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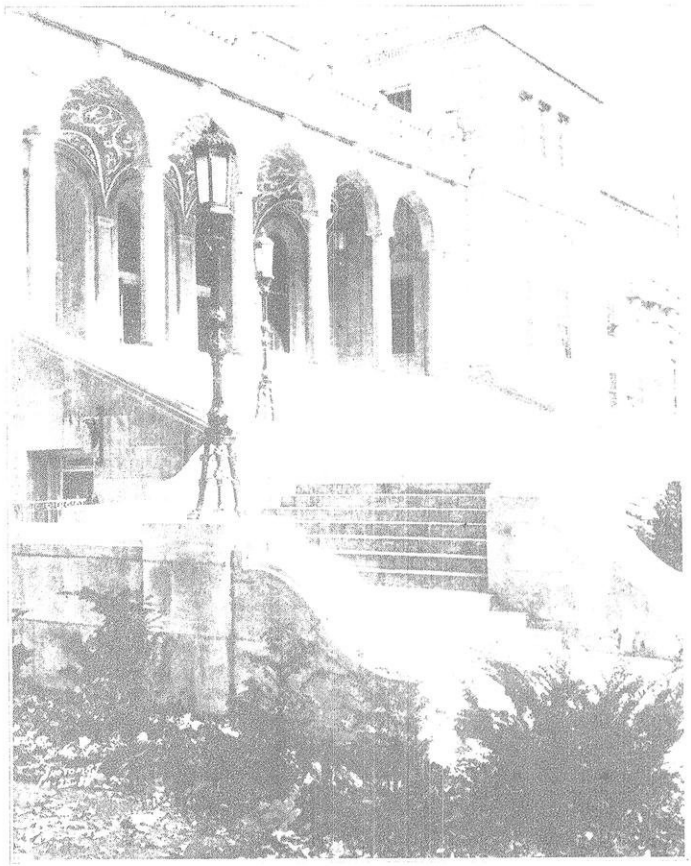
THE WISCONSIN ENGINEER



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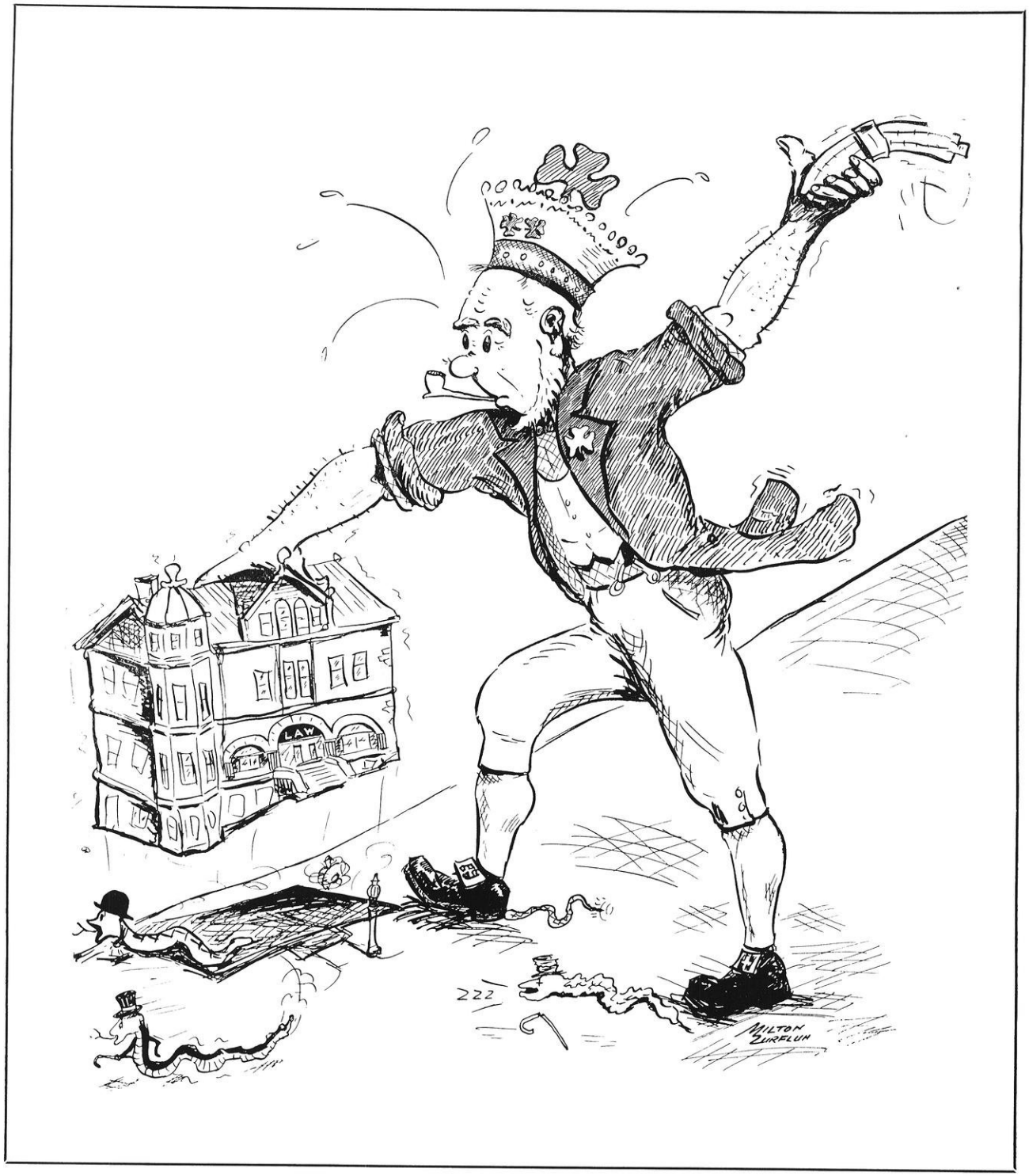


St. Patrick Was An Engineer

The Wisconsin Engineer

VOLUME 37, NO. 6 MARCH, 1933

The Application of

Diesel Power in the Motor Truck Field*

THE idea of operating an internal-combustion engine by using the heat of compression to ignite the fuel was conceived between 1892 and 1895 by a German physicist and engineer, Dr. Rudolph Diesel. He experimented first with powdered coal as a fuel, but finally turned to liquid fuel. He exhibited the first Diesel engine at the Munich Exposition in 1898. The development of the engine was slow because of abundant difficulties. However, there was progress, chiefly in the direction of large units operating at low speed on a constant load. The development of small, high-speed units has come since 1916, and today Diesel engines are available for the motor truck field.

The most troublesome problem in developing the Diesel engine has been that of injecting the fuel. In a gasoline engine, the explosive mixture is prepared in the carburetor, drawn into the cylinder, compressed, and finally fired by a spark plug. In a Diesel engine, it is impossible to inject the fuel into the compression chamber until firing is desired. This is because the flash points of different fuel oils vary greatly, so that, if fuel were injected during the compression stroke, firing would occur at various points of the stroke. It is imperative that the fuel be injected into a Diesel engine just when firing is desired.

There are three general types of fuel injection: air injection, solid injection, and gas injection. The air injection scheme was used on the large engines. High air pressure was used, requiring large air compressors and heavy air lines and fittings. The high pressure — from 700 to 1600 pounds per square inch — caused trouble, and it required about ten per cent of the engine output to supply the air. The expansion of the air delayed combustion in some cylinders. This produced uneven torque and required the use of heavy fly wheels to smooth the flow of power. These features mades air injection unsuitable for motor vehicles.

Solid injection had several variations. The so-called hot-bulb type, while used with some satisfaction on slow-speed engines, was unsatisfactory for truck use because, in starting, it was necessary to remove a portion of the cylinder head and heat it in some way. Another development used a spark plug to ignite the charge, but it required high air pressures to inject the fuel. In multi-cylinder engines, it was necessary to put a pump and a check valve on each cylinder. This is equivalent to putting a separate carburetor on each cylinder of a gasoline engine. Another idea was to use one fuel pump and inject the fuel, under high pressure, through needle valves into the various cylinders, but the cam-operated needle valves gave trouble and performance was not satisfactory.

Gas injection has been successfully applied to the motor-vehicle type of Diesel engine. The engine is of the four-cycle type, with six cylinders, and differs little from the conventional gas engine except in the head construction. It has an injector in each cylinder head. In addition, it has fuel lines instead of wiring, and a fuel distributor head instead of an electrical distributor head. It weighs only about as much as a gas engine of the same power.

A fuel pump draws the fuel from the tank and delivers it to the distributor head at a constant pressure. The distributor head controls the feeding of the fuel to the injectors in the cylinders through a metering pump. The motor is started by setting the metering pump at idling speed. This corresponds to turning on the ignition of a gas engine.

On the intake stroke of the piston, air is drawn into the cylinder through an open intake manifold. At the same time fuel is admitted to a chamber where it remains during the next three cycles and is heated by the compression. Before being injected, the fuel is finally gasified by hot air that is forced into the chamber. The fuel is forced into the cylinder when the piston is at top center. The compression is from 350 to 500 pounds, which produces

* Abstract of a paper presented by Claude N. Maurer, Wis. '16, on February 23, 1932, at the annual meeting of the Engineering Society of Wisconsin.

a temperature from 700 to 1000 degrees F.; more than enough to ignite the charge of gas. The gas enters the combustion chamber through five holes in the bottom of the injector. The holes are small, only five one-thousandths of an inch in diameter. The injector tip is kept clean by an arrangement whereby any carbon deposits are automatically burned away.

The pistons of the engine are equipped with four compression rings and one oil ring. The motor is of the sleeve type. The valves are similar to the overhead valves of the conventional gas engine.

The Diesel truck engine has some undesirable features. Air, as is well known, is the worst enemy of a Diesel engine. Air may enter at any point where there is an oil leak. It is, therefore, necessary to eliminate all such leaks. This is not difficult as the oil pressure is considerably below one hundred pounds.

Another bad feature is the vibration while the engine is idling. In order to produce the high compression that is necessary, the idling speed is from 350 to 400 r. p. m.

A final disadvantage is the difficulty sometimes encountered by the truck driver in finding a supply of fuel oil during summer months. The fuel that gives the best results is a neutral distillate petroleum oil and not a mixture of light oil and heavy residue. The viscosity (Saybolt universal at 100 degrees F.) should be not less than 34 seconds, and Baume gravity from 26 to 36. Light oils such as kerosene will burn satisfactorily, but there is no lubricating value in such oils, and their use will result in damage to parts which depend upon the fuel oil for lubrication.

The stability of the Diesel engine is attested by its performance in a racing car at Indianapolis in 1930. The car qualified with 96.87 miles per hour and finished the 500-mile race in thirteenth place. It established the record of being the only car that ever finished the race without making a stop. The cost of fuel and lubricating oil for the 500 miles was $1.76. In the same year, the same car made an official AAA record of 100.75 miles per hour at Daytona Beach.

A truck powered with a Diesel engine was driven 14,600 miles on the Indianapolis track, with the motor operating continuously averaging 43.4 miles per hour, and established a hauling record of 17.15 ton-miles per one cent of fuel cost.

A Diesel-powered truck, in 1930, made the run from New York to Los Angeles with a gross load of 16,000 pounds at a cost of $11.22. The average speed was 33 miles per hour and the average fuel consumption was 15¾ miles per gallon. The engine has since been used commercially for three years and has given satisfactory performance.

Test runs have shown that the Diesel-powered truck makes better time than the gasoline truck. This is due to a quicker pick-up and to faster speeds on the hills. A Diesel truck will make in 8½ hours a trip that takes 12 hours for the gasoline truck. The torque curve of the Diesel is flatter than that of the gasoline engine, which indicates greater power at the low speeds.

No less than seven manufacturers are now prepared to furnish Diesel-powered trucks. It will, however, be some time before the Diesel engine is used in pleasure cars.

E. S. W. COMMITTEE REPORT ON YEAR'S PROGRESS

THE first municipal water-softening plants in Wisconsin were built during the past year at Evansville and Columbus, according to the report of the committee on sanitary engineering of the Engineering Society of Wisconsin, presented at the annual meeting at Madison. The time has arrived to extend the treatment of public water supplies to include the removal of undesirable chemical constituents as well as the dangerous organic and pathogenic substances.

Excessive iron and consequent "red water" have caused trouble at Williams Bay and other places. Economical treatment of highly colored raw water has been effected at Kenosha by an activated carbon filter. Because water consumers may turn to water supplies of questionable quality when a public supply has objectionable tastes and odors, elimination of the trouble becomes essential to protect public health.

The trend in sewage treatment is toward securing modern mechanical facilities for various processes employed. Separate sludge digestion, with equipment for collecting and utilizing the fuel value of gas produced, continues to be the system most frequently installed in smaller municipalities. Rotary distributors for applying clarified sewage to trickling filters have been installed at Hartford, Elkhorn, Verona, Cedar Grove, Lake Mills, and Portage, and are included in designs for proposed plants. An interesting development is the combined sewage treatment and garbage incineration works just being completed at Kohler. A considerable number of sewerage improvements have been made or are being carried out as a part of unemployment relief.

Considerable effort has been made toward systematizing the treatment works of the same watershed so as to furnish sanitary water for the communities which must use the stream as a source of water supply. The problems in the various districts differ widely, but the smaller water sheds, at least, have problems which are similar throughout the area and which may be of commercial, hygienic, or recreational importance.

In carrying out the necessary sewage interception and treatment projects, municipalities are faced with the problem of financing, which in some cases is occasioning study of the possibilities of placing the construction of these sewerage works on a utility basis through the establishment of sewerage service charges. At the present time the Wisconsin statutes include a sewer rental law, but this makes provision for a special fund which may be used only for the operation, maintenance and repair of municipal sewerage systems. It does not provide for initial construction costs. The placing of a small additional charge on water rates for disposal of the water after use by the consumers has been suggested as a solution of

(Continued on page 91)

State Engineers Gather for

Twenty-fifth Annual Convention of the Engineering Society of Wisconsin

THE 25th annual convention of the Engineering Society of Wisconsin, held in this fourth year of the Great Depression, was surprisingly well attended and developed keen interest in the papers and much good-fellowship.

* * * *

One hundred and three registrants checked in at the table where the Chi Epsilon boys did the honors and affixed the name plates to the manly bosoms.

* * * *

Secretary Owen reported that he had been able to keep one jump ahead of the folding banks and still had the society funds intact.

* * * *

Membership has held up better than might be expected. There was a net loss of 18 members during the year, leaving 339 paid-up members at the time of the meeting. There are about 3000 engineers and 500 architects in the state from which the society can draw members. The high point in membership for the society was 410.

* * * *

The proposal to amalgamate with the American Society of Municipal Engineers as a local section was defeated by a vote of 96 to 22. Apparently no bitterness has arisen out of the proposal and the consequent discussions.

* * * *

The society was welcomed to Madison by one of its own members, James R. Law, mayor of Madison for the remainder of the term of Schmedeman, now governor of the state. What this depression calls for, according to Jim, is a stiff upper lip and some starch in the back bone.

* * * *

The youngest speaker on the program was Herbert J. Ferber, a graduate student in the University of Wisconsin, who told something about his research into the history of the early surveys in Southern Wisconsin. The townships were laid out just 100 years ago, he stated.

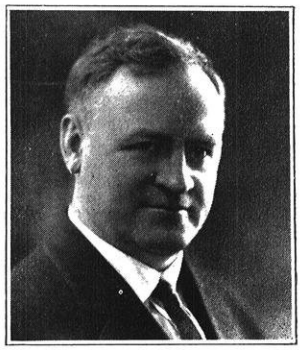
* * * *

The Indians were hostile at the time that the early surveys were made. One surveyor had his base camp raided and burned three times in two weeks. Surveyors today have trouble keeping the wolf from the door, but they don't have Indian trouble.

* * * *

Walter Pierce and Fred Ullius led the discussion of the operations of the Reconstruction Finance Corporation at the luncheon on Friday. There seemed to be some sentiment for removing the limitation that projects must be "self-liquidating" before they rated a loan from the R. F. C. and to substitute the phrase, "needful and in the public interest." That phrase should suit the pork-barrelers.

* * * *



GUSTAV L. LARSON

Secretary Owen was embarrassed, as usual, by the number of people who wanted to attend the luncheons. He seems to be unable to make the showing of hands at the morning session agree with the showing of appetites at noon time. Its hard on the service, but enjoyable for those present.

* * * *

The demonstration of television at the joint banquet with the Technical Club was hampered by a failure of certain needful apparatus to arrive in time. However, Sam Snead, instructor in radio for the Extension Division, was able to give the crowd an entertaining talk in spite of his troubles.

* * * *

Gustav L. Larson, professor of steam and gas engineering at the University of Wisconsin, was elected president for the ensuing year and took over the reins from the retiring president, H. C. Webster, in a brief but effective speech. "I declare the convention adjourned," said Gus.

* * * *

Chi Epsilon, the honorary civil engineering fraternity, supplied the following men who looked after registration and allied duties: C. A. Lyneis, J. P. Kaysen, C. O. Wagner, G. E. Harbeck, E. A. Schellin, R. L. Englehardt, W. C. Lefevre, B. H. Randolph, P. S. Miller, A. J. Steffen, P. F. Morgan, G. Thurner, A. A. Kalinski, A. D. Freas, and R. Schiller. C. W. Ottensman represented Tau Beta Pi in this group.

* * * *

George Randall, city engineer of Oshkosh and former president of the society, served on the nominating committee and also contributed to the discussions.

* * * *

J. P. Schwada, city engineer of Milwaukee, served on the resolutions committee and did most of the hard work of the committee.

Arthur L. Boley, city engineer of Sheboygan, was chosen vice-president, which, under the established tradition, makes him heir apparent.

* * * *

Robert M. Smith, city engineer of Kenosha, and Robert M. Connelly, of Appleton, were made trustees for a two-year term. This adds to the symmetry of the board of trustees. Look at those names and initials and then hand an orchid to the nominating committee.

* * * *

Past presidents of the society were present in large numbers. Of twenty living ex-presidents, at least eleven attended the meeting. They included: G. H. Randall, T. Chalkley Hatton, F. W. Ullius, Jerry Donohue, John C. White, W. G. Kirchoffer, G. E. Heebink, J. P. Schwada, L. F. Van Hagan, L. A. Smith, and W. A. Peirce.

* * * *

Charlie Halbert, state engineer, tore himself away from state affairs long enough to attend some of the sessions and the Friday luncheon.

* * * *

The auditorium of the engineering building was made attractive with flags under the direction of Albert Gallistel, superintendent of buildings and grounds. The squeaky stairway leading to the auditorium was carpeted to quiet the noise. That was a noble idea.

* * * *

The Wisconsin Board of Examiners of Architects and Civil Engineers, according to a report made by Prof. L. F. Van Hagan at the Thursday luncheon, has registered to date about 725 civil engineers and 490 architects. About 100 of the civil engineers were registered under the grandfather clause. The law seems to have been well received both by the engineers and by the public and promises to be effective.

* * * *

The highway paving program for the state will be reduced from the 400 miles done in 1932 to not more than 120 miles in 1933, M. W. Torkelson, director of regional planning for the Wisconsin Highway Commission stated in a talk outlining the 1933 activities in the highway field.

* * * *

Although Wisconsin is exceeded in mileage of paved roads by only four other states, according to Mr. Torkelson, it still needs urgently about 1000 miles more of pavement.

* * * *

A large part of the income from motor vehicle licenses and gasoline taxes is earmarked for specific purposes, and only the balance, if any, is available for new construction. It is probable that $1,000,000 a year, for the next two years, will be taken from this income and used to help balance the state budget. The 1933 highway activities cannot be predicted in advance because of the uncertainty regarding available funds.

* * * *

The session on Thursday morning was designated as "Surveyors' Section" and was devoted to that field.

The Committee on Surveying, in a report read by Karl Zander, of Kenosha, recommended several changes to Chapter 236 of the Wisconsin Statutes covering surveying. It was suggested that the legal requirements in regard to monumenting a plat be changed, that photostats of plans be admitted to record, and that platting and monumenting of cemetery plats be covered more fully and definitely. The discussion of the report indicated that there are still differences of opinion upon these points.

* * * *

The frost boils and frost heaves, that make much trouble for Wisconsin highway engineers and cause much profanity among users of the highways, can be prevented and can be cured according to Harold F. Janda, professor of highway engineering at the University of Wisconsin, who has done effective work for the highway commission on this problem.

* * * *

The water that causes frost trouble, Prof. Janda stated, may be trapped by improper drainage, but it is also sometimes held in certain kinds of soil by capillary action in spite of apparently good provisions for drainage.

* * * *

Louis F. Warrick, state sanitary engineer, presented the report of the Committee on Sanitary Engineering. The first municipal water-softening plants in Wisconsin are under construction at Evansville and Columbus, according to the report.

* * * *

Wisconsin's first school for sewage plant operators was held during the second week in January, 1933, at the University of Wisconsin, under the auspices of the university, the state Laboratory of Hygiene, and the Bureau of Sanitary Engineering of the State Board of Health. Fifteen operators attended.

* * * *

Frank L. Dieter, of Wauwatosa, presented a neat graphical method of locating contours on a topographic map. The equipment that he used to present the idea to a large audience was well designed and made his presentation very effective.

SURVEY COMMITTEE MAKES PROTEST

Protesting that the common practice of publicly employed engineers in competing privately with private engineering companies is neither fair nor compatible with high engineering standards, the survey committee of the Engineering Society of Wisconsin made its annual report at the annual meeting of the society in Madison. The origin of the protest lies in the policy of individuals, either in the employ of the public or of corporations, in making surveys with public instruments or those owned by the corporation, both during and after the hours of their regular employment, which constitute a detriment to the reasonable interests of "private engineering and surveying firms who must pay their own overhead ex-

pense, furnish their own instruments and labor, and in addition pay taxes which in part are used to maintain the very persons who are unfairly competing with them".

Taking a stand that the private surveying firm has a definitely justifiable place in our social scheme, the committee goes on to state that in the interests of harmony and cooperation between public and private firms, this practice must cease.

Further investigation of the committee into the Wisconsin statutes regarding platting law resulted in the formulation of recommended revisions of the laws which would demand sufficient data on the plat from the surveyor to make possible the reproduction of the survey from the data shown, and make thorough marking of boundaries by permanent monuments compulsory.

SAINT PAT'S DREAM

The good saint dreamed,
In fancy dim saw scenes drift by,
Saw lawyers pass until it seemed,
The whole of life had gone awry!

He dreamed — dreaming planned,
A day of days, a joy indeed,
For all true sons within the land,
Who duty-bound upheld his creed.

Saw the gathering of his forces,
Hurling war cries to the breeze,
Lords of Nature's vast resouces,
Masters of the land and seas.

Saw lawyers bowing, lawyers scraping,
Filling all the air with wails,
Heard them pleading and beseeching,
Saw them ride along on rails!

And the P. A. D.'s did grumble,
And the Fiddledephees did groan,
Egg-filled pockets made them tremble,
As they stood before the throne.

"Hail the King!" the plumbers shouted,
And the shysters bowed in fear,
Their downfall plainly flouted,
By old Saint Pat, the Engineer!

By R. DeWitt Jordan

Rastus was testifying in a murder trial.

Lawyer: You say Mr. Anderson walked into the barber shop and without a word, shot Mr. Rathburg?

Rastus: Yassuh! Bang! Bang! Just like that.

Lawyer: Where were you when the first shot was fired?

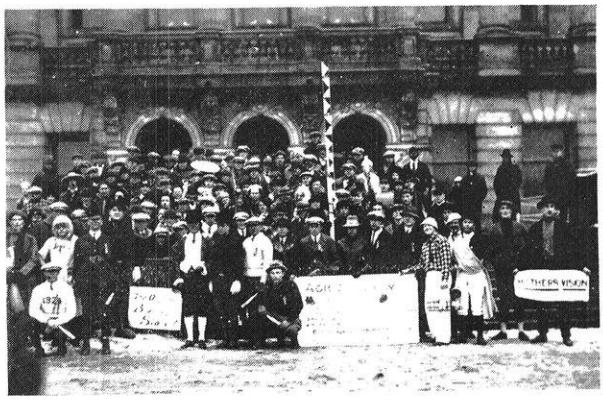
Rastus: Shinin' Marse Rathburg's shoes.

Lawyer: And where were you when the second shot was fired?

Rastus: Over 'cross de railroad under a pile of cross-ties.

ST. PATRICK WAS AN ENGINEER

ST. PATRICK was undoubtably the greatest of all engineers. His greatest contribution to the sanitary development of the civilized world was to drive the snakes out of Ireland and make them take their case books with them. As a peerless transit man he made the only authentic survey of the road to Hell. He proved himself a master mechanician by making, and a master plumber by using, his famous left-handed monkey wrench.

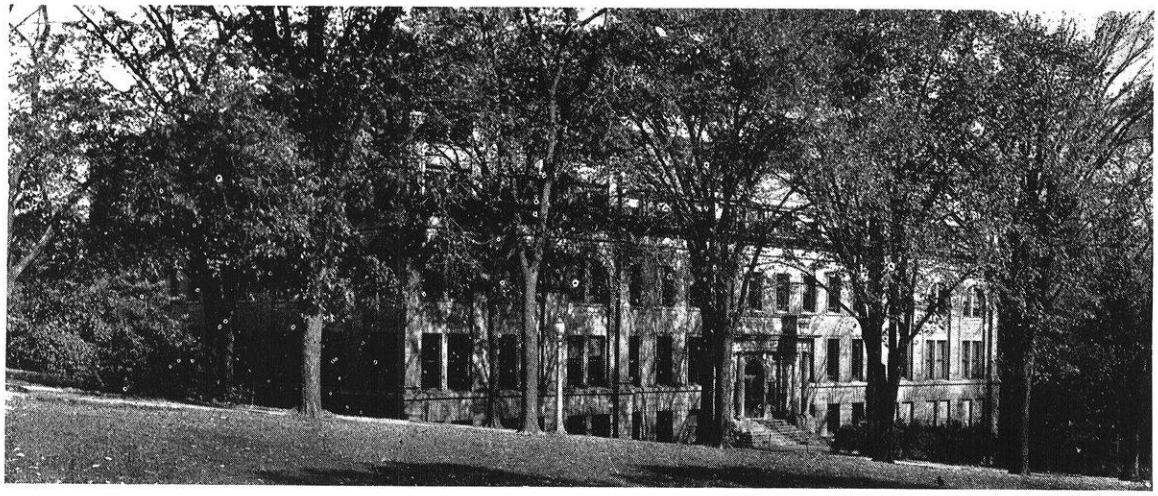


Saint Patrick's Loyal Cohorts.

Back in 1903, when Jimmie Watson, Van, Ray Owen, and Bill Kinne were upperclassmen, a vision came to two University of Missouri students, revealing the whereabouts of a remarkable tablet of stone which when unearthed revealed crude but unmistakable markings representing a transit, a compass, a slide rule and many other engineering tools. And across the face of the stone ran the mystic phrase, "Erin Go Bragh" which means St. Patrick was an Engineer. This was the famous Blarney Stone and ever since that day St. Patrick has been the patron saint of all engineers.

When the engineers at Wisconsin heard about the discovery of the Blarney Stone, which had been taken from Blarney Castle, Ireland, and buried for safety in Missouri, nothing would do except that Wisconsin possess the stone of favor. Not until 1912 were their desires satisfied. In that year it was first featured in the St. Patrick's Day parade by placing it in an open coach drawn by four white horses and parading it in a stately manner all over Madison. During the World War, when all of our engineers went off to "save the world for democracy" the precious stone was carefully hidden from the shysters who would stop at nothing in order to get just one tangible bit of evidence that dear St. Pat. ever soiled his virile mind with their kind of professional ethics.

For years the annual St. Pat's Day Parade was an event looked forward to by the cane-pushers as well as the homage paying sons of the saint. However, like most of Wisconsin's treasured traditions, the affair incurred disfavor with the strictly practical faculty and student body with the result that the loving homage of his sons is no longer wafted to the nostrils of the dear saint on the odoriferous incense of shyster-strewn, scrambled eggs.



« CAMPUS NOTES »

CIVILS GET BACHELOR DEGREES

Seven civil engineers were recommended for their bachelor degrees by the engineering faculty on February 27th. T. E. Hayes is enrolled in the law school where he will take the full course; W. S. Rasmussen and K. Tuhus are taking graduate work; F. P. White is attempting to enter the U. S. air corps; R. J. Jenks has returned to his home in Utah, where he has hopes of a job; H. F. Hoffman and A. J. Klettke have returned to their homes. Hoffman received "Honors" with a 2.47 average.

HONOR LIST OF FRESHMAN ENGINEERS

First Semester, 1932-33

Rate: High Honor List, 2¾ points per credit (17 crs. at 2¾ pts.=46¾ points).

Rate: Honor List, 2¼ points per credit (17 crs. at 2¼ pts.=38¼ points).

High Honor Rate:

Halamka, C. J.	17	50
Williams, T. J.	17	50
Gordon, D.	16	47
Gillies, J. A.	17	48

Honor Rate:

Hertel, R. F.	17	46
Whiteside, R. E.	17	46
Wagner, E. C.	17	45
Wright, J. F.	17	45
Senske, W. M.	17	44
Larzelere, J. S.	17	43
Vollenweider, A.	19	47
Nieman, G. O.	17	40
Cadwell, J. J.	17	39
Rindal, H. T.	17	39
Van Dyke, R. J.	17	39

The following students, although not working at the honor rate, are in the highest 15% of their class:

Burke, H. D.	17	38
Riegler, W. L.	17	38
Dow, H. W.	17	37
Murray, B.	17	37
Stuewe, H. A.	17	37
Hougen, J. O.	17	35
Bromley, J. J.	15	30
Davies, R. L.	17	34
Gross, E. W.	18	36
Webster, L. P.	16	32

POLYGON HOLDS SMOKER

Polygon held an all-engineer smoker March 2, in the Great Hall, Memorial Union. Highlights of the meeting consisted of tap dancing, a magician deluxe, and speeches. Everyone had a good time, as is usually the case whenever refreshments are served. Incidentally, Polygon is to be complimented upon its activity, as most of the engineering societies on the campus have "gone dead" lately.

ENGINEERS CHOSEN TO ASSIST IN MILITARY BALL ARRANGEMENTS

Three engineers have been chosen as the assistants to Oliver A. Grootemaat, '34, cadet major, who is the chairman of the 1933 Military Ball to be held on April 21.

Lorenz A. Leifer, e'33, who is a major in the cadet corps, has been chosen assistant chairman in charge of publicity; Clyde F. Schleuter, e'33, cadet captain, is the assistant chairman in charge of arrangements; and Orville B. Thompson, e'34, cadet lieutenant colonel, is the assistant chairman in charge of finance.

Besides these men, several engineers have been appointed chairmen of the various committees. Aubrey Wagner, e'33, is chairman of the officers' reserve corps arrangements committee, Arthur Treleven, ch. e'33, cadet colonel, chairman of the drill team committee, and Edgar Krainer, e'33, cadet first lieutenant, chairman of the decorations committee.

The Military Ball is reputed to be the biggest and most colorful social affair of the second semester. It ranks second only to the Junior Prom in social importance on the campus.

Each year it has been the custom to invite orchestras of national reputation to play for the affair. This

year it is intended to conduct a popularity ballot on the campus to determine what orchestras the students want. At the time of this writing the orchestras under consideration were: Guy Lombardo, Ted Weems, Wayne King, Ben Bernie, and Jan Garber.

ENGINEERS AND THE ARTS

Leslie G. Janett, ch'35, and Roger M. Knake, ch'34, were among those initiated into Phi Mu Alpha Sinfonia, professional music fraternity, on Sunday, February 26. The initiation banquet was held Tuesday, February 28th, in the Memorial Union. Professor Paul Knaplund, professor of history, was the speaker of the evening. Professor Knaplund spoke on the subject, "Giving Youth a Break".

MECHANICS DEPT.

Mr. "Jim" Van Vleet: "Given two concentric pulleys of 2′ and 4′ radii respectively, with a 100 pound weight hung on the outer one,___"

Louis Bohm, e'3: "Please, which one is the outer one?"

SENIORS INSPECT INDUSTRIAL PLANTS IN ILLINOIS

The senior mechanical engineers spent February 27, 28 and March 1 inspecting industrial plants, pipe lines, and power plants throughout northern Illinois. Prof. P. H. Hyland, Prof. G. C. Wilson, and Mr. E. T. Hanson of the faculty supervised the inspection trip.

Some of the projects visited were the Caterpillar Tractor Co., Peoria; the Western Clock Company, La Salle; the hydro-electric station at Dixon; the Powerton generating station at Pekin; and a natural gas pipe line at Cambridge. Opportunities were afforded the students to see plants in actual operation and to become acquainted with current manufacturing operations. This trip was substituted for the regular trip to Chicago because of the fact that the plants ordinarily visited in Chicago are not operating extensively at present.

According to reports Peoria, Illinois proved to be a most interesting place from the tales related by some of the boys. All the time was not spent in the factories and slight diversification seemed in order.

PROF. L. F. VAN HAGAN ADDRESSES CHI EPSILON

"One of the largest problems facing the new administration is that of the mess in which our railroads now find themselves," stated Mr. L. F. Van Hagan, professor of railway engineering at the University of Wisconsin at a meeting of Chi Epsilon, February 15, 1933. "The railroads are not, contrary to popular belief, dead on their feet. The Capital Times of February 12 printed a picture of a new type railway coach having rubber tired wheels and capable of traveling at a speed of 50 miles an hour.

"It is the opinion," continued the professor, "of a nonpartizan committee appointed by a group of banks and insurance companies to investigate the matter, that the mess in which the railroads find themselves is entirely their own fault. Hoover formed the Reconstruction Finance Corporation primarily to forestall the collapse of the railroads, which would also involve many banks and insurance companies. A few years ago, a railroad bond was considered just as solid as a government bond, because the people thought that a railroad was an industry that would never become obsolete. The railroads, however, have done so much poor financing, and have pulled so much legalized trickery that the end was inevitable.

"One hundred years ago, the roads were promoted and backed by legitimate, honest railroad men, but the industry was such an easy source of revenue that many unscrupulous men took a hand in the affair and exploited it for what they could get out of it. These men, such as Gould, were no different from Capone except that they had more brains. They sometimes bought controlling interests in two parallel roads, and then juggled the traffic on each so as to cause the earnings, and stocks, of one to fall and the other's to rise. Obviously, knowing ahead of time what was to happen, they could so arrange their finances as to make money at every turn. Graft, in the form of 'freight rebates' and 'donations' from communities through which the roads ran, and which were dependent upon the roads, made such men richer than Capone ever dreamed of being."

Prof. Van Hagan's private grudge against the railroads is that they have until recently followed the policy of employing only untrained men. In this respect, it would be far better for the engineers if the government were to run the railroads. The best method, in his opinion, would be for the government to lay down certain basic rules, and then let private interests run the roads. The government's participation in the railroad business during the war was not a fair test of its ability to run the roads because of the unusual conditions existing at that time. At present, the government is participating to the extent that it built and is running some 400 miles of road in Alaska to connect Fairbanks, a city of 4,000 people with the coast. It is, however, losing $1,000,000 a year in the process.

"The Union Pacific Railroad," concluded Mr. Van Hagan, "is now paying 8% or 9% on its stocks, but most roads are lucky if they can break even.

SOCIAL

"Uncle Walt" Tacke, assistant professor of railway engineering, and his charming young wife chaperoned the Adams Hall dance held in Great Hall, Memorial Union, Friday evening, March 3. "Uncle Walt" now has a standing invitation to chaperone anything that he wishes at any time in the future.

READING ROOM TO HAVE ENGINEERING THESES

Arrangements have been made to keep the engineering bachelor theses in the engineering reading room, following a move by the main library to get rid of all bachelor theses more than five years old. This will not affect the usual procedure of depositing the theses so far as the student is concerned.

RURAL ENGINEERING

"Wisconsin's farmers are among the most progressive in the Nation, and one finds among them many scientists of agriculture and dairying, none of whom oppose the many sensible new innovations," raved a legislator not so long ago. To which we can only add the statement that there is a stuffed two-headed calf over in the Eugenics Building up on the second floor.

TELEVISION

"All electrical engineers are nothing more than electromagneticians," said Sam Snead, Chairman of the Radio Dept., University of Wisconsin Extension Division, in a talk given before the Wisconsin Engineers' Society — Technical Club Banquet, on February 23, 1933.

"We are erroneously under the impression that television is new," continued Mr. Snead, "but I submit for your approval a pamphlet published in 1887 entitled 'The Last 25 Years of Television'. Our 'Electromagneticians have a powerful tool in the vacuum tube, with which they have performed many seeming miracles'." At this point, Mr. Snead demonstrated the conversation of sound to light, light to sound, light to electrical impulses back to light, and sound to sound. He also demonstrated the use of a photo-electric cell connected to a relay, and used it to turn lights on or off at will.

"The photo-electric cell is the 'soul' of our modern television apparatus, although it is finding countless other applications," stated Mr. Snead. "For example, the N. Y. Times recently set eight pages of type without a single mistake with the aid of this cell. It is now possible to produce electroplated cuts, from which pictures in magazines are printed, in a few hours, as compared with the four days now required for the process."

"At present, there are thirty-five stations broadcasting television, with about 35,000 amateur experimenters 'looking in'. Television broadcasting is greatly hampered by the fact that the federal government will not allow any commercial advertising to be done via television. Thus, any experimental work carried on in the field must be done gratis, with no possibility of financial return. Amateur reception is an expensive pastime, and it costs about $500 to acquire enough apparatus to get started. At present we broadcast weather maps to ships and airplanes, and some New York firms have started broadcasting styles to their western representatives. The Bell Telephone labs recently accomplished booth to booth, two way television, but it is not at present commercially economical to put this on the market."

Mr. Snead concluded his demonstration with an exhibition of a new electric piano which has no strings, reeds, or other vibrating parts, but consists of a set of oscillatory circuits, each of which produces a definite note through a loudspeaker when actuated by a key on the keyboard. The instrument will play only one note at a time, but it can be made to sound like a banjo, guitar, or piano. It is also possible to move the pitch of the entire keyboard up or down within a range of five notes, thus making it possible to transpose any piece of music by merely turning the knob and then playing the same notes as before. The Philadelphia Philharmonic Symphony Orchestra ordered two of these instruments to fill in its base section. The two instruments will be equivalent to some 30 musicians in the base sections.

"I anticipate that the future will bring much to television," concluded Mr. Snead, "including use in news and picture broadcasting, educational lectures, navigation, warfare, and telephonic attachments."

MORE WORK FOR CIVILS

The University of Wisconsin recently acquired 250 acres of land adjoining the southwestern end of Lake Wingra, and extending from Lost City to Nakoma. This land is to be used for the establishment of an Arboretum. The university has already spent some $60,000 taken out of the Tripp fund, and the City of Madison spent a like amount on the project. At present there are no other funds available, but the project will be held for future development.

Professor Owen emphasized the fact that the T. E. students this year will run their long level circuits out to this area and establish bench marks. All stadia work, short level lines, profiles, and topographic surveys which have been performed on the campus in the past will probably be done on this area in the near future. The various results will be pieced together, and in a few years the T. E. Dept. will donate, as its contribution to the project, an accurate topographic map of the park.

The park will be landscaped and planted with all the various kinds of trees, shrubs, and flora which will grow in this climate. It is hoped that the park will in time become one of the beauty spots of the state.

FOREIGN FILMS

Some of the best examples of foreign photography in motion pictures are now available on the campus. The Russian film "The Road to Life" was an interesting example of psychology mixed with engineering, all to produce the desired result. It is to be noted that in this picture a group of untrained youths, supervised by an untrained man set out to build some 50 miles of railroad, and, in the picture, built it. Actually, of course, the lack of technical knowledge would render any such action practically impossible, but the spirit of "We'll build it in spite of all Hell and high water" is indicative of the standards set and maintained in actual practice by engineers. "Shots" in the picture of Russian life showed the stark bareness of living conditions in Russia.

The French picture "To Us, Liberty", was interesting in its conception of a completely mechanized phonograph factory. The ultimate development of the factory consisted of feeding in the raw materials through one door and taking the finished phonographs off the moving belt at another. When this point was reached, the employes still received their wages, although they did no work, and were seen outside the factory fishing and dancing. This last is about as idealistic a picture of technocracy as was ever made.

STAFF MEMBERS RECEIVE RECOGNITION

Wayne K. Neil (ch.e.'34), George L. Halamka (e.e.'34), Jerome N. Klein (e.e.'33), and Charles O. Clark (c.e.'34), were awarded Wisconsin Engineer's keys at a recent meeting of the Board of Directors of the Wisconsin Engineer. The key is awarded after a year's service on the staff of the *Wisconsin Engineer,* during which period the candidate must have been active enough in the organization to have contributed materially to the magazine.

There is at the present time plenty of room on the staff for engineering students who wish to try their hand at almost any phase of engineering journalism. Students who are interested in work of this kind are urged to leave their name with Professor Van Hagan, or with Professor Volk, librarian.

E. S. W. COMMITTEE REPORT ON YEAR'S PROGRESS

(Continued from page 84)

the financial problem. A legislative bill has been prepared looking toward a satisfactory procedure to meet the needs, and to permit placing the financing procedure in municipalities on the most equitable basis. This bill is now being considered by the Wisconsin legislature.

Transport Methods Change

The report of the utilities committee commented on the fact that where formerly expansion and construction had been conspicuous they were now largely replaced by problems incident to necessary curtailment and economy. Among the notable changes mentioned is the tendency in the transportational field toward abandonment of street railway trackage with the substitution of trolley and motor bus service either in whole or in part. In the larger properties there have been problems of co-ordinating the two types of local transportation. Removing the rapid transit lines from streets and highways to private right-of-way has promoted safety and increased speed. Also, electric service has extended further into rural areas and has been adapted to an increasing variety of farm applications. There is a greater appreciation of the value of steam generation due to improved efficiencies and to several years of low water.

Gas for house heating and larger industrial applications was making good progress a year or two ago, and the extension of high pressure pipe lines brought gas into many of our smaller cities and villages that did not formerly enjoy this service. Competing fuels have recently caused greater activity in the gas industry.

The gradual substitution of dial telephones for improving service and efficiency marks the major change in the telephone utility.

"IF" AGAIN

By ROBERT ISHAM RANDOLPH,
with apologies to Rudyard Kipling

If you can swing an axe or wield a bushhook,
Or drive a stake, or drag a chain all day,
If you can scribble "figgers" in a note book,
Or shoot a range pole half a mile away.
If you can sight a transit or a level
Or move a target up and down a rod,
If you fear neither man nor devil,
And know yourself and trust the living God;

If you can wade a swamp or swim a river,
Nor fear the deeps, nor yet the dizzy heights,
If you can stand the cold without a shiver
And take the Higgins ink to bed at nights,
If you can turn a thumbscrew with your fingers
When every digit's like a frozen thumb.
If you can work as long as daylight lingers
And not complain, nor think your going some:

If you can sight through tropic heat's refraction,
Or toil all day beneath a blistering sun.
If you can find a sort of satisfaction
In knowing that you've got a job well done.
If you can be an eskimo and a nigger
And try to be a gentleman to boot.
If you can use a "guessing" stick to figger
And know a coefficient from a root:

If your Calculus and Descriptive are forgotten,
And your Algebra just serves your fairly well,
If your drafting and lettering are rotten,
And your Trautwine's always handy by to tell
If you can close a traverse without fudging,
Or check a line of levels by a foot.
If you can set a slope stick just by judging,
And never kick a tripod with your foot:

If you can run a line where you are told,
And make it stay somewhere upon the map.
If you can read your notes when they get cold,
And know that your contours mustn't ever lap.
If you can line a truss or tap a rivet,
Or make a surly foreman come across.
If you can take an order as well as give it,
And have no secret pity for the boss:

If you can climb a stool and not feel lowly
Nor have your head turned by a swivel chair.
And if you can reach your decisions slowly
And make your rulings just and fair.
If you can give yourself and all thats in you,
And make the others give their own best too.
If you can handle men of brawn and sinew
And like the men and make them like you too:

If you can boast a college education,
Or, if you've got a sheepskin, can forget.
If you get a living wage for compensation
And give a little more than what you get.
If you can meet with triumph and disaster
And treat them without favor nor with fear,
You'll be a man—and your own master,
But what is more—you'll be an engineer.

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300 USES FOR STAINLESS STEELS

Undoubtedly the best-known and most widely used of the alloy steels are the comparatively large group of chromium and chromium-nickel steels general called stainless steels. Of these, the 18 per cent chromium, 8 per cent nickel steel is probably the most widely used at the present time.

Stainless steels are particularly well adapted for use in resisting atmospheric corrosion, attack from oxidizing agents, and scaling at elevated temperatures. These alloy steels are employed in practically every branch of industry; and in certain fields their excellent characteristics have brought them into special prominence. Chief among these are the food and associated industries, petroleum, automotive, chemical, high temperature and pressure, shipbuilding, architecture, aircraft, railroad, paper and hospital fields. Recent surveys indicate that these industries are the major consumers of stainless steels.

« « EDITORIALS » »

THE CREDIT CONTROVERSY

The decision of the engineering faculty concerning curricular credit for second year ROTC and band is one which effects the student body of this college more closely than of any other. For years the engineering school has furnished a large proportion of both the cadets and the musicians. What the decision of our faculty is effects vitally both organizations and the university as a whole.

About a month ago, the whole campus was surprised by the news that the college of letters and science faculty had voted not to give credit to either of these organizations. The fact that the vote was very close and that it was taken at a poorly attended, hardly representative, faculty meeting does not reverse the decision. It is very doubtful if there are any on the campus who favor war as such. If there are, those persons are ones who will benefit materially by war rather than those who are actively engaged in it. There is no doubt that war is a horrible thing. And aggressive war on the part of this nation would be inexcusable. However, one has to go no farther than his own back yard or that of his landlady to see that the policy in best standing with the people of this country and with others as well, regardless of religious creeds, is "look out for yourself because nobody else will". One cannot expect the wealth of a nation to be any more safe on its unprotected land expanses than the wealth of a business concern or a bank on the front sidewalk. It seems perfectly asinine to assume that it would be. When and if a world-wide program of disarmament becomes a reality instead of merely a topic for polite conversation, the cause will find champions in the engineers but until then the only reasonable course is to champion adequate national defense.

Such a program of national defense does not require a large standing army but a reasonably intelligent force of civilians familiar with the business of war to take charge of any necessary drafted army. A college seems the most logical place from which to provide this type of trained man.

Furthermore the University of Wisconsin is a land grant college by early Congressional provision and as such must provide military instruction, in consideration of which it receives financial aid from the government in addition to regular army appropriations. The abolition of military training, which would surely result if no credit were given to it, would mean the removal of this source of income. With a budget as badly crippled and in as much danger of further reduction as that of this university, there is little room for consideration of an additional cut to satisfy those people who will be pacifists for pacifism's sake only.

The University Bands unquestionably have an academic justification. They serve the university by providing music for football games and other athletic events. The University Concert Band is one of the finest symphonic bands in the Big Ten and as such gives six to eight concerts a year and has in the past made good will tours for the school, paying their own expenses to a very large extent. They serve the students by providing an opportunity for development of appreciation for, and the ability to express, through music, the human emotions. Engineers, in search for a course in which the human personal being is the chief consideration, at present constitute almost half of the bands.

The faculty power to express its appreciation of these values is hampered by the extremely small number of electives in the schedule of any branch. To allow credit for either in the sophomore year means that some of the elective credits normally satisfied in later years can be satisfied by these credits. This materially reduces the availability of electives for the purposes of specializing or broadening culturally, the original purpose of the electives. To demand an extra credit of men who took either for credit would be giving credit only in name and could not be considered. To require more credit of all would be to increase the already too heavy load. The solution of the entire problem can hardly come in a hurry, but credit must be granted.

THE ENGINEER PRESIDENT STEPS DOWN Now that Herbert Hoover has completed his term as president of the United States and has stepped down from his high place following an overwhelming electoral defeat, let us set down our imperfect estimate of the situation.

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Hoover was elected and was defeated by overwhelming votes. In his election, the religious element was strong enough to break the Solid South. The huge vote on that occasion was largely a vote against Smith, nevertheless, Hoover was then well liked. In his defeat were many factors, but the personal unpopularity of Mr. Hoover loomed large among them. In the light of his fine work and high reputation during the war, this final unpopularity is a curious phenomenon.

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It is probable that any other man in Hoover's place would have been cast out because of the Great Depression. All over the world, governments have tottered and fallen under the stress of the times; so it is not surprising that the people of the United States should demand a change of administration. However, along with the general dissatisfaction has gone a personal antagonism against the engineer president.

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Two groups have opposed Hoover violently and bitterly. One was the Wets, who failed to find a champion in the president. The other was the group of political thinkers who believe in a socialistic and paternalistic federal government. This group, likewise, failed to convert the president to their views and, having failed, became his vitriolic denouncers.

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The regular Republican politicians were never enthusiastic for Hoover. He was not a professional politician and lacked the political point of view. They were afraid of his political ineptness and its possible damage to the party.

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At the time of his election, the people of the nation had confidence in his business judgment and executive ability. The record shows that the confidence was merited. He has shown intelligence, courage, and energy in meeting the nation's problems. Drought and flood both struck the country during his first months in office, and both kinds of disaster were countered quickly and effectively. As crisis after crisis presented itself, Hoover moved quickly and surely to his solutions. His outlook was world-wide, and when disaster from afar threatened, he acted without waiting for the tide of woe to strike our shores.

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But Hoover made one serious mistake; he failed to play ball with the newspaper men. He had an engineer's dislike for the type of inane news story that the press of today loves to print about public persons. It irked him to pretend to be an Indian chief or a cowboy to lead a crowd of people in singing popular ballads, or to do the other inappropriate things that are supposed to make very elegant human interest stories for harassed news photographers. He failed to overcome or cover his antipathy to such proceedings and thereby lost standing with the news men, who have subtle ways of making their resentment felt.

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When, at the beginning of Hoover's administration, the republican publicity bureau was closed, a very serious mistake was made. The democrats, contrary to their usual policy, maintained their publicity bureau, provided it with a capable head, and furnished it with plenty of money. Within a year, the democrats had Hoover and the Republican party in a hole from which they never got out. The republicans realized the mistake when it was too late. They reopened their bureau and began a battle to recover lost ground, but were never successful.

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The moral of the tale seems to be this: Engineers who go into public life must play ball with the press.

OUR PLEDGE FOR YOURS For thirty-seven years the *Wisconsin Engineer* has attempted to mirror student opinion within its pages. In so doing, it has served a four-fold purpose:

In furnishing an organ through which the student body could maintain internal contact with its own branches and their activities;

In maintaining contact between the college and its alumni, taking to them the news of the campus and news concerning their old friends;

In promoting a friendly feeling between the alumni, other schools and industrial organizations to which it circulates and this college, thus advertising our men and our college.

And in furnishing an outlet for journalistic expression and managerial ability of the students through contributional channels and staff positions.

To what extent it has justified its existance and to what extent its men have proven its claims for them can be judged by the high rank which Wisconsin has among the engineering colleges of the country.

However much it may, at times, appear to be the work of a few persons, it is the product of a major portion of the student body. Upon the ability of that body to support it, both morally and financially, rests its hopes for success or failure. In the past the *Engineer* has merited the highest esteem of engineering journalists. It can again win national honors and prizes if the students are willing to put enough into it to make it the best in the country. If Kansas, Nebraska, and Minnesota rate a higher place among engineering college magazines than Wisconsin, it does not mean that their men or their college is superior to ours in any manner whatsoever, but that their men support the work of their college more nearly to the man and that each is a booster and a backer. In every case the printed organ of the college is what its students make it.

It is the wish of the *Engineer* to be as you desire it. To that end, the staff solicits your criticisms and your suggestions. To that end it maintains a contribution box

(Continued on page 94)

« CAMPUS ORGANIZATIONS »

PI TAU SIGMA

The following officers were elected by Pi Tau Sigma, honorary mechanical engineering fraternity, at the first regular meeting of the second semester:

G. C. Schmid_____*President*
A. B. Epple_____*Vice-President*
P. P. Hnath_____*Corresponding Secretary*
H. L. Mohn_____*Secretary*
J. E. Brennan_____*Treasurer*

Plans for the second semester include an inspection trip through the new Forest Products Laboratory.

A. I. E. E.

Papers presented by two seniors in electrical engineering comprised the greater part of the program at a joint meeting of the Madison section and the student branch of the American Institute of Electrical Engineers, February 15, at the Memorial Union building.

The first speaker was F. D. Mackie, who discussed "The Electrical Propulsion of Ships". This was followed by a paper on "The St. Lawrence Power and Waterway Project", presented by John Schneller. The session was concluded with pie ala mode and coffee.

The date of the next meeting of the student branch was set for March 15, 7:30 p. m., at the Union. An address by Edward Bennet, professor of electrical engineering, explaining and defending his "Plan for the Restoration of Employment", was to be the feature of the evening.

CHI EPSILON

Chi Epsilon held two meetings during the past month on February 15 and February 21 respectively. The former was held in the Round Table room of the Union. Prof. Van Hagan was guest of the evening, and spoke on "American Railroads of the Present Day". At the latter meeting, held in the education laboratory in the Engineering Building, the election of new members was completed.

POLYGON

The apparent inability of the farmers to organize themselves efficiently is one of the most important contributing factors in their present plight, according to Ira L. Baldwin, assistant dean of the College of Agriculture, who spoke to the large group of students who attended the Polygon smoker in Great Hall of the Union, March 3.

Dean Baldwin discussed the milk strike and the general question of farm relief. Other features on the program included a magic act, and tap and acrobatic dancing. Walter Wyss, president of Polygon, acted as master of ceremonies. Following the entertainment, refreshments were served in Tripp Commons.

WESTON PROMISES REVIVAL IN A. S. C. E.

Promising a revival of the rather defunct student branch, Roy Weston, new president of the American Society of Civil Engineers, thanked the members for their display of confidence at the meeting of the society which was held Thursday, February 15, in the Engineering building. The business of the evening was the election of officers. Those elected were: Roy F. Weston, president; Harold J. Behrens, vice-president; Phil Morgan, secretary-treasurer.

The revival became a reality for the night at least with the meeting of March 8. The feature of this meeting was the revealing talk of Prof. O. S. Rundell of the law school on "Fiction in the History of Law". The speaker, his topic, and the new place of meeting, the Memorial Union, all contributed to the promised revival of this society.

OUR PLEDGE FOR YOURS

(Continued from page 93)

on the first floor of the Engineering Building and an office on the second floor. To that end the new staff pledges itself, whole-heartedly and unreservedly, asking only the same whole-hearted cooperation from the student body as it pledges itself to give.

« ALUMNI NOTES »

CIVILS

Redeen, Byron O., c'32, has been, since last October, a machinist in the Phoenix Hosiery Co. at Milwaukee. He has been employed full time.

Raccoli, Theodore, c'30, who has been on the engineering staff of the Illinois Highway Commission since his graduation, was let out as a result of the change in political administration in that state. Present address is 3206 McKinley Blvd., Milwaukee.

Wootton, Clarence, e'30, is working in Milwaukee as a junior engineer in the U. S. Engineers' office.

Bamberry, James, c'28, is a construction engineer with the U. S. Engineering offices. He is doing field construction work in the Fox River Valley.

Parson, Walter J., c'26, who has been stationed in Baltimore, has been transferred to the Vicksburg offices of the U. S. Engineering Department where he is in charge of the hydraulic studies dealing with the Mississippi flood control work near Vicksburg.

Smith, Judson P., c'26, is recovering from an injury to his back. Since his graduation he has spent one summer with the Wisconsin State Board of Health, one summer as inspector of drinking water systems on Great Lakes steamships for the U. S. Public Health Service, and four and one-half years in chemical research for various companies. His address is 911 Tenth St., Wausau, Wis.

Lindner, Clement P., c'25, on March 1st, was married to Sarah Pauline Burnette at Wilmington, N. C. After March 15 they will make their home at Vicksburg, Miss.

McCoy, Julius M., c'25, visited the college on February 6 and related a story of activities that ranged from lumbering operations and railway location in Oregon, to highway contracting in Wisconsin. Mac was married on June 15, 1929 to Eleanor E. Larson, of Minneapolis, whom he met while she was a teacher and he was a highway engineer at La Crosse. After March 1 of this year, they expect to be at home at 815 South 13th Street, La Crosse.

Schneider, Alfred W., c'24, is now working for the Marchese Brothers Construction Company in Milwaukee.

Duffy, W. F., c'84, after 48 years of civil engineering work has retired from the profession and hopes to "take it easy in sunny Louisiana." During the past 48 years he has done work in 25 states and in two foreign countries.

ELECTRICALS

Boerner, Thomas J., e'28, who is development engineer with the R. C. A., is now located in Bolinas, Calif. He is developing new transmitting equipment at the trans-Pacific radio station there.

Loeber, C. W., e'28, is U. S. Radio Inspector with the Federal Radio Commission, and is now stationed in Kansas City, Mo.

Tiedemann, Dimitry, e'28, EE'29, is working as an electrical development engineer with the Northern Electric Company at Montreal, Canada.

Rasmussen, Clarence, e'23, is now in Chicago, working as a consulting engineer with Rasmussen & Company.

Rusch, Hugo L., e'23, is an industrial engineer for the Northern Pump Company of New York City. Mr. Rusch was formerly with the Johns-Manville Corporation. He is living at 243 Crestwood Ave., Crestwood, N. Y.

Johnson, Earl D., e'21, is a recent graduate of the new U. S. Army Air Corps primary training field at Randolph Field, San Antonio, Texas.

McMullen, Cleve A., c'18, is manager of the Crescent Electric Supply Company at Quincy, Ill.

Stillwell, E. D., e'10, has been appointed superintendent of the Lock Operating division of the Panama Canal in charge of both the Atlantic and Pacific Locks. For the past fifteen years he has been superintendent of the Atlantic Locks at Gatun. His address is Pedro Miguel, Canal Zone.

Kifer, E. H., e'08, is now located at Muskegon, Mich., where he is president of the Muskegan Gas Company. He was former vice-president and general manager of the San Antonio Public Service Company.

Brobst, J. E., e'03, has been transferred to managing engineer of the Industrial Control Engineering Department of the General Electric Company at Schenectady.

Burkholder, Charles I., e'96, is now the vice-president and general manager of the Duke Power Company at Charlotte, N. C.

CHEMICALS

Martin, Herbert Q., ch'33, is making Bonita, Louisiana his temporary home, and inquires if a pet alligator is desired by any of his class mates.

Hansen, Ralph, ch'32, is working for his uncle in a book bindery.

Millard, George, ch'32, is working in the Milwaukee plant of the Chromium Corporation of America.

Schink, Ludwig, ch'32, has left the engineering profession, perhaps to beat the depression, for it is reported that he has completed a course in beauty culture and is now a qualified operator.

M. J. Sterba, ch'32 and **C. C. Watson**, ch'32, on February 16, issued number 2 of volume 2 of "The Retort", a news letter published occasionally and sent to all members of the "32" chemical class.

Dormer, George G., ch'31, M. S.'32, has been attending the Michigan State Teachers College at Marquette, Michigan during the autumn quarter.

Ceaglske, Norman H., ch'29, announces the arrival in Madison of a daughter, Nancy, on January 19, 1933.

Riplinger, E. C. ch'28, writes that the Seaboard By-Products Coke Company of Jersey City, N. J. is still making it possible for him to earn a living.

Zinn, Robert E., ch'27, is still with the Victor Chemical Company, Chicago Heights, Ill.

Krenz, Alfred S., ch'23, is associated with Krenz and Moore, 5114 West Center Street, Milwaukee, acting as selling agents for ventilating fans, stokers, and coolers for transformers.

Pickford, Jerome (Jerry), ex'23, one time pitcher on the varsity baseball team, writes that he is still holding his job with a public utility company, making Hammond, Indiana his headquarters.

MECHANICALS

Hopkins, Kenneth E., m'31, is working as assistant superintendent for the Freeman Manufacturing Company, at Racine, Wis.

Hyland, Harvey G., m'29, has sent us the news from Niagara Falls, N. Y. that he is the father of a baby girl, Barbara Elsie, born on February 5. The Hylands are living at 1224 86th Street, Niagara Falls, New York.

Smith, Harold, m'26, still retains his position as an engineer with the Standard Oil Company. He now has his headquarters at Sugar Creek, Mo.

Chase, Sherman, m'24, is now with the Illinois Steel Company, at Chicago, in the capacity of assistant chief test engineer.

ENGINEERING REVIEW

REVERSED REFRIGERATION

In the ordinary electric refrigerator in the home, the heat which finds its way into the compartment is absorbed at the low temperature by the refrigerator mechanism and discharged into the room at slightly above room temperature. This same process can be used to heat homes in cold weather, the heat being taken from the cold outside air and liberated within the house at a temperature sufficient to warm it. The process furthermore presents features of technical and economic interest due to the fact that energy consumed in mechanical refrigeration represents only a fraction of the heat energy delivered; thus cutting down very considerably the power consumption from ordinary methods of electric heating.

Engineers have been experimenting with this method of heating to determine its practical possibilities. During the past winter, a house actually occupied was heated successfully in this manner. Although the equipment used was more or less experimental, the principles involved were definitely demonstrated. During the present winter an improved installation has been in operation to solve certain practical problems still remaining, and also to obtain additional data regarding economic limitations of its use in severe climates. This type of equipment can be arranged to cool in summer as well as to heat in winter, and, in fact, one of these installations was used for this purpose during some of the warm weather last summer.

This development has not yet reached the commercial stage, so that no apparatus is now available. However, it is anticipated that the tests of this winter will go far to settle the remaining problems involved.

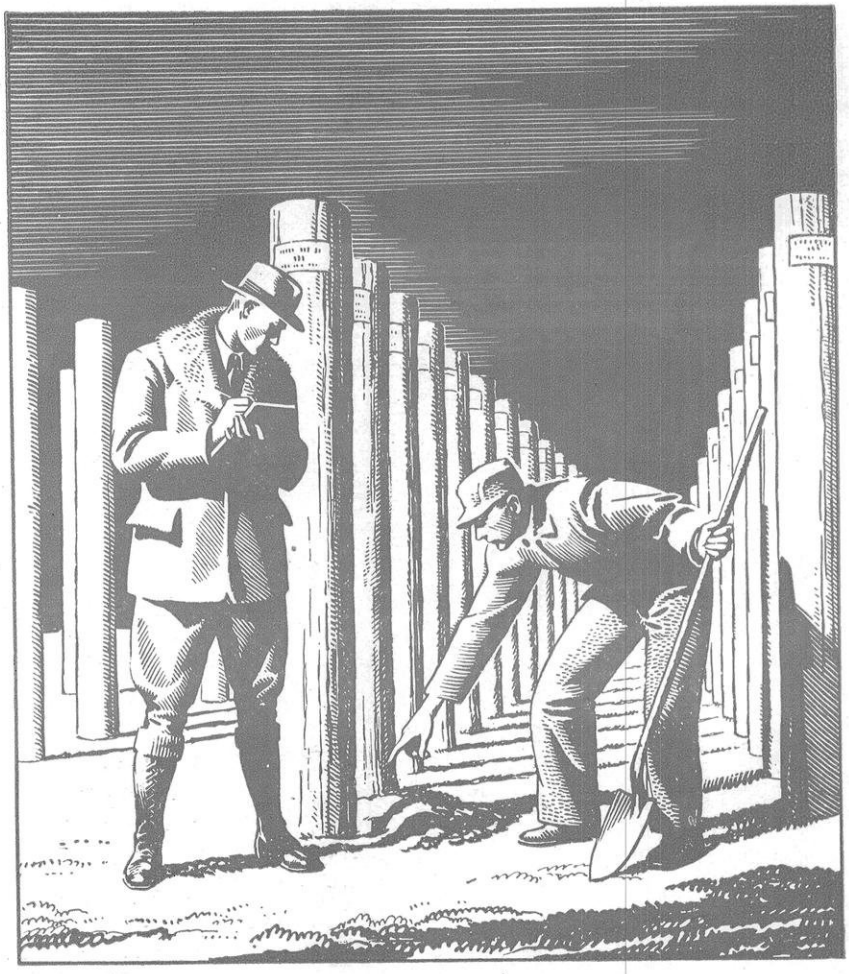
A-C QUANTITIES READ DIRECTLY

Alternating current quantities are metered directly on an unusual instrument developed and used by Westinghouse for adjusting commutating field shunts on large a-c. railway motors. On a vernier dial, phase angles are read directly to a fraction of a degree, and components and scalar quantities of current and voltage are read directly from meters. The impedances of the meters are such that their introduction into the circuits had a negligible effect on the distribution of current and voltage drops.

The new vectometer in operation.

This vectometer is patterned after the metering equipment used on the Westinghouse a-c. calculating boards. The vernier dial on which the phase angles are read is connected to the rotor of the phase shifter, which has a three-phase primary winding and a two-phase, four-wire secondary balanced winding. By throwing from the "in phase" to the "quadrature" position the switch that is connected to the secondary, the standardizing current is shifted 90°. In reading scalar quantities, the difference between the successive dial readings gives the phase displacement of the quantities.

The vectometer illustrates Kirchoff's law in complicated networks, and facilitates ascertaining power factor measurements ordinarily obtained through the reading of volts, amperes, and watts and the subsequent use of a slide rule in finding the power factor angle. In connection with the study of the symmetrical component method of analyzing unbalanced polyphase conditions, multiplication by j, a, and a^2 can be performed simply by rotating the phase shifter through the proper number of degrees.



Wooden soldiers *in the* war *against decay*

To conquer the forces of decay which attack telephone poles, scientists of Bell Telephone Laboratories carry on a relentless campaign.

They study many kinds of wood, test many preservatives. They isolate wood destroying fungi and insects—study them in the laboratory—search for a practical means of combating their attack. They have set out armies of stub poles in Mississippi, Colorado and New Jersey where altitude, climate and soil vary widely. At regular intervals they inspect these poles to learn which woods and preservatives are best.

Such scientific thoroughness — found in all phases of telephone work — is one reason why Bell System plant becomes more efficient each year. And why telephone service is so dependable.

BELL SYSTEM

TAKE A TRIP HOME BY TELEPHONE
. . . TONIGHT AT HALF-PAST EIGHT!

G-E Campus News

TAMING LIGHTNING

A crackle, a deafening crash—and a gigantic streak of man-generated lightning leaped 30 feet. Thus, was 10,000,000 volts, the largest artificial flash ever produced by man, discharged at the G-E high-voltage laboratory.

To produce this enormous voltage, a 50,000,000-kw. lightning generator imitates nature. Hundreds of small capacitors take the place of nature's clouds. They are charged by transformers. When the voltage is built up, the capacitors are discharged in series to produce 10,000,000 volts. Sounds simple, doesn't it? However, the power output of the generator—during the infinitesimal period of the flash—is nearly twice that of all the generating stations in the United States.

F. W. Peek, Jr., a Stanford grad of '05, was chiefly responsible for this achievement—incidentally, he is now the chief engineer of the G-E Pittsfield Works. "Lightning tamer," his old classmates would probably call him. And rightly proud of him they should be, for in the field of transients and dielectric phenomena he is second to no one.

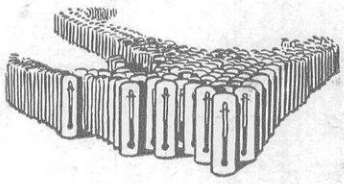
ATOM CHASER

On December 10th last, a mild-mannered scientist stood in the Great Hall in Stockholm and received the Nobel Award in Chemistry for 1932. Then he went skiing with his wife and daughter, seemingly unmoved by being the second American chemist in 31 years to be so honored.

In 1909 Dr. Irving Langmuir, a '03 graduate of Columbia University, came to Schenectady, to the G-E Research Laboratory, to ask questions about tungsten wire, its behavior in a vacuum. He stayed, just "looking around" and wondering why the bulbs of incandescent lamps blackened so easily. He found out, and thus developed the gas-filled lamp. It saves Americans a million dollars every night.

Then he wondered about atoms coöperating with electrons and produced the high-vacuum electronic tube, making possible radio broadcasting, which created an industry. Incidentally, he contributed a new type of welding—atomic-hydrogen.

They call him atom chaser, electron driver. The Swedish Academy of Science rewarded him — not for lamps, radio tubes, or welding methods, but for achievements in pure science. For just "wondering."

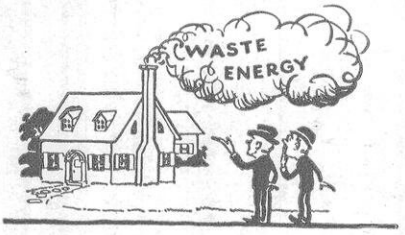


25 MILLION THERMOMETERS

You may have heard about our new power plant at Schenectady—the first of its kind ever built. In it there's a 20,000-kw. mercury-vapor turbine. The plant uses mercury vapor for power, the exhaust vapor producing superheated steam.

270,000 pounds of mercury will be needed for the boilers. That's enough for 25,000,000 thermometers. Perhaps you wonder why we don't use water. Well, the new process makes possible some thirty per cent more power from coal than heretofore. And we don't expect that those boilers will be refilled.

W. L. R. Emmet, an '81 graduate of the U. S. Naval Academy, is the inventor of this mercury-vapor process. That isn't all he's done, either. In his capacity as a consulting engineer at G. E., he developed the steam turbine from a small beginning to a place of dominating importance, and he first applied electric power to ship propulsion.



FLAME WITHOUT SMOKE

Smoke and soot mean wasted energy. That's what our engineers thought, too. They rolled up their sleeves and began to work. For five years they studied electric control of oil combustion. And they developed progressive impact combustion; they broke a single drop of furnace oil into a hundred million parts.

In this process, oil and air collide under pressure, and each drop of oil breaks up into millions of particles. Application of heat further breaks down the oil into gaseous hydrocarbons; and when the latter encounter air, the entire energy of the fuel is converted into hot flame without loss of carbon in smoke.

This is just one of the features of the radically different G-E oil furnace — another G-E achievement. And such men as E. D. Harrington, a '16 grad of Beloit College, helped to chuck tradition to the winds. He was closely associated with the entire development of the oil furnace. He's now Engineer of the new Air Conditioning Department.

95-954DH

GENERAL ELECTRIC