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# The Wisconsin Engineer

MEMBER OF ENGINEERING COLLEGE MAGAZINES ASSOCIATED

VOLUME XXXI NUMBER V

"I BUILT A BRIDGE"

PUBLISHED BY THE ENGINEERING STUDENTS
*of the* UNIVERSITY OF WISCONSIN

*February, 1927*

# The Wisconsin Engineer

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The Wisconsin Engineer
UNIVERSITY OF WISCONSIN

VOL. XXXI, NO. 5 MADISON, WISCONSIN FEBRUARY, 1927

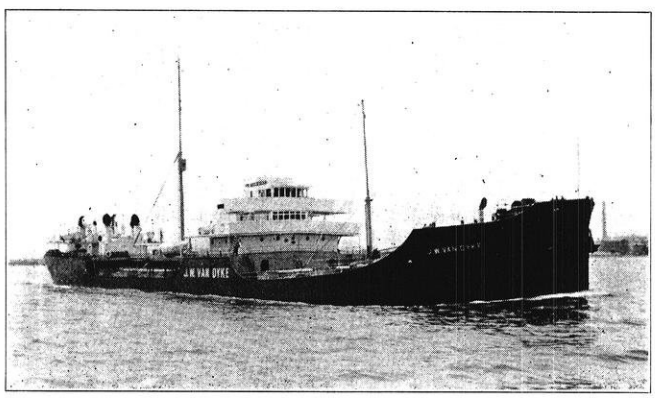
# SHIP PROPULSION

*By* W. B. BASSETT, e'09

*Head Propulsion Section, Westinghouse Elec. & Mfg. Co.*
*East Pittsburgh, Pennsylvania.*

YOU are invited to take a trip around the world with a party of young people who have chartered the good ship Badger State sailing on July 1st from pier #90, New York, at 4 P. M. The tour will include the Hawaiian Islands, Japan, China, India, the Malays, Egypt, Greece, Italy, France, and England — in 183 days of interesting and instructive sightseeing — 75 days of sailing. Such invitations as the above are quite common at the present day and so engrossed are we in the thoughts of other details of such a voyage that we do not consider what has made such an offer possible.

One seventh of the earth surface, we are told, is covered by land and these landed areas are separated by large bodies of water which form a natural barrier to trade and travel. The original form of travel by water employed the use of a log on which the traveler sat, and by means of his arms and hands acting as paddles, the log could be propelled about. The next step was to form these logs into rafts so as to accommodate a larger cargo and with increased safety. Then we come to the wooden paddle and later the sail.



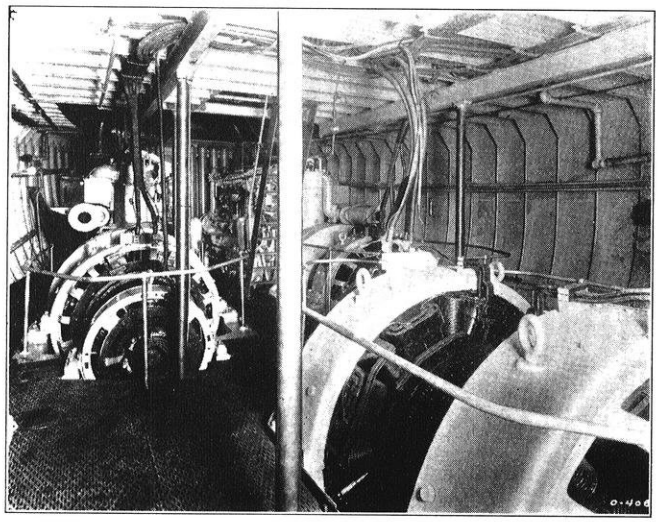
*J. W. Van Dyke, 60,000 Bbl. Tanker*

The next step was to build a boat by taking a large tree, hewing out a box-like section, shaping up the ends, lowering the meticentric height, and providing for larger capacity. Following this appeared the built up construction of wood around a frame with the keel as a base. From this the present design has been developed. For centuries the sail provided the accepted method of propulsion and it is only recently that power drives have supplanted the sail. A review of the shipping records of the U. S. will show that in 1877 there were about 27000 vessels of all types of U. S. Registry. Of this number all but 300 were sailing vessels. The total number of ships has changed but slightly up to the present time, but the method of propulsion has been one of rapid change. In 1914, however, there were still as many sailing vessels as power vessels. Today, the situation is just the reverse of that existing in 1877. In 1926 all but 3000 of the 27000 vessels are power driven. So you see more progress has been made in the last 50 years than has been accomplished the centuries prior. There was one very important development during the first part of the century about 1830, when a Swede by the name of Erricson, a brilliant engineer, invented the propeller which has played such an important part in power propulsion. Strange as it may seem, Erricson was forced to come to the United States to try out his patents after the design had been pronounced impractical by the British Admiralty.

The rapid strides in power propulsion immediately following 1914 was due largely to the World War under the conditions of which a sailing vessel could not exist. It is, therefore, easy to see that with this rapid change many different forms of power propulsion would demand a trial and we have the following types of power drives competing with each other for admittance to the marine field.

1. Direct connected reciprocating engine.
2. Direct connected turbine.
3. Geared turbine.
4. Turbine electric with direct connected motor.

5. Turbine electric with geared motor.
6. Internal combustion engine, direct connected.
7. Internal combustion engine, geared.
8. Internal combustion engine, electric using direct connected motors.



*Engine Room, Pennsylvania R. R. Tug.*

The space allowed for this paper will not permit a detailed analysis of each form of drive but will rather touch the high spots in an attempt to get a picture of the trend of the development of propulsion systems.

*Direct Connected Reciprocating Engines*

This form of drive has occupied a prominent place in the ship propulsion field and even today we find cases where it still is king when all the factors are considered. This applies particularly where cheap coal is available and where the operating season is shortened by weather or trade conditions. Other forms of propulsion are inherently more expensive but at the same time more efficient. Where cheap coal can be had, the fuel bill of the reciprocating drive is not such an important item, and the lower first cost means lower capital investment charges. The present tendency to improve the economy of steam drives by utilizing high pressures and temperatures has not been fully met and the progress in this direction, it is reasonable to suppose, will be met with improvements in other types of drive, so that the relative place of the various drives from the standpoint of economy may be relatively the same as at present.

*Direct Connected Turbines*

The steam turbine, as we all know, is inherently a high speed machine and its economy in operation depends upon its high speed. On the other hand, a ship propeller is adapted only to comparatively low speeds. While there have been quite a number of large installations on battleships and large liners, they have been made at the sacrifice of efficiency of both the turbine and the propeller and for this reason direct drive turbines have little standing in the propulsion field today. This leads us to the consideration of Geared Turbine Propulsion.

*Geared Turbines*

By placing a gear between the propeller and the turbine, we are able to accommodate the high speed of the turbine and the low speed of the propeller which results in a very much improved form of drive from the standpoint of fuel consumption. There were many geared turbine equipments applied during the war and owing to the pressure of war conditions and lack of previous experience certain details caused trouble and temporary embarrassment. The troubles, however, have been corrected in a positive way as evidenced by the service of gears built more recently. There should be no hesitancy in applying a gear of modern design and manufacture to this work. There has just come to my desk a report of inspection of the Geared Turbine ship, Manukai, owned and operated by the Matson Navigation Company, of San Francisco. She is a single screw ship of 5000 shaft horsepower and has made to date nearly 250,000 miles. The report states "The engine room and our equipment on this vessel is an exhibit, the equal of which we have never seen."

Geared Turbine drive will receive much consideration for high powered naval vessels where weight and space factors are of prime importance.

*Direct Drive Diesel Engines*

Since the war, the Diesel engine has rapidly come to the front, and now about half of the ocean going tonnage is being equipped with Diesel engines. The economic reason for the application of Diesel engines lies in the fact that the fuel cost is about one-half that of existing steam drive. Due to the slow speed the weight per H. P. of these direct-connected engines runs very high, but in spite of this handicap, direct drive Diesel engines are being applied successfully on cargo and passenger vessels as well as on harbor and river craft and should enjoy a prominent place in the present existing field. Diesel engines have also produced the urge for improvements in steam equipment.

*Electric Propulsion*

The term electric propulsion has been applied to a system where electric motors are connected to the propeller shaft, the power for these motors being obtained from the generators driven by one of the several types of prime movers. Electricity is beginning its march in the marine field as it has done in the field of industry and in the more closely associated field of transportation. For many years little thought, and much less study was given to the problem of applying electrical apparatus to ships. I know of no better way to show what has been done than to refer to table #1.

It will be noted that Electric Drive has found its way into a number of different classes of ships in combination with the Diesel engine as a prime mover.

*Turbine Electric Drive*

This type of drive has been made standard for Battleships in the U. S. Navy as it affords more posi-

*(Continued on page 164)*

# JAPANESE RE-CONSTRUCTION

*By* LEONARD S. SMITH

*Professor of City Planning and Highway Engineering*

I SHALL never forget the scenes of destruction that met my eyes last October as I inspected Japan's most important commercial city, Yokohama, and this was three years after that fateful earthquake and fire of September 1, 1923. It takes time to rebuild a great city provided you replot each block and replan and reconstruct its street system, its harbor, its waterworks, its sewer system, its 194 bridges, its schools, fire department, and other public buildings, and especially if the city is handicapped by lack of money.

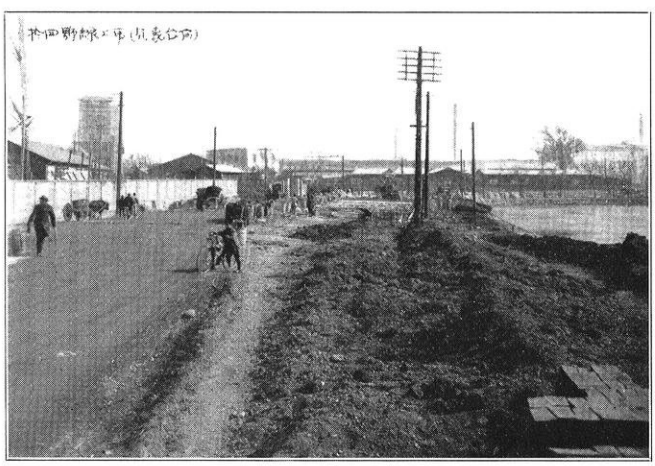
It takes time to take proper advantage of such an opportunity to replace an old city so as to be safe and convenient for modern conditions of business and traffic, and bitterly are the cities of Chicago and San Francisco regretting their short-sightedness in not taking advantage of a similar opportunity, for the widening of a single Chicago street has cost more than the widening of 27 miles of Yokohama streets. San Francisco too, being situated on an earth fault 2000 miles long will very likely some day have another opportunity of replanning itself. May it then have better vision than in 1906. The ruins in Tokyo and Yokohama were still smoking when the Government of Japan decided that the capital of the nation and the country's chief seaport should be rebuilt on modern lines. A law was passed prohibiting the construction in the ruined district of all buildings except those of a temporary nature, until such time as a suitable street plan might be prepared. This illustrates the advantage of a democracy governed by its highest rather than its average intelligence, and raises the question as to whether we Americans are not after all paying a very high price for our particular brand of democracy.

*Professor Smith has recently returned from the Orient, where he has been making a first-hand study of conditions in the cities of Japan, and especially in Tokyo and Yokahama. His study took him into various parts of the Japanese Empire, and he has presented in this article some phases of Oriental life which most of us have over-looked.*

*— THE EDITOR*

Viscount Goto, the mayor of Tokyo, immediately cabled on the day of the fire to an American expert in municipal affairs, Professor Charles A. Beard of New York City, asking him to come on next steamer and assist in preparing a general plan for the reconstruction of Tokyo. In a recent interview with Viscount Goto, he left no doubt in my mind as to the value of Professor Beard's services; his only regret being that the plan which they jointly conceived for rebuilding Tokyo was deemed too expensive to be carried out in all its details. The construction of a system of subways at a cost of $100,000,000, and the improvement of Tokyo harbor and canals at $25,000,000, and some other large items were necessarily abandoned for the time. Professor Beard's efforts were especially helpful in suggesting a definite financial plan for raising the $350,000,000 which it was finally agreed should be spent in replanning and rebuilding the nation's two great ruined cities.

Until I studied the subject on the ground, I had little idea of the difficulties involved in making the necessary land adjustments for the widening of nearly 200 miles of streets and the building of new streets.

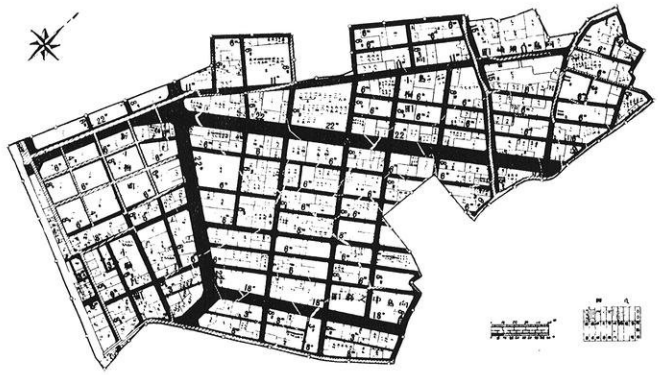


*Widening of street by filling in of Canal*

*Same street after completion, widened from 33 to 90 feet*

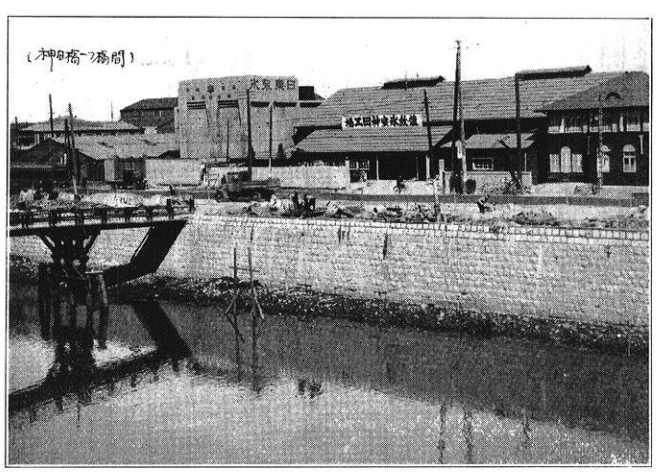
It involved the harmonizing of tens of thousands of land titles and also many land leases. It is most interesting to note that this was not done arbitrarily, as most Americans seem to assume, but instead in a very democratic way. The devastated portion of Tokyo, 15 square miles, or about one-half its area, was divided into sixty-nine districts in each of which the inhabitants elected a committee of 16 to 20 members to represent them before an equal number of governmental authorities. This committee first fixed the land values, then traced the new streets and then replatted the entire district. So far as possible, owners were given locations in the new plats similar to those they previously owned; and where the readjustment wiped out entire lots, as it frequently did, the owners were compensated with a similar lot in some other locality. Land values in Tokyo are very high, as much as $14.00 per sq. ft. and even higher. All land in excess of 10% condemned for street improvements is being paid for by the Government at the values determined upon by the district committee. In some cases the land owners and their tenants could not agree on the values of their respective rights; in such cases of haggling it was sometimes found necessary, in order to prevent delay, to remove both owner and tenant to a new location and let them fight it out at leisure.

*A section of Tokyo before replanned. Note the irregular and narrow streets.*



*The same section after replanned. The heavy black shows the new and the many widened streets (166 miles in all).*

In connection with this land adjustment, the city was also zoned into residential, commercial, and industrial districts. The zoning system covered besides Tokyo and Yokohama thirty-six other neighboring cities and villages; in fact, was a great regional zoning plan which in the case of Tokyo covered an area of ten times the area of Tokyo proper.



*New masonry walls on Canals in Tokyo*

So far, I have briefly covered only one item of the actual reconstruction of these great cities. Besides this, each city found it necessary to not only repair but also greatly extend its water works, sewer, and drainage systems. Complete new modern fire departments, new gas plants, and tramway systems, central municipal markets, all owned by the cities, were built as were the telephone, electric light and telegraph systems. The Yokohama harbor and the railroad terminals in both cities were either destroyed or greatly injured.

We Americans are short-sighted and provincial, for we are prone to judge foreign peoples by the lowest class of menials with whom we chance to be acquainted, the "wop", the "Jap", and the "Dago". Would we like to have foreign nations judge our civilization by the poorest class of American day laborers? Yet this is what we do most commonly. While in Japan I came in close contact with all classes of Japanese society, from viscounts to farm and day laborers, and a more courteous and kind-hearted people of all classes does not exist. They are not only polite and kind to the foreigner but also to each other. Indeed there is very much which we can well afford to copy from these neighbors of ours across the sea. Let us continue to help them as in the past, and also to learn from them the lessons of personal cleanliness and urbanity of manners.

The earthquake and fire did more than destroy the physical obstacles which had stood in the way of civic betterments. It has resulted in doing away with old customs and prejudices and thanks, largely, to Charles A. Beard's painstaking studies and reports, and to the cooperative Japanese leadership, has made room for a new city government properly organized for its new tasks and endowed with adequate powers, manned by able and honest public officials and supported by an intelligent citizenship. This greatest of modern catas-

*(Continued on page 178)*

# PORTRAITS TO BE PRESENTED AT ENGINEERING SOCIETY MEETING

*By* M. HERSH, *Sophomore Civil*

THE convention of the Wisconsin Engineering Society on February 17 will see the formal presentation to the College of Engineering of the portraits of Dean F. E. Turneaure and former Professor Storm Bull painted in Milwaukee last summer by Prof. Carl Marr of Munich, Germany. It was through the co-operation of more than 150 alumni and the faculty of the College of Engineering that the portraits were painted.

With the close of this year, Dean Turneaure completes thirty-three years of service in the College of Engineering. It was decided that this was an appropriate time to have his portrait painted. At the same time, to perpetuate the memory of former Professor Storm Bull, who was instrumental in the development of the College of Engineering, a painting of a photograph was made. The paintings will hang in the engineering reading room next to the portrait of former Dean Johnson.

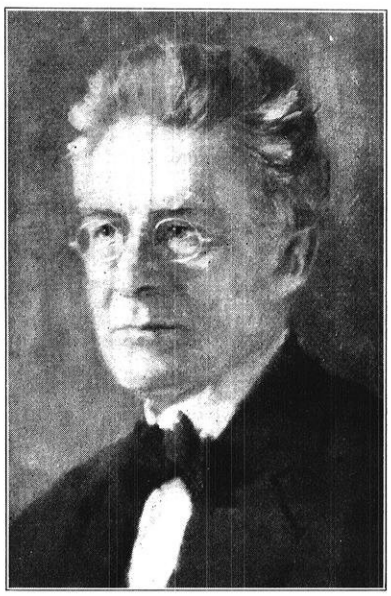
DEAN TURNEAURE

Storm Bull was appointed an instructor in 1879. He was twenty-three years old, and a graduate of the Zurich Polytechnic Institute, Germany. This was at a time when the College of Engineering was known as the department of mechanic arts. He was made assistant professor in 1885, and professor in 1886. Much of the progress of the College of Engineering in developing from a department to a separate school is due to Storm Bull. As chairman of the department in its infancy, his instructional activities covered everything from machine design and descriptive geometry to steam engineering.

When the College of Engineering was formally organized in 1888, Storm Bull was made professor of steam and gas engineering. He served in this capacity with distinction until his death in November, 1907.

Among the professors in the College of Engineering at present who were students under Storm Bull are L. S. Smith, professor of highway engineering and city planning; E. B. Maurer, professor of mechanics; and F. P. Woy, professor of engineering administration. Professor Smith recalls an amusing incident in one of the courses he took under Storm Bull. The students used to nod their heads while Professor Bull was lecturing. The nodding of their heads seemed to satisfy him because he thought that the students were understanding him when they did it. One day the students decided not to nod their heads at the next lecture. Storm Bull noticed this at the lecture and became quite excited over it. Suddenly in the middle of a sentence, he blurted out in his imperfect English, "Why you no nod heads?"

Mrs. Storm Bull is still living and resides in Madison. Storm Bull was a relative of Ole Bull, the famous violinist. It is said that Storm Bull was appreciative of good music and enjoyed art, and never missed an opportunity to hear a musical concert or failed to be present at an art exhibition.



STORM BULL

Dean Turneaure came to the College of Engineering in 1892 as professor of bridge and sanitary engineering from Washington University, where he was an instructor. He was made Dean of the College of Engineering and professor of civil engineering at the death of Dean Johnson in 1902. He was city engineer of Madison from 1900 to 1902, and has been director of the engineering experimental station of the College of Engineering since 1914. He is the author of several books and contributor to technical magazines, the most well known book probably being "Theory of Modern Frame Structures," in which he was co-author with former Dean Johnson and C. W. Bryan. Dean Turneaure has recently completely revised the book which is now in its tenth edition.

The artist, Professor Carl Marr, formerly maintained a studio in Milwaukee, but is now working in Germany. He came to America purposly to paint the two portraits. Before going to Germany to take up residence he was well known in Milwaukee, and many of his paintings are hanging in Milwaukee and in other cities in Wisconsin.

# Campus Notes

### PROFESSOR ROARK TO HUNT LIONS IN AFRICA

Prof. R. J. Roark of the mechanics department has been granted leave of absence for the semester, and with Dr. G. S. Bryan of the botany department will sail from New York on February 19 to explore and hunt in eastern Africa. They expect to be gone more than three months.


In the stop-off at London, England, before the journey, Professor Roark will visit the engineering laboratories at the University of London, which are famed for their work on optics. From London the men will sail for Tanganyka, on the eastern shore of the Red Sea, where they will fit out an expedition and march more than three hundred miles into the interior. Their objective will be a crater region which is reported to be rich in rare plants and animals.

Dr. Bryan will gather specimens for comparison with plant collections which he made in 1923 at the mouth of the Amazon in Brazil. Professor Roark will assist him in botanical work and both will hunt the wild life of the region with camera and gun, perhaps bringing down a lion or two.

---

### ENGINEERING SHOPS BUILD ELECTRIC CONTROL CLOCK FOR ATHLETIC DEPARTMENT

The electric clock, introduced this year to keep time during the football, basketball, and hockey games, is a product of the enginering shops and is due to the ingenuity of Mr. Romare, mechanician of the College of Engineering.

The clock is the outgrowth of a pacing device designed by Mr. Romare and used by the athletic department as an automatic pacing control. A bell rings for a moment at set intervals of time and thus can control the speed of the runner on the track. The bell can be set for intervals of one-half second to 180 seconds. A series of four electro-magnets and relays control the device, insuring accurate time intervals.

The clock is similar to the pacing device in principle. To stop it for "time out" in an athletic event, a switch can be used to break the electric circuit.

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### FACULTY BOWLERS MEET TO RE-ARRANGE SCHEDULES

The members of the engineering faculty bowling league met Jan. 12 to re-arrange teams and discuss plans for the rest of the year. It was decided that each member pay $2.50 in advance for the first five games of the new series and a similar advance payment for the remainder of the games. A committee, nominated to re-arrange teams, was composed of the following men: Doke (chairman), Tice, Schrader, Piltz, and Richtmann.

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### SOPHOMORICAL SOPHISTRY

Soph Civil: "Do you know Beck? Well, he just dropped 50 feet."

Frosh Civil: "What! 50 feet! Did he get hurt much?"

Soph: "H- -l no, it was 50 feet of tape!"

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### CASE ENGINEERING LOAN FUND INCREASED TO FINAL AMOUNT

The Archibald Case loan fund for engineering students was increased to $5000 when Dean F. E. Turneaure received $500 from Mr. J. Frank Case, New York City, consulting engineer and donor of the fund. This brings the fund up to the amount originally intended.

The fund, which is administered by Dean Turneaure, was established by Mr. Case in memory of a son, Archibald Williston Case, who was graduated from the course in civil engineering at the university in 1915, and who was killed in August, 1916. Many students are benefitted by numerous loans each year, which are generally repaid within a short time so that the money is again available for other needy engineering students.

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### A CHOICE OF TERMS

A track supervisor received the following note from one of his track foremen:

"I'm sending in the accident report on Casey's foot when he struck it with the spike maul. Now under 'Remarks', do you want mine or do you want Casey's."

---

Jacob Levin, c'27, was recently elected president of the University of Wisconsin Chapter of Avukah, American Student Zionist Federation.

### LECTURE ON LIGHTNING ARRESTERS FEATURES JOINT A. I. E. E. MEETING

"Lightning Arresters" was the subject of a talk given before a joint meeting of the student branch and Madison chapter of the A. I. E. E., January 17, by Mr. A. L. Atherton, of the Westinghouse Electric and Manufacturing company.

Beginning with the introduction of the valve type of arrester by the General Electric company about 20 years ago, Mr. Atherton traced the history of the lightning arrester to the auto type of arrester, introduced six years ago, which has become the outstanding device of its kind because of the facility with which it can be placed anywhere along the line.

The program was concluded with a film portraying the use of water power, "white coal", which was furnished by the Westinghouse company.

### A. S. C. E. ELECTS OFFICERS FOR NEW SEMESTER

The A. S. C. E. held its election of officers for this semester on Jan. 6. R. T. Homewood, '27, was elected president; L. J. Beck, '28, vice president; David Harker, '27, secretary; and Marvin Hersh, '29, publicity director.

Jacob Levin, '27, the retiring president, will continue as chairman of the program committee.

### THE CHEF MIGHT KNOW

Lawyer (sarcastically): "Don't you think you are straining a point in your explanation."

Engineer witness: "Maybe I am, but you often have to strain things to make them clear."

### PROF. D. W. MEAD HEADS MADISON KIWANIS

Prof. D. W. Mead, head of the department of hydraulic and sanitary engineering, is president of the Madison Kiwanis club for the present calendar year.


"Gus" Larson holds the honor for the most ingenious household invention of the past year. After many years of pumping his player piano, Professor Gus is sitting back and enjoying his music without having to work for it. He has connected his vacuum cleaner to the instrument and the cleaner does the dirty work.

### NEW INSTRUCTOR APPOINTED IN MECHANICS DEPARTMENT

Paul T. Norton, e'17, formerly secretary of the Case Crane and Engineering Company, Cincinnati, has been appointed instructor in the mechanics department. He will teach courses in mechanics and structures, taking the place of Professor Roark who has been granted a leave of absence. Mr. Norton's Madison address is 1529 Jefferson Street.

### SOPH ENGINEER TEACHES CORNET

Rudolph Lhotak, m'29, has been appointed to the instructional staff of one of the Madison conservatories of music. Lhotak is cornet soloist with the university band, and has had several years' experience in teaching and solo work.

## WHAT ABOUT SAINT PAT'S PARADE?

What about St. Pat's Parade? The feast of the honored saint is less than a month away, and not even whispered rumors of the celebration have been heard! With signs of an early spring and indications of dormant lawyers things look favorable for a real parade some where near the feast-day of the ancient engineer.

### "I BUILT A BRIDGE—"

I built a bridge,
Whose serried towers 'kist the wind-swept skies.
Span on span,
From shore to shore across the hissing tide.

I built a bridge,
With cable arcs cupping the skies vast blue.
Link on link,
Fading away like purple shadows dipped in far horizons.

I built a bridge,
From earth to sky against the eternal sun.
Truss to truss,
Of deeds my whole life girdled round.

And when the time shall come,
When I must cross that bridge my soul has built,
God grant that it stand firm!
Symbolic of a race that's run, a pathway to the stars.
No greater praise can men then confer:
"He built a bridge!"

*—R. D. Jordan, '27*

### NEW GAS METER TO AID IN CHEMICAL RESEACH

A gas meter with a capacity of 1200 cubic feet per hour has been given to the chemical engineering department by the Wisconsin Gas and Electric Company of Racine, Wis. The big meter will be used in researches now being carried on by the department in co-operation with the Wisconsin Utilities association to determine the proper construction of burners for industrial furnaces.

*(Continued on page 182)*

## SHIP PROPULSION

*(Continued from page 158)*

tive and quicker maneuvering. Also better protection to the machinery is afforded by separating the power plant from the propelling motors. This form of drive has also been applied to a limited number of cargo vessels, ferry boats, and one passenger vessel now building. All of these applications utilize alternating current with the one exception of ferry boats where direct current prevails. Maneuvering is accomplished by throttling the turbine and reversing by the electrical circuit pole changers. It is safe to say that turbine electric drive for other than large naval vessels will be confined in its application to a limited number of special types of ships.

Turbine electric with geared motor may be considered as a modification of the above and is employed where the advantages resulting from improved power factor of the high speed induction motor as compared with that of the low speed direct connected motor, justify the use of the gear.

### *Internal Combustion Engine Electric*

This is the latest form of drive to enter the field and its rapid development and application to many different classes of ships requires special consideration.

It is particularly desirable for use on vessels in restricted waters owing to its superior maneuvering qualities, its flexibility and pilot house control. The system comprises a Diesel or other type of internal combustion prime mover coupled to D. C. generators which furnish the electrical energy for the propelling motor or motors.

The system is controlled by variable voltage control in which the fields of the generators which are separately excited are varied and reversed thus varying the impressed voltage on the motors. This system provides a positive control from zero to full speed ahead or astern all at the will of the pilot. The prime movers run at constant speed and in one direction. The advantage of this system over systems using the engine room telegraph by means of which the pilot transmits signals to the engine room is readily apparent. The pilot is not dependent upon the engineer to carry out his orders. The engineers duty is to keep the engines in good operating condition.

The power plant is made up of two or more generators, any one of which may be cut out of the system when repairs are to be made, and the operation of the vessel can continue at the same time at reduced power by the generators in service. In the case of other forms of propulsion the failure of a unit renders the ship useless (except where multiple screws are used).

This system has been successfully applied to tugs, tankers, ferries, yachts, towboats, fire boats, hopper dredges, cargo ships, and a coast guard cutter.

While, so far, the applications have been in moderate powers, the system can be readily extended to high powered vessels.

Mention should be made of the use of electricity for auxiliaries on board ship. The possibilities of application of electricity to ships compare favorably in variety with those on land. Some of the more common items are, anchor windlass, steering gear, ventilation fans, pumps, refrigerating machines, evaporators, capstans, warping winches, cargo winches, space heaters, cooking, and ship lighting. The power for these auxiliaries is supplied by separate lighting and power sets.

Marked economy results from the use of electrical auxiliaries. In the case of cargo winches the ratio of fuel cost alone for electrically operated winches as compared with steam is in the ratio of one to seven or a saving of 85%. There are no long steam lines to maintain—no frozen steam pipes to delay the work of unloading or loading cargo. The electrical equipment is easy to maintain and always ready for its work.

A full article could be written on each of the subjects treated in this paper dealing with the problems of the application of power for ships. The object of our work is to furnish a higher degree of protection for life, property, and cargo, and to do this by the most economical means.

**A FEW ELECTRICALLY PROPELLED VESSELS**

| Ship | Power | S. H. P. | Type | Owner |
|---|---|---|---|---|
| Van Dyke #1 | D** | 370 | Tug | Atlantic Refining Co. |
| P. R. R. #26 | D** | 575 | Tug | Penn. Ry. Co. |
| Unknown | D** | 750 | Tug | Panama Canal |
| Richlube | D** | 350 | Tanker | General Petroleum |
| Unknown | D** | 1800 | Tanker | Atlantic Refining Co. |
| J. W. Van Dyke | D** | 2300 | Tanker | Atlantic Refining Co. |
| Poughkeepsie | D** | 300 | Ferry | P'keepsie-Highland |
| San Leandre | T§ | 1200 | Ferry | Key Route R. R. Co. |
| Yerba Buena | T§ | 2600 | Ferry | Key Route R. R. Co. |
| Virginia III | G‡ | 50 | Yacht | R. T. Durrett |
| Alcyone | D** | 350 | Yacht | H. W. Putnam |
| Aloha | D** | 670 | Yacht | Arthur Curtis James |
| Unknown | G‡ | 50 | Tow Boat | U. S. Engr. Corps |
| Gillette | D** | 100 | Tow Boat | U. S. Engr. Corps |
| Gouverneur | D** | 225 | Tow Boat | U. S. Engr. Corps |
| Jos. Medill | T§ | 500 | Fire Boat | City of Chicago |
| Graeme Stewart | T§ | 500 | Fire Boat | City of Chicago |
| Port Houston | D** | 720 | Fire Boat | Port of Houston |
| Sandmaster | D** | 1000 | Dredge | Constr'n Mat'ls Co. |
| W. A. McKenzie | D** | 1600 | Dredge | U. S. Engr. Corps |
| Dan C. Kingman | D** | 1600 | Dredge | U. S. Engr. Corps |
| Twin Ports | D** | 500 | Cargo | Patterson S. S. Co. |
| LaMarea | T§ | 2500 | Cargo | United Fruit Co. |
| Unknown | T§ | 4800 | Cargo | Bradley Transport Co. |
| Langley* | T§ | 5400 | Naval | U. S. Navy |
| Kamoi | T§ | 8000 | Naval | Japanese Navy |
| Lexington | T§ | 180000 | Naval | U. S. Navy |

* Ex-Jupiter, airplane carrier.
** Diesel.
§ Turbine.
‡ Gasoline.

NOTE: Vessels named "Unknown" are now in course of construction.

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*The world usually pushes a man the way he makes up his mind to go. If going up, it pushes him up; if going down, it pushes him down — gravitation, however, making the speed greater on the decline.*

—*Exchange*


**"AND THERE SHALL BE WAILING AND GNASHING OF TEETH"** In order to allay the fears of those of our alumni who live in the northern part of the state, it might be well here to say that the low rumblings and moaning noises that have been coming up to them from the South are not the effects of an earthquake or other great natural disturbance. Our university is still intact and the buildings and grounds are as serene and beautiful as they have always been. The rumbling noises have been occasioned by the loud groans of the students of the College of Engineering, and the lusty shouts of "I told you so" coming from the instructors, as exam week settled upon us. From the number of vacant chairs in the classrooms, it would appear that the earth had opened and swallowed a few of our classmates, but outside of that there were no casualties. A relief expedition is being rushed into the devastated area, and all cases of sore eyes will be handled at once in the traditional way.

For forty-five years, in the College of Engineering, exam week has been coming twice a year, as inevitably as death and taxes — and for forty-five years embryonic engineers have been getting their sleep in lectures and trusting in the Lord and a fast infield to write a decent final exam — and for forty-five years this semi-annual wail has arisen to the skies and the decks have been wet with the gore of these "innocent victims." And the instructors go slinking down the halls with the blood-lust in their eyes, thinking up new ways of putting the old stall about not having gotten the grades figured yet. And the Dean gets out his blue pencil and begins to cross names out of the Student Directory.

The pre-prom exams have again passed into history.

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**THE ROAD SCHOOL** The last month has seen another demonstration of the progress the State of Wisconsin is making in its good-roads program. Highway men from all parts of the state have assembled here in order that they may keep abreast of the new things in the construction and maintenance of our highways, and hear talks by the foremost men in the highway field.

Not only are the meetings held, but manufacturers of all types of road machinery and instruments have prepared exhibits for the occasion, and Capitol Square and Washington Avenue are lined with the most modern devices for the construction and maintenance of every type of highway. There are huge snow plows powerful enough, it seems, to move a house. There are motor scrapers that seem to contain every appliance and attachment known to the industry. There are great caterpillar tractors that lumber around the square occasionally, lurching as they cross the car tracks, and giving forth a clanking roar that would put a modern boiler factory to shame. And sheep-skin-clad men stroll about among the scrapers, and mixers, and whatnot, peering under this and into that, while attempting to withstand the arguments and persuasion of the high-powered salesman in charge of the apparatus. A meeting ground has been established where maintenance man may meet engineer, engineer may meet manufacturer, and ideas can be exchanged which may lead to the development of new devices, new uses for old ones, and a better understanding by all concerned of the problems being met in other branches of the new industry.

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**THAT LETTER OF RECOMMENDATION** A graduate who has been out of school for several years called on one of our faculty members recently and asked that the faculty man write a letter supporting his application for a certain position. The faculty man did his best, but his best was decidedly colorless. The graduate's scholastic record showed a preponderance of good grades with a fair scattering of excellents. The alumni card showed no record of outside activity; the man apparently was devoid of interest in any except his own private affairs. There was no indication that he would be an addition to the life and spirit of the organization to which he wished to attach himself. It was impossible to write a letter of recommendation that would glow with warmth and conviction when the record that the man had made here in college was in itself so lacking in warmth and color. *Moral:* What's omitted from the tracing will not come out in the blue-print

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**CLOCKS** A recent publication contains a very interesting tale of a large clock. This particular timepiece, it seems, is the center of the exhibit in a jeweler's window in the city of London. It is a handsome thing, this clock, with a beautiful mahogany case and a shiny brass pendulum. On its ivory face and inlaid in solid gold are the numbers of the hours of the day, and about the numbers twine exquisitely engraved ivy vines and beautiful flowers. But there is a strange thing about this clock, — it has no hands! Day in and day out it is seen running and can be heard to tick loudly — it does everything but indicate time, and that is the one thing for which the clock was made. The clock is compared to some people whose activity and loud ticking never count because they fail to accomplish anything — they have no set purpose in life and fail to keep time.

*(Continued on page 180)*

# Alumni Notes

Last month we ran Larry Sogard's sketch showing the specifications for a Railway Masonry Inspector. The following is taken from a letter from L. A. Schmidt, c'23. "I noted with interest my mutual friend, Larry Sogard's idea of what a "well drest" masonry inspector should wear, and I want to say that if any of our men left the office in the morning so scantily clothed, I would send them right back to get some more, becuz surely such regalia as that is would still leave them half naked. The following articles required in my party would help clothe the young man in fitting style:

1. They must carry a transit and level rod as well.
2. A 100 ft. engineer's tape, half thrown must be fitting over the shoulders, with arms placed between the 2 loops.
3. I see no place in Larry's sketch for at least 3 field books.
4. The parachute idea is good in places where sky hooks are unavailable.
5. In Oklahoma, no one is well clothed without a .45 automatic and a few rounds of ammunition for rattle snakes, buffaloes, etc.
6. "Horse shoe" brand is way too mild in this country where cactus is the prevailing chew.
7. A moustache is a sadly missing necessity.

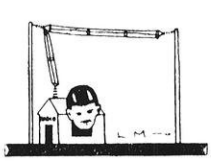
Larry's idea is a very good one so far as it goes, but I wish some one would put the artist's touch to the drawing and add the additional required articles in revised drawing. This would give a good idea for what a "dam engineer" carries."

Now that the civils have come thru with all the trimmin's to make this department as peppy as it should be, let's hear from the electricals, and the mechanicals, and the rest — keep the ball rolling — keep the department pepped up!

## ELECTRICALS

**Fairman, Floyd I.,** e'25 is Division Engineer with the Kentucky Utilities Company, Paducah, Kentucky. Mr. Fairman was formerly located at Beloit, Wisconsin.

**Guillemin, Ernest A.,** e'22 writes us that he is back in this country. "Well, I'm back again with a German Ph. D tucked under my hat and busy teaching Eddie Bennett's transients in the E. E. department at Technology here at Boston. I mix in a few German mathematical symbols for effect here and there and find the work quite interesting and inspiring — what more can a man ask? I sure found studying at a German university interesting because it's so different from the hard-headed way we go at it over here. Some time when I'm not so busy I'll have to write a little article on European educational systems versus our own. I have some pretty tough minded ideas on that subject. . . . I also have some tales to tell about mountaineering and skiing in the Alps that I'd write up if I only had the talent. I'm afraid it would read too much like an engineering report, tho, and that would spoil the romance."



**Kranz, Herman E.,** e'14, E. E.'17 has left the Western Electric Company to become Chief Engineer for the Grigsby-Grunow-Hinds Company of Chicago, manufacturers of radio equipment. Mr. Kranz resides at 703 N. Fifth Avenue, Maywood, Illinois.

**Holub, E. E.,** e'25, is engineer for the Wisconsin Public Service Corp., of Green Bay, Wisconsin. His address is 817 So. Webster Avenue.

**King, Kino,** e'24, is Chief Engineer for the Wisconsin Public Service Corp., at Green Bay, Wis.

**Knoerr, R. R.,** e'20, is electrical engineer for Knoerr & Fischer of Milwaukee, Wis. His address is 503 Milwaukee Street.

**Lardner, Henry A.,** e'93, is vice president of the J. A. White Engineering Corp., of New York. His address is 43 Exchange Place. Mr. Lardner is at present serving a four-year term as mayor of Montclair, New Jersey.

**Marx, C. H.,** e'24, is engineer with the Wisconsin Telephone Company, at Milwaukee. He gives his address as 915 1st Street.

**Meyrick, G. S.,** e'22 is in charge of operation of the power plant sub-stations and transmission lines of Wisconsin Public Service. His address is 418 S. Jackson St., Green Bay, Wisconsin.

**Rogers, Ross W.,** e'21 has changed his address to 408 S. Oak Park Ave., Oak Park, Illinois.

**Schleifer, A. C.,** e'08 has recently taken charge of the E. A. Lundy Company's mechanical department to direct the efforts of their eight offices distributed throughout the U. S. and Canada in furnishing engineering service in conjunction with the merchandising of cranes and other material handling equipment. His headquarters are at 373 Broadway, Milwaukee.

**Smart, John W.,** e'23 a former editor of the Wisconsin Engineer, is the father of a seven pound daughter, born January 17th, 1927. Smart is employed by the Electric Storage Battery Co., Marquette Building, Chicago, Illinois. His residence is at 446 Provident Avenue, Winnetka, Illinois.

**Works, L. P.,** e'19 is now in charge of the Electrical Department of Green Bay and Penninsular Divisions of Wisconsin Public Service. His address is 1025 Emilie Street.

## MINERS

**Dollmeyer, H. G.,** min'23 was married to Miss Martha Helen Bergland on January 1st, 1927, at Galva, Illinois. Their address is 596 Oakland Avenue, Milwaukee, Wisconsin.

## CHEMICALS

**Baehr, William B.,** ch'24 has changed his address to 360 Palos Rd., La Salle, Illinois.

**Cretney, Robert W.**, ch'21 announces the arrival of Wesley Myron Cretney on January 12, 1927. Cretney is with the Thermatomic Carbon Company at Monroe, Louisiana.

**Walker, Wesley .S**, ch'26 is with the Linde Air Products Co. at 169 Chandler St., Buffalo, N. Y.

## CIVILS

**Bradley, W. H.**, c'78, has moved from 110 N. Plymouth Boulevard to 667 S. Hoover St., Los Angeles, California.

**Christianson, C. B.**, c'22 has moved from 208 S. Front Street to 1117 Chapline Street, Wheeling, West Virginia.

**Foxon, Roy D., c'24** has left the Pennsylvania Highway Commission to take a position with the Wisconsin Highway Commission, at Wisconsin Rapids, Wisconsin.

**Gilman, Edgar Dow**, c'13, C. E.'14 has been elected president of the Engineers Club of Cincinnati. In January 1926 he was appointed Director of Department of Street Railroads and Motor Buses, and on January 1, 1927, was appointed Director of the newly organized Department of Public Utilities.

**Niles, Thomas M.**, c'23 has set out on the sea of matrimony. He announces his marriage to Miss Peggy H. Smith of Milwaukee.

**Parker, H. A.**, c'08 is division engineer for the Oklahoma state highway commission and county engineer for Tulsa county. After attending the national road show at Chicago he came to Madison to visit his brother E. E. Parker, c'07 who is city engineer here.

**Pulver, Harry E.**, c'10, C. E.'11, associate professor of Structural Engineering at the University Extension Division and G. A. Hool of the same department are editors of a new text book for vocational and trade schools, entitled "Concrete Practice."

**Robb, C. E.**, c'24 in a letter to Professor Van Hagan writes, "I have had the very pleasant experience of having my estimate for the 1925 motor vehicle fatalities stand up, after a year of buffeting by all my associates. I estimated a total of 22,800 fatalities for the year, and two or three months later an eminent statistician from the East estimated the total to be 22,500. Of course, my estimate was discarded and the higher estimated was used thruout the year. A week ago, the census bureau issued the final authentic figures which were approximately 21,900. As a result, my estimate of 22,800 for the year of 1926 is being generally accepted by my associates as "conservative and very near the truth." Mr. Robb is with the Public Safety Division of the National Safety Council, 108 East Ohio Street, Chicago.

**Schmidt, L. A.** c'23 has moved from Pineville, Kentucky, to Okmulgee, Oklahoma, where he is Assistant Engineer on the construction of the Okmulgee Dam. His mailing address is City Hall.

**Schuman, E. C.**, c'24, C.E.'26, better known to his many friends about the college as just "Ev," is now with the Portland Cement Association as Assistant Research Engineer. "Ev" has his hangout at 4322 N. Langer Avenue, Chicago, Ill.

**Tesch, G. W.**, c'23, is in the Engineering Department of the Wisconsin Valley Electric Company, of Wausau, Wis.

**Tesch, W. J.**, c'23, is engineer for the Illinois Power & Light Corp., of Gausing, Ill.

**Tuttle, H. S.**, c'25 has located in Rhinelander and is platting and subdividing land in upper Wisconsin and Michigan.

**Youngberg, Adolf F.**, c'22 was married on New Year's Day to Miss Helen Johnson of Madison. Mrs. Youngberg is a graduate of the Milwaukee Normal School. They will live in Appleton, Wis., where Mr. Youngberg is a construction engineer.

**Zelade, E. E.**, c'26, is Junior Highway Engineer for the Wisconsin Highway Commission at Milwaukee. He is living at 1201 Water Street.

## MECHANICALS

**Arnold, Arthur**, m'26, is engineer for the Modine Manufacturing Company, of Racine, Wisconsin. He is living at 1111 Park Avenue.

**Barr, Carl**, m'25, is Field Engineer for the Public Service Company of Northern Illinois. His address is 304 Washington Blvd., Oak Park, Illinois.

**Edwards, Arthur W.**, m'25 a former member of the business staff of the "Wisconsin Engineer" was elected chairman of a meeting of recent graduates of this university, held on January 21 at the Hotel Sinton in Cincinnatti for the purpose of forming a permanent Wisconsin Alumni club in that city. The other engineers present were: Edwin E. Larson, ch'25, A. P. Rasmussen, m'26, John A. Rabbe, Jr., e'26, and Andrew M. Cowan, e'26.

**Flagler, L. A.**, m'26 is with the American Rolling Mill Company at Middletown, Ohio. He writes, "I am always interested in your alumni notes and turn to them first on receiving my copy. I wish that they may continue as I know other alumni are also interested in hearing of the whereabouts of their classmates.

"My work is with the Betterment Department here at Armco. It consists of the setting of bonus standards and improving labor methods. Our force has the run of the mill and access to any records or formula, a privilege that few in other departments have. The work proves very interesting and is far from boresome as some jobs get to be after the novelty is worn off."

**Hrubesky, Geo. F.**, m'24 is now doing experimental work in the new powdered fuel plant at Green Bay. He is living at the Y. M. C. A.

**Simpelaar, Clyde**, m'26 formerly of 500-38th Street, Milwaukee, Wisconsin, has changed his address to 633 Church Street, Beloit, Wisconsin.

**Phillips, Harry A.**, m'22 is with the Westerlin & Campbell Company. His address is 883 Massachusetts Ave., Indianapolis, Ind.

**Shoemaker, William T.**, m'26 gives his address as 45 W. Phil-Ellena St., Philadelphia, Pa.

**Verner, James C.**, m'26 has been transfered from the Massena, N. Y., works to the New Kensington, Pa., works of the Aluminum Company of America. He gives his address as Aluminum Club, New Kensington, Pa.

**Smith, Harold M.**, m'26 is in the Power Plant Design Department of the Standard Oil Co. at Whiting, Indiana. He resides at 336 Central Avenue.

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The world's deepest bore for oil, which is still in the process of drilling, has reached a depth of 7,200 feet. The well is being sunk on the Simpson Ridge anticline, near Laramie, Wyoming, and when the Dakota sand is reached it is expected that an enormous producer will be brought in.

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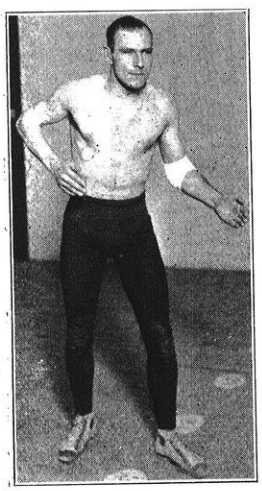
The construction of a bridge over the Mississippi at New Orleans is now practically assured — General Harry Taylor, chief of engineers of the United States Army having approved the revised application. The bridge will have a central span 130 feet above sea level, and there will be no interference with navigation. The railroad approaches will be more than a mile and a half in length.

# Athletics

## WRESTLING

Ever since the close of the football season, the wrestling squad has been drilled intensively, but light work-outs were held even before that time. Coach Hitchcock had a goodly number of veterans back, including "W" men, to form the nucleous of this year's team, which despite a raft of ill fortune in the shape of injuries to valuable men, looks very good. In the two meets held during the first semester, with Iowa and Illinois, the Cardinals came out second best, but in both cases some of the best men were not in good physical condition.

Wrestling is an art that requires the ability to stand severe punishment, as well as requiring muscular strength and intelligent application of hard studied principles. Besides, a grappler is entirely on his own resources during the whole continuous period of his bout. These heavy requirements prevent many men from enrolling in the sport and sometimes cause others to drop it when they discover that they cannot stand the gaff. It is to such a man's sport as this that engineers turn, and in it they have made a fine showing, helping to place the team one of the highest in the conference.



SPLEES
*Senior Electrical*

Of its sport representation the college is very proud to claim the wrestling coach, for George Hitchcock, himself a wrestler of no mean ability, spends part of his time instructing plumbers in the shops. Then, too, the captain of this year's team, Bill Splees, is a senior electrical. Last year he placed fourth in the 158 pound class in the conference meet, and this year has proven as good, if not better. Furthermore, at the Illinois meet, Splees, whose injured arm should have kept him from taking active part in the competition, finally persuaded the coach to let him wrestle, for the available substitutes in that class had small chance of success. In spite of the injury he went into the bout and made an excellent showing for the first few minutes; finally, however, the arm gave way and the captain fought a desperate but losing battle. Nevertheless, Bill Splees was the hero of the day.

Smitz, soph civil, is another up-and-coming engineering wrestler, in the 115 pound class. In his first conference meet with Iowa, he showed up very well, and altho he lost by a decision to the strong Illinois man, he looks like a dependable man. Max Brackett, senior electrical, has shown plenty of fight in his bouts in the 175 pound class, and did fine work. In the 135 pound group, engineers are represented by Sueho, soph electrical, and by Feldhausen of the same rating, who should show lively competition to others in their class. George Stetson is a promising candidate in the 125 pound division. Other engineers doing good work are Huber, Cappa, and Riviers, sophomores, the first two being electricals and the latter a mechanical. The College of Engineering is rightly proud of these representatives on the wrestling team, who are doing their bit for Wisconsin's athletics.

On the whole, the wrestling team has shown up well, and with a continuance of the good work on the part of the coach and team, and a fair share of the breaks, the team should round out as successful a year in 1927 as it did in 1926.

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## HOCKEY

Altho the hockey team suffered defeat at the hands of two teams, Minnesota and Manitoba, the scores show that Wisconsin has a strong sextet. It certainly was no disgrace to be beaten by the Canadian team, which is probably the best college hockey team in the world; and as for the Gophers, everyone knows of their strength. In the game with the University of Manitoba, Madison fans had a chance to see one of the finest exhibitions of real hockey playing that has ever been staged around here. It was a remarkably clean game, neither team being penalized, and the smooth clocklike team work of the Canucks made an unbeatable offense. In the first period the opponents ran up a score of five, but in the following periods, brilliant playing of the Cardinals, especially on the part of Captain Bill Lidicker, prevented an increase of more than two points. During the latter half, the Badgers played a strong defense game, and the 7 to 0 defeat shows, rather than a weak team, a team not quite so good as the best.

Engineers are doing their share in making a successful aggregation. The captain, William Lidicker, from Milwaukee, is a senior civil. He is, no doubt, the most outstanding player on the team; many times his quick thinking, lightning-like speed, and accurate shooting have saved the day for Wisconsin. At the position of left wing he is the most feared of the Cardinals by the opponents. Harold Ruf, junior civil from Green Bay, is another engineering puckster. Transferred this year to the defense position, from that to goal guard, he has proved to be a valuable man. Don Britton, junior electrical from Madison, is another strong candidate for

*(Continued on page 180)*

# Engineering Review

### MADISON PRODUCTS CAUSE COMMENT IN LONDON PRESS

A London, England, Sunday paper, of October 31st, carries an article regarding a refinement in the manufacture of aeroplane motors that is based on an engineering development by one of our Madison factories.

This article refers to the Armstrong-Sidley factories at Coventry, England, and describes the new Genet, five-cylinder, air-cooled engine, designed especially for light aeroplanes, the engine weighing only 150 lbs. and developing 75 horsepower. In describing the details of manufacture it goes on to say that the balance of the engine at all speeds is truly wonderful and that this is only made possible by the use of a new precision balancing machine, recently installed, by the use of which they can secure a positive balance of the crank shaft which is described as follows:

"When the crankshaft is placed in position and rotated, it is possible to tell by reading a delicate instrument at the side and a moment's calculation on a slide rule exactly where the shaft needs lightening — and not only that, but exactly how much should be taken away at that spot. By this method the job is done, and done better, in just one tenth of the time formerly taken. There could not be a better instance of how modern equipment can cut down cost of production and yet improve the result."

This balancing machine above referred to as such a mechanical wonder was developed and manufactured by the Gisholt Machine Company of this city, and the equipment used by the Armstrong-Sidley plant was installed during the past summer.

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### HISTORY REPEATS ITSELF

According to a recent press article, plans are being considered for a "ship railway" across the Isthmus of Tehuantepec, in the southern part of Mexico. This feat is being promoted by European capitalists, and plans have been drawn up by Messrs. Rudolf Wasserman and Heinrich Fastisch, eminent German scientific engineers. The estimated cost of the project is between $150,000,000 and $175,000,000. The completed plans have been laid before the Mexican Government, according to the report, and apparently now hinges upon the final granting of a concession by the Mexican Government.

The plan is not an entirely new one, and several times in the history of engineering in America it has been proposed, and almost brought to a conclusion, each time, however, being defeated by the almost insurmountable difficulties surrounding both the construction and the financing of such a gigantic project. At one time even John Eads, the great engineer, went so far as to draw plans for the ship railway, and in 1871 Professor Fuertes, of Cornell University, made a survey of the isthmus and reported that the scheme was very practicable and that conditions were very favorable to both the construction and operation of such a project. Again in 1902 Mr. A. E. Cheff, of Washington, D. C., published an article in the *Scientific American* heartily endorsing the plans and re-printing Captain Ead's plans and drawings.

The present plan calls for a considerable enlargement and expansion of the old ideas, due to the increase in size and length of ships, the pulling power of locomotives, the advance in track design, and to the general advancement of the science of engineering. Where eighteen of the old-style locomotives would have been required in the old days to haul a much smaller type of ship over the isthmus, it is now planned to use six huge double-compound locomotives to haul ships that greatly exceed in size those which sailed the seas in 1871 and even in 1902. The greatly increased size of ships has made necessary to the expansion of the plans in regard to width of the roadbed — where formerly it was planned to have six sets of rails, it will be necessary to have thirty rails to carry the huge ships, and the width of the roadbed will be approximately 190 feet. Captain Eads' plan called for a curve, at one point of the system, with a ten-mile radius, to allow the handling of ships up to a thousand feet in length. The present promoters of the plan, however, plan to have a huge turntable at this point, which will enable them to take advantage of a broad and level canyon through the Sierra Madros.

The contemplated railway, if completed successfully, will prove a keen competitor to the Panama Canal which, at the present time, is reported to be working at full capacity. The charges will be less in proportion to those now being charged for passage through the present waterway, and the vessels will only be out of water about seven hours. Although the project, on the face of it, is somewhat fantastic, if it can be proven practicable the marine world will reward the pioneers whose courage carries it through to completion.

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### THE MILWAUKEE HIGH PRESSURE STEAM INSTALLATION

The article in the January number on the dedication of the Milwaukee high pressure steam installation has been criticised as being possibly misleading in regard to the size of the high pressure unit. The high pressure turbine has a capacity of 7,000 kva. but the steam

*(Continued on page 177)*

# THE EXPLOSIVES ENGINEER— FORERUNNER OF PROGRESS

The title of this advertisement is also the title of a motion picture film that illustrates the part played by men who move materials with explosives in the great industrial undertakings of our times. It shows how engineering methods have transformed blasting from an uncertain, hit-or-miss operation into a science based on mathematical calculations. It illustrates the opportunities in this newest branch of the engineering profession.

More than this: it takes you behind the scenes in the great testing laboratories maintained by the United States Bureau of Mines and by one of the largest manufacturers of explosives, and shows you the exacting care with which explosives are tested in order that the tools of the explosives engineer may be as dependable as his figures.

"The Explosives Engineer—Forerunner of Progress" is contributed to the cause of industrial education. Together with another new Hercules film it will provide an evening of dramatic and instructive entertainment.

The other new film dispels the mystery that has heretofore surrounded the manufacture of electric blasting caps. This film clearly shows the manufacture and features of the Hercules Electric Blasting Cap. It illustrates the marked advantages of the larger diameter cap shell, adequate water-proofing, and platinum bridge.

Upon request, either or both of these films will be loaned without charge. Please let us know the date on which you wish to make your showing and we shall forward one or both, prepaid. Kindly use the coupon.

## *HERCULES POWDER COMPANY*

*(INCORPORATED)*

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HERCULES POWDER COMPANY,
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I should like to show your film (or films):

☐ "The Explosives Engineer—Forerunner of Progress."
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*Please mention The Wisconsin Engineer when you write*

### ENGINEERING REVIEW

*(Continued from page 174)*

from its exhaust is utilized in low pressure turbines to generate an additional 30,000 kilowats. Since this steam is all generated in the high pressure boiler approximately 37,000 kilowatts are generated from the steam supplied by the new boiler equipment.

This is the second plant of this kind, the first being at Weymouth, Mass. In both plants steam generated at a pressure of 1200 pounds per square inch is expanded in a high pressure turbine from the initial pressure to a pressure of 300 to 325 pounds per square inch, and exhausted into a header from which normal pressure turbines are fed. The Milwaukee high pressure turbine is twice the size of those designed for the Weymouth plant.

### ICE FOR BENDING TUBING

The United Bureau of Standards has recently found that, in making coils or spirals of small diameter brass or copper tubing, ice assists satisfactorily. The tube to be bent is first filled with water, which is then frozen by being packed in salt and ice. After freezing, the tube, filled with ice, is bent into the desired shape. The ice is then allowed to melt and run out, leaving the tube clean, shapely, and empty.

### STEAM CORRODES IRON

Steam in the absence of oxygen attacks iron to a very slight extent at 650 deg. F. The action increases rapidly with the temperature so that serious damage may result in time at temperatures around 1,200 deg. F. It has been shown that in steam boilers, with an oxygen concentration in the water of less than 0.1 c. c. per liter, a small amount of gaseous hydrogen is evolved at a temperature of 585 deg. F. The amount evolved increases with the temperature within certain limits not yet fully defined. The action of steam on iron at high temperatures produces magnetic oxide of iron according to the reaction:

$$3Fe + 4H_2O = Fe_3O_4 + 4H_2$$

This is becoming a more important practical consideration owing to the present tendency toward higher pressures and superheating in modern steam power plants. Already, signs of deterioration have been observed in steel superheater tubes. It has been found that steel, wrought iron, malleable iron, and white and gray cast iron are all subject to attack, but that the high-chromium and nickel-chromium iron alloys are much more resistant under these conditions.

—*Mechanical Engineering*

### THE MATERIAL IN STEEL COLUMNS AFFECTS STRENGTH MORE THAN CHANGES IN TYPE OF CONSTRUCTION

In a recent report, the Bureau of Standards of the Department of Commerce give the results of tests recently completed on the column strength of various types of steel. The results obtained show that dif-

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### JAPANESE RE-CONSTRUCTION

*(Continued from page 160)*

trophes, which brought a frightful death to 100,000 people, destroying 200,000 homes and other buildings, together with all the public services of a great city, a total money loss of over a billion dollars is thus seen to be transformed into a great community blessing, resulting in most fundamental civic improvements that are making Tokyo a worthy capital of a great and progressive nation.

It has seemed to the writer that the effect of such a masterful handling of a city's destruction, the first instance of its kind in the history of town planning, might and should extend to communities far beyond the boundaries of Japan. May not indeed such countries as United States and Canada, whose annual fire losses exceed a half billion dollars, occasionally increased by such greater conflagrations as were seen in Chicago, Baltimore, San Francisco, and Santa Barbara, may not, I say, these countries study with profit the important lessons to be learned from the present reconstruction of Tokyo and Yokohama?

One hears it said that such a successful handling of a desperate situation was due to the *despotic powers* of the national and municipal authorities, and that, therefore, similar efficiency could not be expected in democracies governed by their average intelligence. To those who are familiar with the facts, it is hardly necessary to point out that Japanese officials do not have despotic powers, — that municipal governments in Japan are indeed very similar both in form and in substance to those of American cities. The federal government also is similar to that of England with a cabinet responsible to the people through a parliament of two houses. City aldermen and members of the lower house of parliament are elected by universal manhood suffrage. The Japanese constitution, in fact, does not confer upon the Emperor as great powers as those enjoyed by the president of the United States.

What then are the reasons why, under exactly the same conditions of destruction by earthquake and fire, San Francisco and other American cities have made such failures of their reconstruction, while Tokyo and Yokohama seize the opportunity to reconstruct themselves into model communities, and this too without precedents to copy? Discussion of this point would seem decidedly worth while.

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### RUSSIAN INVENTS NEW INSULATION MATERIAL

According to a recent dispatch from Leningrad, Russia, a new type insulating material has been invented by the Academician Joffe. The new material may supercede porcelain and other present high-voltage insulators. In a recent test, a piece one-twentieth of a millimeter in thickness successfully resisted a sixty-thousand-volt charge. The maximum resistance of rubber insulators is about one thousand volts.

## ENGINEERING REVIEW

*(Continued from page 177)*

ferences in the physical properties of material used in columns produce greater variations in the column strength than all the differences in type of construction. In the tests, sixty-nine columns were used each having H-shaped sections and constructed of steel having different specifications. These were tested under five different types of construction. The finished columns were tested to destruction in the 10,000,000-pound testing machine of the Bureau.

—*Contractors and Engineers Monthly.*

## ATHLETICS

*(Continued from page 172)*

the defense position. Besides the captain, who plays in the wing position, the engineers are represented by a junior mechanical, Roger Cahoon, from Baraboo. In addition, Gus Maasen, junior chemical from Milwaukee, and Jim Larson, soph civil from Racine are making a strong bid for positions on the regular sextet.

To the coach, Rube Brandow should go much of the credit for the excellent showing made by the pucksters. He did not assume his position until after the first of the year, when most of the other teams were going strong, but since then has devoted no inconsiderable amount of energy and time to building up the team and securing real competition, such as the University of Manitoba, for them. Having made a good showing against these strong teams at the beginning of the season, prospects for the other games look good and Wisconsin should finish the season well up on the list.

## EDITORIALS

*(Continued from page 166)*

It seems to us, however, that there is another type of person who has overcome this difficulty in a remarkable fashion. He is like a clock that has hands but no works. He is constantly figuring out fantastic schemes, bringing new things into vogue, and making the wise-cracks of the world — his hands are constantly pointing, but there is nothing back of them to direct the direction in which they point. They just point and that's all there is to it. He is usually a reliable person and can be trusted about as far as you can throw Bascom Hall with your left hand.

Other people are like tiny watches, watches which make no fuss and, from outward appearances, are without motion; but which, upon close inspection, prove to have hands that move and indicate the passing hours. Without any outward fuss or bustle, people of this type accomplish much because they have a definite purpose in life. You cannot hear their ponderous tick, because they do not work that way. They don't set all Langdon Street agog when they drive slowly along in a borrowed machine. To the world they fill a small place, but they fill it well and accomplish definite achievements.

## CAMPUS NOTES

*(Continued from page 163)*

### ST. PATRICK'S FIRST JOB

The expounder of legal wisdom was almost speechless as he gazed upon the scene of the Grand Canyon.

"Isn't it superb, wonderful, inspiring?" he asked his companion, a consulting engineer.

"Yep," responded the C. E. drily, "that was some excavating job."

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The sixteenth annual road school of the Wisconsin Highway Commission and the Wisconsin County Highway Commissioners' association was held in the state capitol, January 25 to 28, inclusive.

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### DEAN TURNEAURE'S BOOK GOES INTO TENTH EDITION

Dean F. E. Turneaure's book on "Modern Framed Structures" has just gone into its tenth edition, having been thoroughly revised and partly re-written.

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### BEDTIME STORY FOR ENGINEERS

In the valley of Calculus, close by the river of Arsenic, lived a little slide-rule, by the name of Log-Log. Little Log-Log went out hunting for integrals one day, armed with his trusty double-barreled Lefax. After looking for tracks for a long time, between the limits of zero and raspberry pi, he suddenly came upon a wild integral feeding on a dyne bush. The ferocious integral became enraged at the interruption and charged at poor little Log-Log. As he came thundering through the dense underbrush (density is inversely proportional to the square of the distance from negative infinity) he roared and growled his battle cry of "Heterodyne your signals to one frequency." Little Log-Log stood ready with his Lefax, and was prepared to use his self-spilling fountain pen in case of a hand to hand struggle. As the charging integral came within ten millimeters of where little Log-Log stood, Log-Log pulled all 27 triggers and fired into the integral's third quadrant. The enormous power of the Lefax which was heavily charged with trigonometric and logarithmic tables, spun the integral about his y-axis and sent his moment of enertia flying along a sine curve into the fourth dimension. Little Log-Log restored his trusty Lefax to his brief case and oscillated along the path to his home, dragging the inert integral by his polar co-ordinates. When he arrived home, his supper of broiled ohms and ionized ampere soup was waiting for him. Now, if you are all good little engineers maybe Uncle N. G. Neer will tell you some more of the adventures of the little Log-Log.

*—Armour Engineer*

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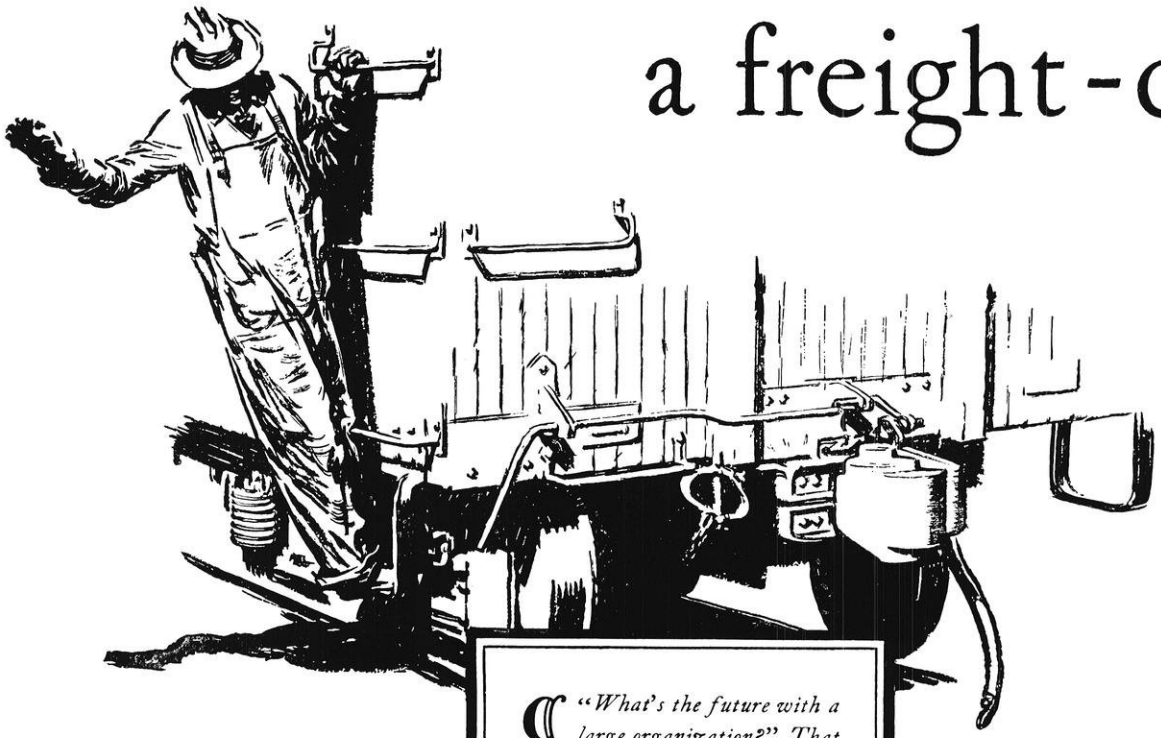
*A little nonsense now and then is relished by the best of men.*

*—Selected.*

# His text-book was a freight-car



*"What's the future with a large organization?" That is what college men want to know first of all. That question is best answered by the accomplishments of others with similar training and like opportunities. This is one of a series of advertisements portraying the progress at Westinghouse of college graduates, off the campus some five—eight—ten years.*

CORLISS A. BERCAW

WHEN Corliss A. Bercaw went down to the tracks to get facts for his thesis in 1918, he was only following a lifelong habit.

From the time he was old enough to delight in the shrill whistle of a locomotive, through his student days at California Institute of Technology, the most fascinating thing in the world to him was a railroad train.

It isn't just happy chance that, at 29, he is a Sales Engineer in the Transportation Division of the Westinghouse Company, at Philadelphia. And it was quite natural that Bercaw should have an important share in the negotiations involving one of the most revolutionary transportation developments of the century—the development of the gas-electric rail car.

This design provides locomotion within the passenger car itself. So on many branch lines locomotives can be discarded with great saving to railroad companies and with increased convenience to passengers.

But to perfect this new car required thorough cooperation between the Westinghouse and Brill Companies, whose engineers supplied, respectively, the electric generator and gas engine which, combined, give this car its practical advantages. Bercaw acted as liaison man during this development stage, and now he is engaged in selling, among other things, these cars, representing the newest idea in railroad transportation.

When Bercaw entered the Graduate Students' Course at East Pittsburgh in May, 1919, he was fresh from college—and naval aviation. His enthusiasm for railroading was not allowed to cool—he wasn't shunted into unfamiliar lines. For thirteen months he was a student in the Railway Shops. Then for six months in the General Engineering Department he learned how to apply Westinghouse Equipment to railroad needs. It was a logical step next to the Heavy Traction Division of the Sales Department at East Pittsburgh. And two and a half years there landed him in his important work in Philadelphia.

To men who find a railroad train fascinating, Westinghouse opens a field that has unlimited opportunities for success.

**Westinghouse**

WESTINGHOUSE ELECTRIC

*Please mention The Wisconsin Engineer when you write*