, which discovers truths that speculation could never reach.

In the Research Laboratories of the General Electric Company, Bacon's principles are followed in every experimental investigation. The gas-filled electric lamp and the electron tube were worked out on paper, but it was experimental verification of the underlying mathematical theory that made electric illumination, radio broadcasting and X-rays what they are today.



More than a million dollars a year is devoted to research by the General Electric Company in order that the giant—electricity—may be made more and more useful to mankind.

GENERAL ELECTRIC