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The WISCONSIN ENGINEER

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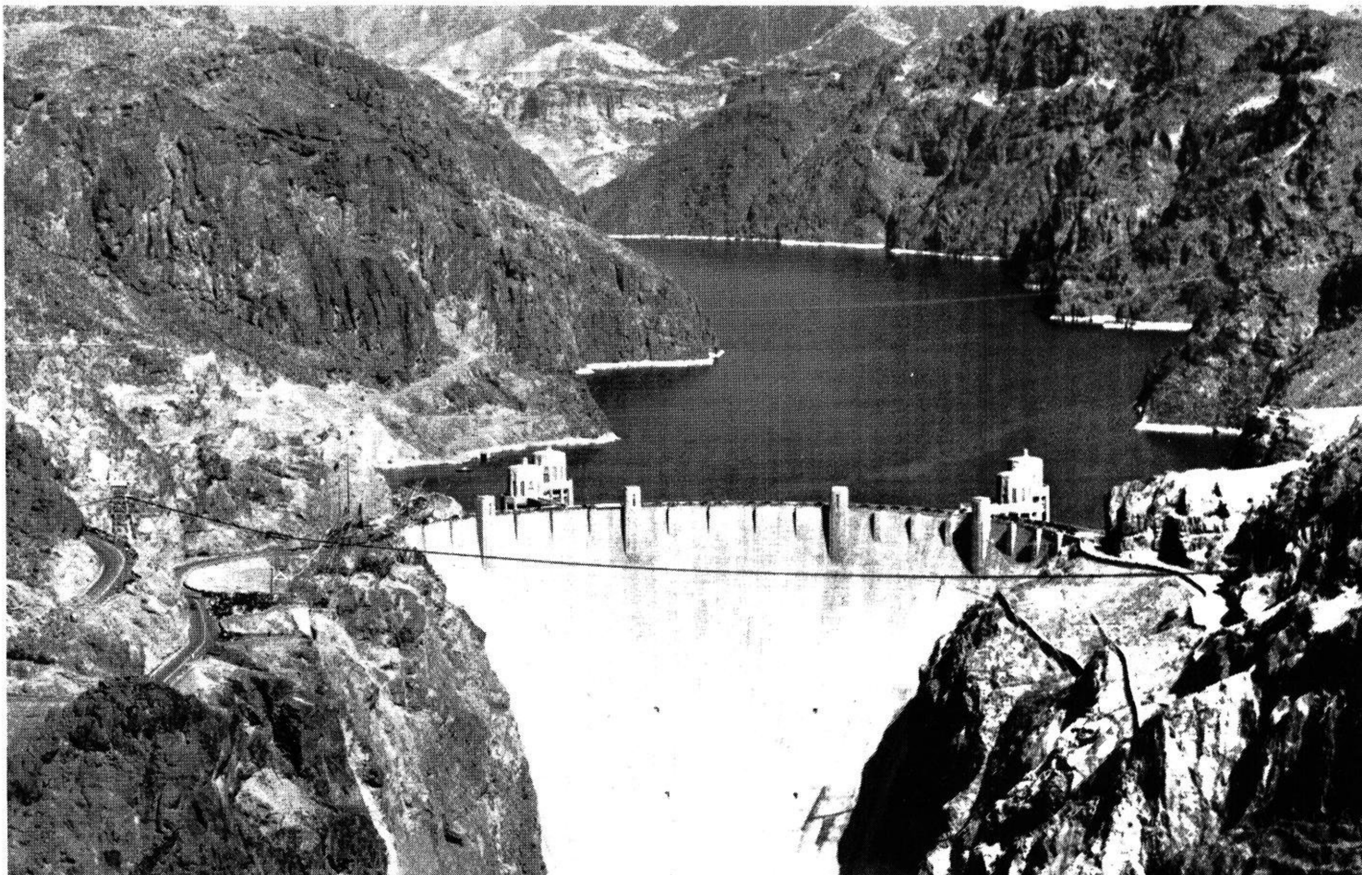

February, 1941 ★ **Tau Beta Pi Essay** ★ **Stress Analysis** ★ **Oil**

The WISCONSIN ENGINEER

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On The Cover . . .

BOULDER DAM lies in the mountainous Black Canyon the Colorado. Built at a cost of $120,000,000, it is an investment that will be repaid with interest to the federal government in 50 years.

It rises 726 feet above the floor of the canyon. The power houses that look so small down in the canyon are about two city blocks long and equal in height to a 20-story building. The pressure at the base of the dam is 45,000 pounds per square foot.

The white spray in the foreground is the testing of needle valves which 20,000 visitors witnessed. These needle valves, 8½ feet in diameter, were put in action on September 28, 1940, the fifth birthday of Boulder Dam.

Although there will be 15 large and two small power units installed, only six large and one small units are finished and in operation. The power plant will have a capacity of 1,835,000 horsepower, with each large turbine 115,000 horsepower and each small one 55,000 horsepower.

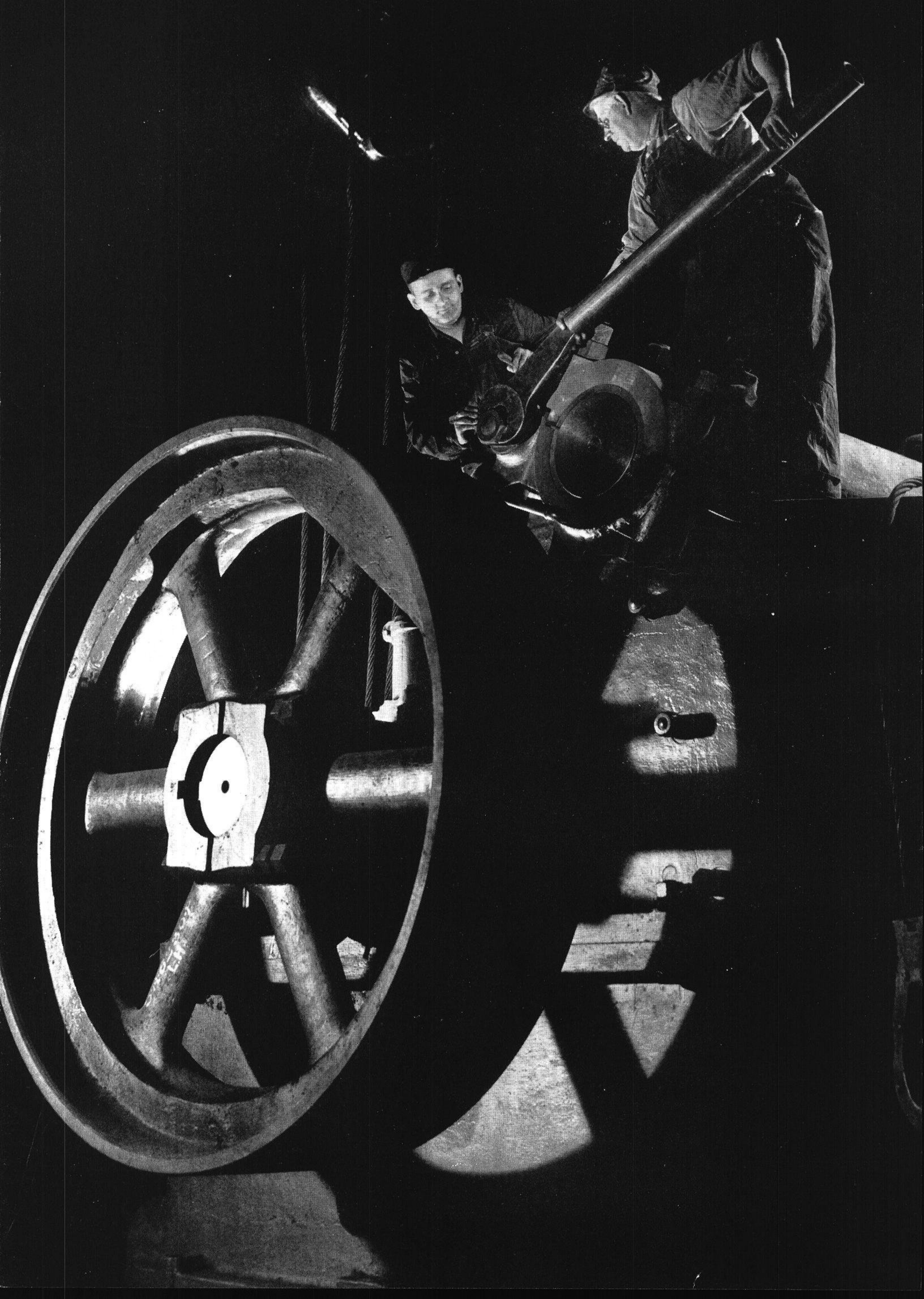
Boulder Dam, completed in five years, is an engineering achievement and an architectural masterpiece. Flood control of the Colorado, silt removal, irrigation, a water fowl refuge, and the generation of electrical energy are its major contributions.

(*Photo courtesy U. S. Department of Interior*)

In This Issue . . .

IN COMING ISSUES . . .

Engineers' Code of Conduct . . . Why Engineers Can't Sell . . . Exposition News . . . St. Pat Candidates.



Lost: The Key to Success

by Fred Webbere, min'41

This Is the Winning Essay of Those Submitted by the Recent Initiates of Tau Beta Pi

SEVERAL thousand young men will graduate from engineering institutions within the coming year. Several thousand young men will, on the eve of commencement, turn to themselves with the question, "Why?" Some will know immediately a very definite reason for pursuing such a highly technical field as engineering. Others, not finding justification so quickly, will shrug their shoulders, turn the question aside, and enter into their new life without a purpose. A noble few will tarry awhile to know the answer because they now realize that this answer might well be the key to success.

It is surprising to learn how few of these men can actually explain their presence on an engineering campus. This was certainly not their only opportunity. Engineering was not the only possibility for their future. They have made a choice! First of all they have chosen a profession rather than a vocation. Secondly they have limited their choice to engineering—one of a number of learned professions. And finally, though not so vital, they have specialized in a particular branch of engineering. Now a choice implies decision; decision reflects consideration; and the fruit of consideration is motive! These fellows must have a reason for spending four years in preparing an engineering career.

There are only a few reasons why an engineer should not be able to instantly justify his choice. He may have fallen into that group by accident. It is possible that this was the first type of work that occurred to him, and he humbly accepted his first thought without challenge. I say, it is possible! It may be that because of the advice or desires of someone else he willingly entered engineering not knowing exactly why. Or it may be that he actually had a very definite reason when he started, but perhaps he has been disillusioned; perhaps the opportunities he expected failed to materialize. He lost his enthusiasm, but continued his course merely because he began it. To these men we pass on the casual warning: Success in engineering requires purpose! Either know why you're holding that degree or hand it back; it won't do you much good without knowing!

Perchance our judgment is too rash, for there is one, and only one more reason why our young engineers are so indefinite when explaining their choice. Among the many explanations given for an engineering option are financial opportunities that it offers, industrial opportunities it affords, favorable aptitudes and qualifications of the applicant, or abnormal interest in practical applications of the properties of matter and power. These are good reasons—if well founded. The sad state is that they are not always well founded. Financial and industrial opportunities of engineering are not only personal factors but they depend on the economics of the times as well. Aptitudes and qualifications are difficult to determine at a precollege age, hence most of the weight of the final decision lies on interest. But without a thorough and accurate conception of what engineering is, how can one predetermine where his interest really lies? Furthermore, just how much is that interest dimmed by the drab routine of academic work?

The great need then, and it might well be the entire solution to our problem, is for more thorough vocational guidance; something that can describe a profession, predict its future with reasonable certainty, and bring to the inquiring youth a list of reasonable and informative qualifications. Many of the vocational guidance attempts that have been made do not do this. They present only vague generalities. But before the young man can make a decision he must know the nature of the work, the conditions under which the engineer lives, the localities prominent in the particular field. He must know not only the general requirements for all professions, but the peculiar demands of the field that he is considering.

There are too many misfits in engineering—men who undoubtedly could have been successful in other lines. But their choice was made early in life, and they had to stick to it. Had they a real understanding of the reasons for their occupational selection, their situation might have been a happier one. Had they the opportunity for effective vocational guidance, again the gain might have been theirs—and not theirs alone but the world's also. For such a man not only prevents a more competent one from occupying his position, but he withholds his maximum usefulness from a world that needs his best.

To prevent such occurrences we plead more efficient guidance for the prospective college student. It is difficult to change once the training has begun. And to those unfortunate enough to have completed their training without due consideration to the reason why: Take time out to become familiar with your decision; review your motive; for unless the evidence of decades fails, the key to a successful engineering career is purpose!

Let's Play With

Soap Bubbles and Airplane Beams

by Blake Wheeler, e'42

IN THE FIELD of mechanics it is a commonly recognized fact that beams will fail not only due to normal bending but due to lateral buckling or twisting as well. This is especially true in aircraft construction, because here it is desirable to use as wide and thin beams as possible for maximum strength with a minimum of weight. Although designed for normal loading these beams are frequently subjected to torsion as well. Realizing this about twelve years ago the Bureau of Aeronautics, Navy Department, appropriated funds for investigation of elastic instability at the United States Forest Products Laboratory. The two men who cooperated on this project were George W. Trayer, at that time connected with the Forest Products Laboratory, and H. W. March, professor of mathematics at the University of Wisconsin.

These two men did not have to start with the problems of normal bending of beams, or with torsion in beams of ordinary shape such as circular, elliptical, or rectangular, for mathematical equations had already been developed for these conditions. Beam sections such as I, T, U, Z, and L were those which hadn't been brought within the mathematical scope. Since applying torsion directly to the beam was an unsatisfactory method of testing, an experiment involving the use of soap bubbles was developed along lines discovered by previous investigators.

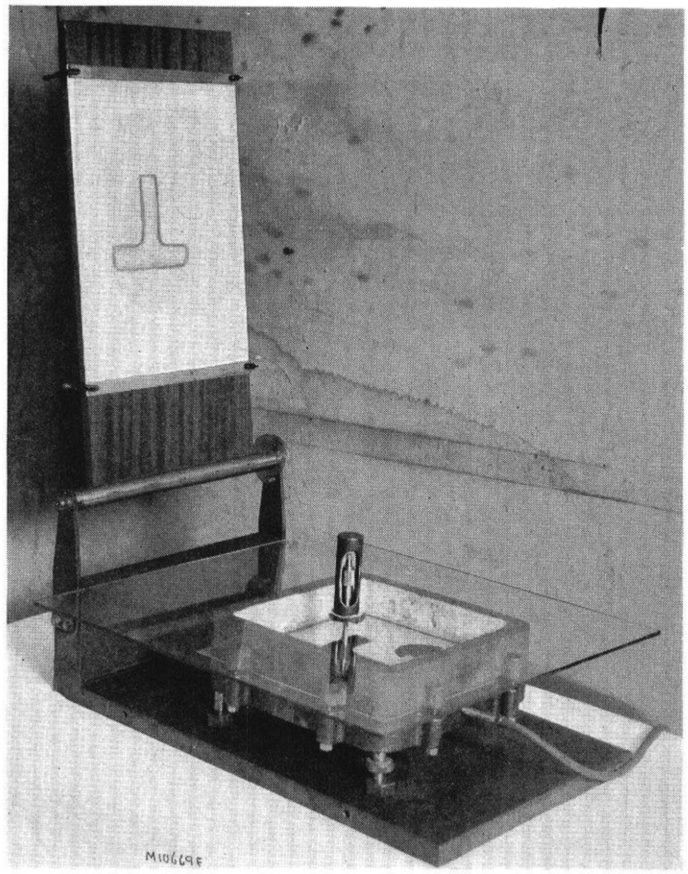
The use of soap bubbles in the determination of torsional rigidity depends upon the analogy between the torsion problem and the displacement of the film with a uniform pressure on one side. When a soap film with a difference of pressure between the two sides is stretched over a hole the same size and shape as the cross section of the beam it may be shown mathematically that the following points hold:

1. The shear stress at any point of the cross section is proportional to the slope of the film at the corresponding point with respect to the plane of its boundary.
2. The contour lines of the film represent the direction of the resultant shear stress at every point.
3. The torsional rigidity of the section is proportional to the volume between the soap film and the plane of the plate.

Apparatus then had to be designed on which the bubble could be formed and measured for slope, volume, and contour lines. The flat test plate for each type of beam was made of aluminum, approximately .05 inches thick. Two holes, one round and the other the shape of the beam section under investigation, were cut in the plate. The round hole was used as a basis of comparison since the rigidity and the stresses of a round shaft are easily computed. The hole representing the test beam was not necessarily the same size as the beam cross section, since it was known that the torsional rigidity of two geometrically similar sections vary as the fourth power of the corresponding linear dimensions.

In the actual test assembly (Fig. 1) the aluminum plate was clamped between the sides and the bottom of a cast iron box. The box was supported on leveling screws and if there were any humps in the plate they were weighted down so that the surface was absolutely horizontal. The iron box was covered with a piece of glass, through which a hole had been made for a micrometer gage. The point of the gage extended downward so that it could be adjusted to touch the bubble. Its height could be read to one one-thousandth of an inch. Provision was made for a greater air pressure below the test plate than above.

It is evident that just ordinary soap bubbles would not have sufficient tenacity to last while all desired readings were obtained. The solution found most satisfactory was



Testing a T-shaped Beam
—Photo courtesy Forest Products Laboratory

BUBBLES AND BEAMS make a combination rarely encountered in engineering. But here is an article which tells how soap bubbles have been used to find the torsional strength of airplane beams. The story is not a particularly new one, but it is always an interesting one. On these pages the author has attempted to write the story not only for the sake of popular interest, but as an explanation which technical students could appreciate.

Mathematical geniuses have failed to write solvable equations for the resistance to twist in beams. It was by purely fortuitous happenstance that the equations which represent the torsion of an elastic bar of any uniform cross-section are of exactly the same form as those which represent the deformation of an elastic membrane of the same shape under a slight, uniform pressure. In fact, these bubbles present the engineer with a complete picture of the distribution of stresses in a beam.

The invention originated in the aircraft factories of Great Britain during the first World War. Structural engineering as a whole has benefitted from this experiment, which, while but a minor contribution to engineering progress, exemplifies the happy result of original thinking applied to our familiar classroom studies of mathematics and mechanics.

made by adding a very small quantity of triethylamine oleate to a fifty per cent solution of glycerine in distilled water. Films of this substance would often last throughout an entire working day. The film was drawn across the holes with a strip of celluloid wet with the solution. The expanding of the bubble was accomplished by a column of water forcing air out of a burette into the closed space below the film. Air from the lungs was not used because the carbon dioxide would be harmful to the soap film.

When the bubble was blown up the micrometer point was set so that it just touched the film at some point. A paper tacked to a board hinged to the back of the apparatus was brought down parallel to the glass plate and a pin point on the top of the frame over the micrometer pricked a mark on the paper. With the micrometer still at the same setting the glass cover was shifted until the point touched the bubble at a different place. Following this procedure a contour line or a line of equal elevations was pricked out on the paper. The micrometer setting was then changed and another contour line traced out. As many lines as desired could be determined, ranging from the surface of the test plate to the top of the bubble.

To make the boundaries of the soap bubble correspond as nearly as possible to the boundaries of the hole, the edges of the holes were beveled at forty-five degrees and the plate laid with the sharp edges on the top. Although care was taken to prevent an excess of solution, edge effects still remained. The small errors due to them could, according to these experiments, be reduced by using as boundaries of the cross sections, contour lines near the surface of the plate.

The contour lines present quite an understandable picture of the section under consideration. The shear stress is inversely proportional to the distance between these lines when the represented differences in elevation are equal. The volume, and thereby the torsional rigidity of the specimen, could be determined by planimetering the contour lines and determining the volume between the planes by an average end method.

The birthplace of the experiments with thin membranes for determining torsion was in the Royal Aircraft Factory at South Farnborough, England, in 1917. Major G. I. Taylor, a military pilot as well as a skilled mathematician, first conceived the idea from the analogy previously noted between the equations for torsion in an elastic bar and those which represent the displacement under pressure of a thin elastic membrane. A soap film approaches very nearly perfect elasticity so it was chosen for the work. The design of the apparatus is credited to another South Farnborough man, A. A. Griffith. On the papers published by these two men, Messrs. March and Trayer based their experiments which resulted in more simple and adaptable equations.

Attempts had been made to determine the torsional rigidity of U, T, L, Z, and I beams by considering their component parts as rectangles. The more recent soap bubbles experiments showed these computations to be too small. The contour lines show a hump where the rectangles meet, indicating an increase in rigidity over the sum of the rigidities of the rectangular parts. In developing an empirical formula for torsion the problem is to find the constant, K, in:

$$T = KG\frac{B}{L}$$

Where T is torque, G is modulus of rigidity, L is length of the beam, and B is total angle of twist in radians. By obtaining data from these soap bubble experiments, this torsion constant was determined empirically for these frequently used beams.

The actual torsion tests, on beams such as these, yielded results considerable greater than those determined from soap bubble tests. This was attributed to two causes:

1. The stiffening effect of the blocks that were glued to the ends of all beams tested to make the end sections rectangular, preventing the warping of the cross sections that takes place in the twisting of all cylinders or prisms not of circular section.
2. The combination of bending and torsion caused by the fact that in many instances the axis of twist did not coincide with the axis of the figure.

Since the soap film provides a torsion constant that would hold under pure torsion, there is usually a certain margin of safety due to the way the ends of the beam are fastened.

Although most of these tests were conducted with regard to wood specimens the results would hold equally well for metal, taking into consideration the elastic properties of the two materials. Consequently this analogy between soap bubbles and torsional rigidity, first noted early in the twentieth century by the German scientist, Prandtl, has filled an important link in modern structural problems.

Drilling for Oil

by Don Uecker, m'42

OIL . . . lifeblood of a thousand legions of laboring engines, potential heat in millions of oil furnaces, father of dyestuffs and medicines, agent in a thousand industrial processes today . . .

The whole story of petroleum, from the dim, dark beginnings of the earth, through the first oil waterproofing of boats by the Sumerians, past the tireless inventor working on a gas engine, down to the latest improvement in high test gasoline is an absorbing and gripping saga. To the engineer, however, perhaps the most interesting phase is that dealing with the locating of the pools and the drilling of the wells.

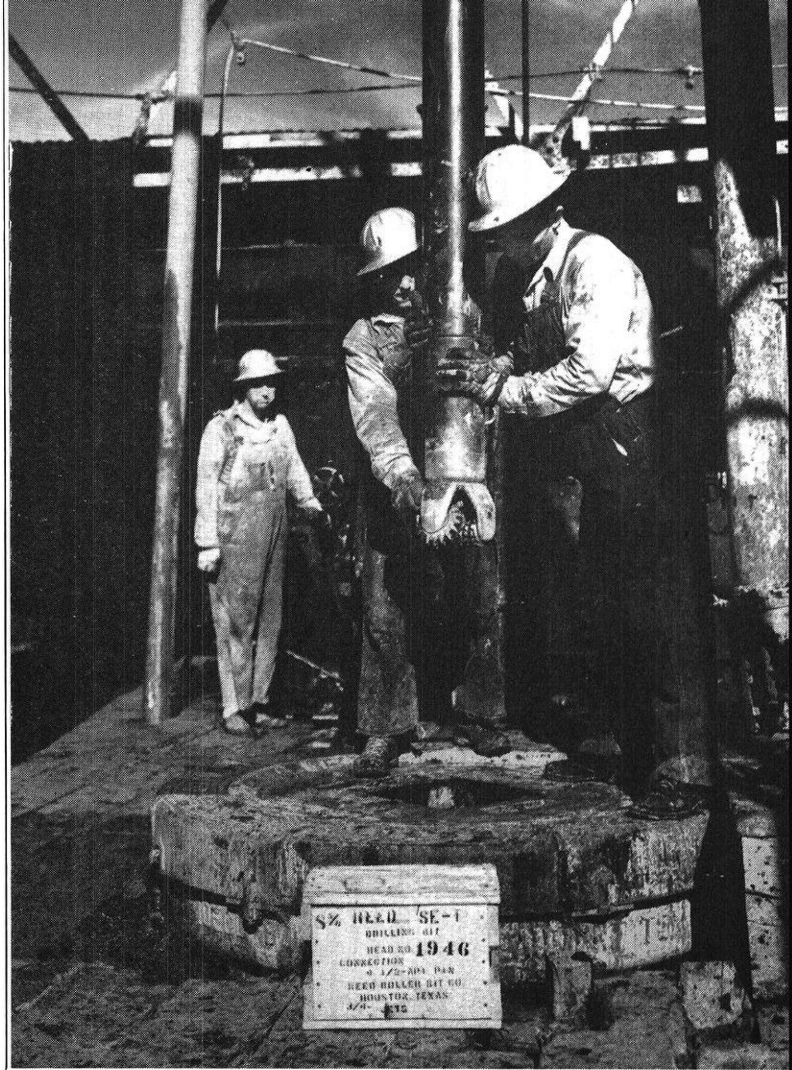
Way back in the childhood of the world, the sea was teeming with millions of tiny protozoa. The new, vigorous rivers upon the face of the earth were bringing down tons of sediment every minute, and as the protozoa died, their bodies were covered with a layer of silt which hardened to rock due to later coverings of sediment. There are two schools of thought on the formation of the oil, however. One says that the protozoa manufactured the oil like a bee makes honey, and claims that in specimens today one can see a little drop of oil clinging to the skeleton of the protozoa. The other school claims that the oil IS the protozoa, compressed and partially distilled. Anyway, through ages of the earth, thick layers of potential oil bearing rock were laid on the bottom of the sea and covered over. Now if the layers of rock just above and below the oil strata are impervious to water, conditions are right for the formation of an oil pool. There is one other requisite for a first class oil field. There must be some kind of a reservoir for the oil to collect in. An ideal type is a huge upward fold of the rock, called an anticline. This is the type most common in oil fields today. Another reservoir is formed if the strata are slightly inclined, and suddenly sealed off by a fault movement of the rocks. Now the water in the relatively pervious oil bearing rock layer is free to move around, and the protozoa, now little drops of oil, by courtesy of heat and pressure, are floated along until they come to the reservoir where they rise to the surface. In most cases some of the oil is distilled to natural gas, and gas pressures of eight thousand pounds per square inch are common. So now we have gas, oil, and salt water floating around in underground reservoirs, and the problem is to find the oil, drill for it, save the natural gas, and miss the salt water.

The location of wells in the early days of oil was mostly hit and miss. The prospector, finding an oil seepage, would drill and sometimes get oil, sometimes gas, and sometimes water. When competition became keener, the relatively scientific knowledge of the geologist was brought to play, and it is by means of the classified and indexed knowledge of the geologists that most oil is roughly located today. Having been told that at a certain location oil might be found, the prospector takes a shell drill bit and spots in. The shell bit brings up a solid cylinder of rock about an inch in diameter, and furnishes the prospector with a cross section of the earth's crust. Oil rock is usually identified by smell, feel, or appearance, but the oil sometimes runs out while the specimen is being brought to the surface, and its presence is not noted. In such cases, the prospector sends down a rod studded with evenly spaced electrodes, touches it against the side of the rock and checks the electrical conductivity of the different strata, oil bearing rock having low electrical conductivity.

Differences in the magnetic properties of oil rocks gave birth to still another kind of prospecting. A sensitive magnetometer is hooked into a radio circuit, and adjusted in a manner too involved for this author. The apparatus is then carried about a suspected field, and when the earphones say "click" in a certain tone of voice, oil is underneath.

Let us say a prospector has found one point in the oil bearing strata. That still doesn't help him much since he must determine its slope, depth, and direction. In the olden days these were shrewdly estimated, but more certain methods are now employed. As has been said, oil rocks have a different density than their neighbors, and sound waves travel through them with a different velocity. At the junction of two strata sound waves may be refracted or reflected. To make use of these phenomena, the prospector drills a fifty foot hole in the rock, loads it with a quart of T.N.T. and fires it. The vibrations are reflected and refracted on the rock strata below. These waves finally come back to the surface and are detected by sensitive seismographs scattered for miles around. When the waves die out, and data are plotted, and as often as not the whole underground structure is known, illuminated as it were by this huge underground "searchlight." This is one of the most popular forms of prospecting, since prospectors are often imposed upon for land options which may be worthless, and the above method takes only a half acre of ground. The seismographs are usually located on the public highways of the surrounding country.

From the time immemorial, workmen have used two methods of drilling into materials. The older is by driving in a sharp tool by repeated blows, as witness the hammer and nail. The newer consists of boring with a rotating tool as with a twist drill. Both of these methods are used in drilling for oil today. In the first, a bit made of very tough and durable steel, looking very much like the star drill, is hooked on a cable, raised two to five feet and allowed to drop onto the rock below. This process is repeated about thirty times a minute, sinking the hole with fair speed. The drill must be turned every other stroke to let the cutting edges get a fresh bite on the rock. Water seeps into the hole and mixes with the rock dust forming a heavy mud at the bottom of the hole. This must be removed if the drill is to function effectively. The bailer which is used is a piece of pipe with its closed end down, equipped with a valve which opens when it is touched to the bottom of the hole, allowing the mud water to rush in and be hauled to the surface. The engineering of a drilling rig is not simple. A cable six thousand feet long with a heavy bit at the end is close to breaking under static load, to say nothing of the shocks encountered in drilling. For drilling a 1,000-foot hole seven and a half tons of equipment are necessary. For a 5,000-foot hole the weight increases to four hundred tons, and becomes quite bulky. As the hole is sunk, it must be lined with casing pipe, and the stresses set up by the casing's own weight are high. Many kinds of threaded joints have been developed, but the most suitable method seems to be welding the casing as it is sunk into the hole. To facilitate fishing for broken tools, the driller often makes the hole larger at the top, and this introduces still other complications. The casing must fit the hole snugly on all sides to prevent the rock from caving in. To achieve this, the driller sometimes sets his casing and pumps concrete down the hole, which comes back up outside the casing and thoroughly fills all the spaces. The concrete in the casing is then drilled out. The bugaboo of all drillers is that, in spite of all his precautions and careful workmanship, the crust of the earth moves while he is drilling, shearing off his casing and cable, losing his drill and sealing off his hole forever.



Inspecting the Drilling Apparatus

Rotary drilling is the other method of sinking a hole. Here the cutting tool consists of a pair of toothed cones that are mounted at the bottom of the bit and revolve as the bit turns. For long life and little attention, they are often tipped with tungsten carbide edges. Since a twisting action is necessary, a cable connection is unsuitable and a pipe is substituted. The pipe used is about four and a half inches in diameter, thick walled, and comes in about forty-foot lengths. A single piece of this pipe may look rugged, but a miniature of the completed drill for a medium well could be twenty feet long, one hundredth of an inch in diameter, with walls less than a thousandth of an inch thick. Deep wells have been sunk only by a combination of careful theoretical analysis, practical experience, and plain luck. Since the stresses set up by the drill's own weight is considerable, the driller aims to keep the upper part of the pipe in tension while the bit is forced into the rock by the weight of the lower part. This method is much faster than the first, and holes have been sunk at the rate of one hundred feet an hour.

It is when a drill breaks, in spite of all precautions, that one may see strong men weep. A broken drill causes a delay of rarely under six months, and by that time, your neighbor may have all your oil drained out through his well. Here also one may see the ingenuity of the driller, for literally hundreds of fishing tools have been devised for retrieving lost drills. But "fishers" are specialists and charge well, so drill breakage is to be avoided at any cost.

The spotting in of an oil well is done carefully to insure a vertical hole. In spite of precautions the hole may drift hundreds of yards out of line, due to an imperfect bit, or strata of uneven hardness. In planned oil fields this is undesirable, since the wells are laid out according to a pattern to insure even oil flow. Many devices have been brought out to check the direction of a hole. One of the most simple is the lowering of a glass tube filled with hydrofluoric acid. It is left undisturbed till the acid has etched a line into the glass, raised, and read. A more spectacular method floats a compass needle in gelatin. To use it, one heats the gelatin to melting, lowers it in the hole, allows it to remain until it solidifies, and reads the deflection by the compass needle.

When nearing the pool of oil, extreme care must be exercised. The high gas pressure is valuable in forcing the oil to the surface, but it is extremely powerful and may wreck a whole drilling rig. To this end, a "christmas tree" is placed over the hole when oil is neared. The "christmas tree" is a large cone of steel, fitted with a gland at the top for the drill to act through and having valves at the sides to take care of the spurting oil. It is indeed a thrilling sight to see some gusher shoot hundreds of feet into the air, but a total lack of such waste oil is evidence of a well run field.

February '41 Grads on the Job

by Roy McIntosh, min'42

Chemicals

AHRENS, FRED W., is working in the Organic Chemicals Department of the E. I. du Pont de Nemours & Company, Wilmington, Del.
COOLEY, ALFRED B., is with the Goodrich Rubber Company, Akron, Ohio.
GOODMAN, ROBERT B., has a position with the Mosinee Paper Company, Wausau, Wis.
HARE, JAMES H., having received his commission as Second Lieutenant through the R.O.T.C., is awaiting call to active duty.
HASSELKUS, HERBERT W., is employed by the Bay City Malleable Company, Saginaw, Mich.
HIGLEY, KENNETH E., is a member of the Sales Department, Dugas Engineering Corporation, Chicago, Ill.
MENY, DONALD H., no report.
NICHOLS, GEORGE S., has a position in the R & H Chemicals Division, E. I. du Pont de Nemours & Company, Niagara Falls, N. Y.
PARKER, JOHN M., is located with the Goodyear Tire and Rubber Company, Akron, Ohio.
RASMUSSEN, JOHN K., is in the Research Laboratory of the American Can Company, Maywood, Ill.
RASMUSSEN, LESLIE E., is employed in the Engineering Department of the E. I. du Pont de Nemours & Company, Wilmington, Del.
REICHENBERG, HAROLD E., is in the Purchasing Department of Gimbel Bros., Milwaukee, Wis.

Civils

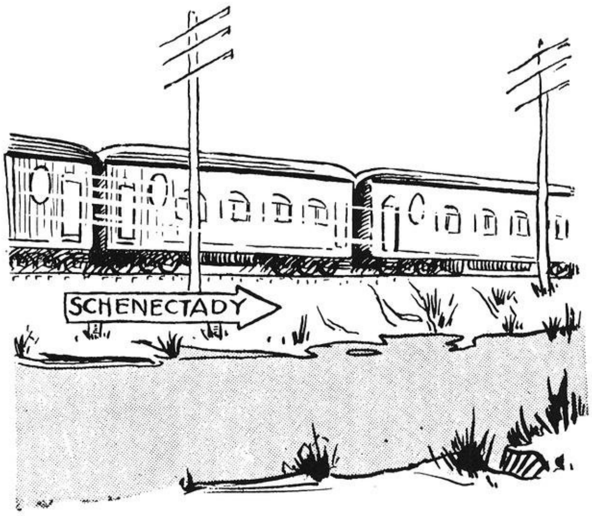
BREM, GEORGE F., JR., no report.
JOHNSON, EARL A., no report.
SOLOCHEK, NATHAN N., is Junior Highway Engineer with the Illinois Highway Commission.
TOWLE, CLAIR J., no report
VAN SICKLE, NORMAN E., has a position with the Johnson Service Company at the New York office.
WELLER, MARVIN E., no report.

Miners and Metallurgists

KEATING, JOSEPH M., is engaged in industrial engineering work at the Spring City Foundry, a member of Grede Foundries Incorporated, Waukesha, Wis.

Mechanicals

BENNEWITZ, ROBERT H., is employed by the Linde Air Products Company, New York City.
BERTHOLD, WILLIAM M., has a position with the Commonwealth Edison Company, Chicago, Ill.
BEYER, WALTER J., is employed by the Trane Company, La Crosse, Wis.
BRILL, EDWARD F., is with the General Electric Company, Schenectady, N. Y.
CHOREN, ANTON M., is employed by the A. B. Dick Company, Chicago, Ill.
CLARK, BURTON E., is with The Buda Company, Harvey, Ill.
ERBACH, WALTER C., no report.
FRERES, ROBERT N., has a position with the Goodrich Rubber Company, Akron, Ohio.
FRESCHL, EDWARD, JR., no report.
GRIEB, WILLIAM C., no report.
HACKNER, EDWARD G., is with the General Electric Company, Schenectady, N. Y.
HAMMER, FRED, has returned to his typewriter repair business in Milwaukee, Wis.
HELLER, ROBERT W., no report.
JACOBS, JOSEPH J., is employed by the Allis-Chalmers Company, West Allis, Wis.
KOLAR, ROBERT J., is with the General Electric Company, Schenectady, N. Y.
KURTENACKER, ROBERT S., has a position with the Gardner Machine Company, Beloit, Wis.
KUTSCH, HILBERT F., is with the Oliver Mining Company, Duluth, Minn.
LANGDON, ROY E., no report.
MOTHS, LYNN R., is employed by the General Foods Corporation, New York City.
NORDLIE, FREDERICK R., is an employee of the Gardner Machine Company, Beloit, Wis.
PANTHOFER, ERNEST H., is with the Perfex Company, Milwaukee, Wis.
ROSENBERG, WARREN B., has a position with the General Electric Company, Schenectady, N. Y.
SCHLINTZ, HAROLD H., no report.
VOIGHT, FREDERICK A., is with the General Electric Company, Schenectady, N. Y.
WAGNER, WALTER J., no report.



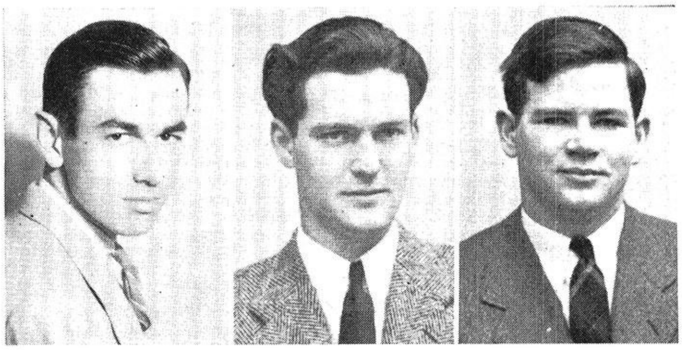
Electricals

BECK, GEORGE, is doing graduate work in electrical engineering.
BRADY, GORDON F., has a position with the General Electric Company, Schenectady, N. Y.
DAY, LEROY N., is an employee of the General Electric Company, Schenectady, N. Y.
GIGOT, ERWIN N., no report.
GROSCH, JOSEPH G., no report.
GUSTAFSON, RICHARD B., is with the General Electric Company, Schenectady, N. Y.
HEIDEN, CHARLES M., has a position with the General Electric Company, Schenectady, N. Y.
KIEFERT, HERBERT W., is with the Commonwealth Edison Company in Chicago, Ill.
LOSCHING, BERNARD H., is with the Schlueter Dairy Supply Company, Janesville, Wis.
LUKAS, CHESTER F., is graduate assistant in the electrical engineering laboratory at the University of Wisconsin.
ROHM, MILTON C., is employed by the Allis-Chalmers Company, West Allis, Wis.
SHEARIER, EARL L., no report.

Wisconsin Engineer Staff Changes

WITH this, our last issue, the executives of **The Wisconsin Engineer** relinquish their posts to the incoming administration. At the meeting of the Board of Directors on February 17, Homer Schneider, e'42, was elected editor, John Erwin, m'42, associate editor, and Harvey Schlintz, e'42, business manager. To these men fall the responsibilities that were ours for the past eight issues of this publication.

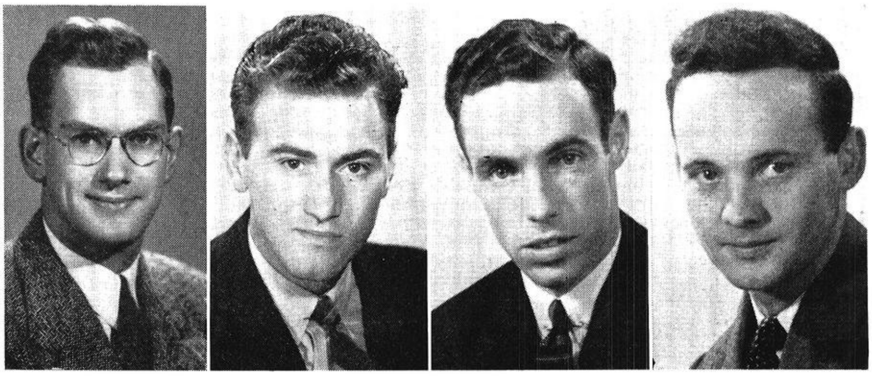
Having cleared out our desk drawers, we have a few words to say before leaving room 356, Mechanical Engineering Building. The experience, the contacts, the friendships, and the fun of producing a magazine have been ours. True, we could think of more pleasant things than meeting a deadline every month, but such events as working on the Exposition issue, attending the staff banquet, traveling to Arkansas for the ECMA convention, and reporting the senior inspection trip in Chicago will be remembered for a long time.



Schlintz Erwin Schneider

At this time we would like to acquaint you a little better with the newly elected men. Schneider, who was feature editor for the past year, comes from Wisconsin Dells. He was a member of the debate squad and Phi Eta Sigma while a freshman, and at the present time is active in Kappa Eta Kappa, professional electrical engineering fraternity; Eta Kappa Nu, honorary electrical engineering fraternity; and the Wesley Foundation.

The new associate editor, formerly campus news editor and editorial assistant, graduated from Wauwatosa High School. John's activities include the freshman tennis squad, Pi Mu Epsilon, honorary math fraternity and he is vice-president of Alpha Tau Sigma, engineering journalism fraternity. His summer work at Allis-Chalmers and his NYA job during the school year enable him to be practically self supporting.



Kuetemeyer Itzkowitz Keating Honigsberger

Harvey Schlintz, new business manager, is a Madison resident and the younger brother of Harold Schlintz, last year's business manager. Harvey has earned his new post by his work as advertising manager for the past year.

The glory and public recognition often go to the executives of the magazine, but there are always several staff members who work many hours on the magazine and receive very little credit for them. Tribute must be paid to four seniors: Walter Honigsberger, Joe Keating, Nathan Itzkowitz, and George Kuetemeyer, for their excellent service on the staff.

For three years Walt has been one of the chief cogs in each make-up of the **Engineer.** This work entails the taking of the galley proofs as they are received from the linotype setter and arranging the material with pictures and title so that it fits the space alloted to it. A graduate of Washington High School, Milwaukee, he is active in A.S.M.E., the Exposition, and is secretary of Alpha Tau Sigma.

For two years Nate Itzkowitz has exposed himself to bodily harm by writing the famed "Static" page. Nate's skillful adulteration of the "King's English" plus the use of his copyrighted jokes, and Troubleshooter news has made this page the favorite of the students. Nate was offered a bigger salary by the Octopus but refused to desert the **Engineer.** He is a member of A.S.C.E., Alpha Tau Sigma, Chi Epsilon, and he is self supporting.

Joe Keating, a February graduate in metallurgical engineering, was alumni news editor for the past year. Joe was active in the Mining Club, Union (con'td on page 20)

ALUMNI NOTES

by Doug Bainbridge, min'42

Electricals

ACKERMAN, ADOLPH J., '26, CE '33, is development engineer for the Dravo Corporation of Pittsburgh. He was the former head construction engineer for the TVA and is joint author with Mr. Charles H. Locher of a book fresh from the press entitled **Construction, Planning, and Plant.**

BERG, JOHN JR., '31, is with Douglas Aircraft in California.

BROBST, JOHN E., '03, who is managing engineer of the General Electric Company in Schenectady, New York, visited the University recently to speak to the seniors about the General Electric training course.

GERKS, IRVIN H., '27, has been ordered to active duty as Major in the Signal Corps Reserves at the Aircraft Radio Laboratory, Wright Field, Dayton, Ohio.

WALTER, CARL P., '38, answered the call of wedding bells to the tune of Miss Mary Stilwell. They were married at Fanwood, New Jersey, and he is now a Second Lieutenant in the United States Army.

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Chemicals

CEALGLSKE, NORMAN H., ch'28, MS'29, PhD'36, of the State University of Iowa has been appointed assistant professor of chemical engineering at Washington University, St. Louis, Missouri.

NIENOW, FLOYD W., '34, is trouble shooting in the technical service department of the Pennsylvania Salt Manufacturing Company, Philadelphia.

SCHWINGEL, C. H., ch'27, MS'28, PhD'30, now has the position of assistant manager in the lithograph and art department of the American Can Company.

Civils

ANDERSON, BOYD, '36, and **LUDOWISE, BEN F.**, '32, are working for the army engineer's building in concern with the new locks in Panama.

BARTZ, ELLWOOD L., '40, sailed on Nov. 28 for Honolulu where he will be on survey work for the U. S. Engineers Office.

BOLSTAD, JAMES W., '40, is employed by the Northern Pacific Ry., as chairman at Missoula, Mont.

BULLEN, PAUL W., '40, is instructor in drawing at the University of Minnesota.

CREW, LOUIS C., '25, is project manager near Camp Custer, Battle Creek, Michigan. This is a development of the Public Buildings Administration for the army.

HARVEY, STANLEY T., '36, is working in the stress division of the Boeing Aircraft Company at Seattle, Washington.

HERRIED, IRVIN C., '40, is junior civil engineer with the Civil Aeronautics Authority in the projects and surveys division, with headquarters at Washington, D. C.

HOWSON, LOUIS R., '08, has been nominated for the presidency of the American Water Works Association.

LYNEIS, CLAUDE A., JR., '33, is now with the Dupont Company as expediting engineer on the Charlestown, Indiana, project.

MIELKE, JOHN H., '40, is with the engineering department of the city of Waukesha.

MOHR, HARVEY W., '30, is statistical engineer in the safety division of the Wisconsin Motor Vehicle Department at Madison.

RUF, HAROLD W., '28, is in charge of the engineering division of the Grede Foundries Incorporated, Milwaukee.

SHOREY, EDWIN R., JR., '35, is now production engineer with the Shell Petroleum Corporation at Wichita Falls, Texas. He was previously located as mechanical engineer at Tulsa, Oklahoma.

VIERIEG, J. RICHARD, '35, has obtained the position as consulting engineer for J. L. McConnel in Chicago.

WILSON, FRANCIS C., '37, who was graduated as Master of Business Administration from Harvard in 1939, is now with the Geuder Paeskthe and Frey Company in the department of production scheduling at Milwaukee, Wisconsin.

Miners and Metallurgists

GEITTMANN, HERBERT C., '38, has been ordered to active duty as First Lieutenant in the ordnance division of the United States Army at Pickatinny Arsenal, New Jersey. He was previously employed as sales engineer for the Steel Sales Corporation of Chicago.

OCKERSHAUSER, TOM E., '36, has been transferred from the position as petroleum engineer with the Shell Petroleum Corporation at Tulsa, Oklahoma, to that of production engineer with the same company in the Houston District.

SWANSON, DARWIN E., '40, graduated from the United States Army Air School at Kelly Field, Texas, on February 7, 1941. He has entered a three year term of duty as Second Lieutenant in the Army Air Corps.

Mechanicals

COLLADY, E. B., g'09, has been advanced to the rank of Brigadier General and is commanding the 75th Coast Artillery at Fort Lewis, Washington. General Collady received his commission as second lieutenant in the regular army in 1910 and was advanced to the rank of Lieutenant Colonel in 1918. He now commands a mobile antiaircraft regiment which will soon be sent to Anchorage, Alaska.

CORP, PAUL M., '33, was formerly a sales engineer for the Lincoln Electric Company but is now welding supervisor for the Heil Company in Milwaukee.

McNIESH, ROBERT J., '40, who was with the Wisconsin-Michigan Power Company has now taken a position in the engineering and construction department of the TVA at the Fort Louden Dam Division, Lenoir City, Tennessee.

ENGINEERING CAGESTERS

HARLO SCOTT . . .

Varsity basketball man, honor student, and CAA pilot is Harlo Scott. A third year mechanical engineer, Scott is playing his second season of varsity ball. It was two years ago that he played his first basketball under Coach Bud Foster. Last year he was not out, but this year he has come back to earn one of the regular forward assignments.

Most exciting game of the year to Scott, outside of the overtime win from Purdue, was the Princeton game, in which he was given his first starting assignment. It came as a surprise to him, being announced only a few minutes before game time. "Sure took my wind away," said Harlo.

Scholastically speaking, Harlo had a 2.2 average last semester. At the same time he took CAA pilot training which entails going to night school. Don't ask us to explain how he does it.

Scott's plans for the future all hinge around the national draft. He would prefer to finish his schooling and his other year of competition, but his low draft number already has him slated for camp in June. Like the Badger fans, Harlo has his fingers crossed.

DONALD TIMMERMAN . . .

Tallest basketball player in the Western Conference and one of the three engineers on the varsity squad is Donald Timmerman. "Tim," as he is called by his teammates, is six feet, nine inches in altitude, towering above every man on the floor.

He has seen the fighting Badgers rise from the depths of a miserable season two years ago to the title contenders they are today. Tim's height and ability have made him a valuable pivot man during this trek to the top. Between Timmerman and Englund, all-conference center, the Cardinal goal has been ably protected all through the season.

Basketball is not his only sport. Don is also a member of Coach Jones' track team, where he has high jumped (six feet two) and broad jumped to many wins for the Badger tracksters.

Tim is a Sioux Falls, S. D., boy who came to study mechanical engineering, and who developed into a noted athlete. It will be many years before Wisconsin basketball enthusiasts stop talking about Tim and the way he could pick the ball right off the basketball floor.

FRED REHM . . .

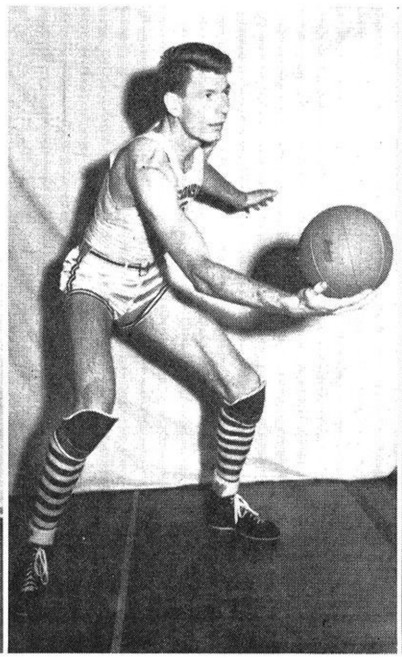
That whirlwind of the backcourt with the number 30 on his chest who pleases Badger followers no end by consistently snaring the rebounds off the backboard, is none other than Fred Rehm, a junior chem engineer.

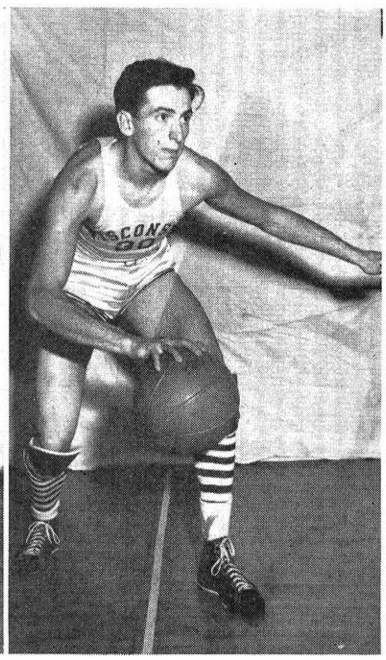
Only a sophomore, Fred has gained a regular starting berth on the varsity five.

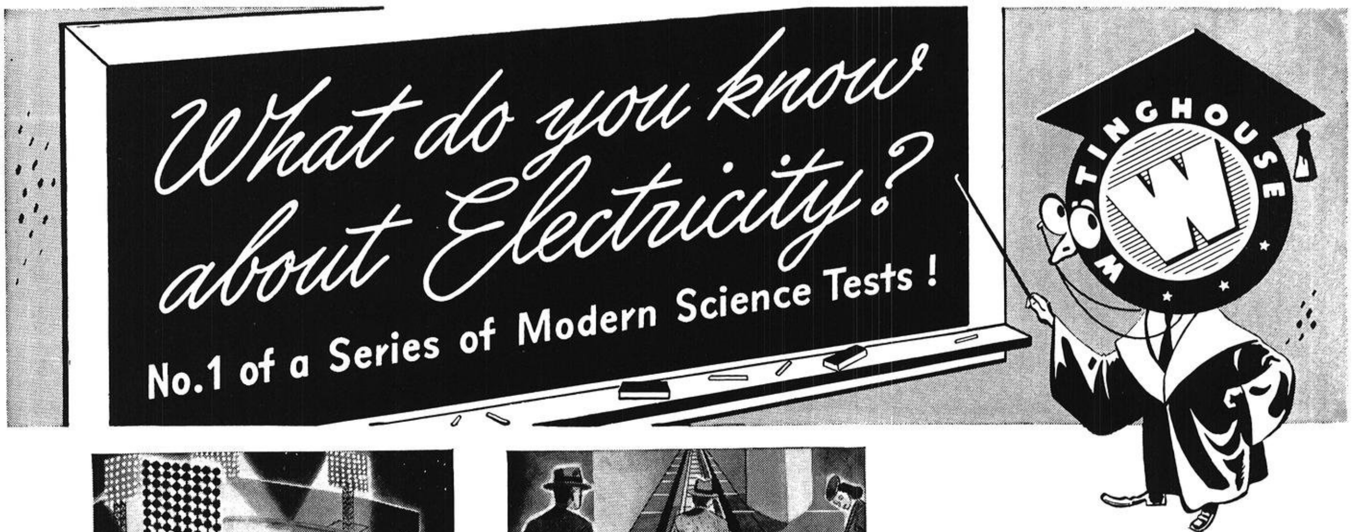
Rehm came to Wisconsin from Pulaski High in Milwaukee, where he was captain of the high school squad. A revealing indication of his personality and popularity is the fact that he was president of his high school class for all four years. He was also a star soccer player at Pulaski.

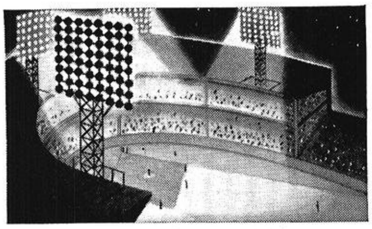
Reposing on a mantle at the Badger Club, where Fred lives, is a trophy which is awarded annually by Phi Eta Sigma, freshman honor fraternity. It was won for the Badger Club last year by Fred's scholastic achievements. Last semester he garnered a 2.5 average on a full schedule, while working and practicing ball at the same time.

Nineteen years old and a sophomore, Rehm has already carved a niche for himself. He will be a very valuable man to those Badger cagers for the next two years.





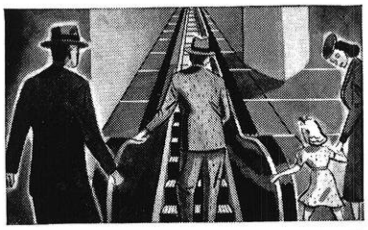




NIGHT BASEBALL

Six major league parks have been equipped by Westinghouse for night baseball. Each of these "8-tower" installations develops approximately the following amount of light:

1. 750,000 Candle power
2. 100,000,000 Candle power
3. 2,575,000 Candle power
4. 210,000,000 Candle power



LONGEST ELECTRIC STAIRWAY

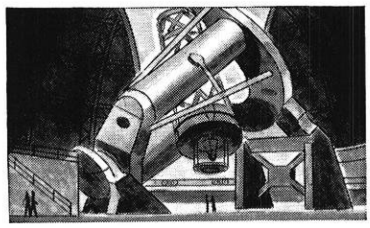
Two years ago Westinghouse engineered and built the longest electric stairway ever used in this country. It was designed to:

1. Save subway riders millions of steps.
2. Transport passengers to the top of the Empire State Building.
3. Carry shoppers from floor to floor in Macy's Department Store.
4. Transport World's Fair visitors to the inside of the Perisphere.

THE STERILAMP

Science has acclaimed the new Sterilamp developed by Westinghouse because:

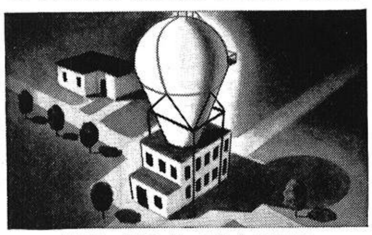
1. It provides normal daylight for classrooms, offices and factories.
2. It facilitates medical diagnosis of difficult pathological conditions.
3. It kills micro-organisms with ultraviolet radiation.
4. It extends the range of airway beacons.



THE LARGEST TELESCOPE

The 200-inch telescope for which Westinghouse designed and built the mounting is now being erected:

1. On Mt. Palomar, California.
2. On Bear Mountain, New York.
3. On Sankaty Head, Nantucket.
4. On a mountain in Aberdeen-Hoquiam, Washington.



THE ATOM SMASHER

The giant 90-ton atom smasher in the Westinghouse Research Laboratories is used principally for:

1. Testing the tensile strength of metal.
2. Measuring the impact of projectiles.
3. Conducting theoretical research in nuclear physics.
4. Providing high-voltage beam for deep X-raying.

THE TIME CAPSULE

The Westinghouse Time Capsule buried on the site of the New York World's Fair contains:

1. Various plans for universal peace.
2. A record of contemporary civilization.
3. Autographs of celebrities who visited the N. Y. World's Fair.
4. A list of the most important electrical inventions of the twentieth century.

Just a Word Before You Begin

Here's an opportunity to test your knowledge of electricity and measure your familiarity with important developments in the field of science.

Optional answers are provided for each of the six situations illustrated at the left. Your task is to select the one that's correct. So that there'll be no temptation to peek, the answers are printed below, upside down.

If you get four out of six correct your knowledge of electricity is average. Five out of six is good. If you chalk up a perfect score the class ought to vote you "most likely to succeed."

★ ANSWERS ★

Night Baseball .... Ans. 4.
Longest Electric Stairway..........Ans. 4.
The Sterilamp .... Ans. 3.
Largest Telescope .... Ans. 1.
The Atom Smasher .... Ans. 3.
The Time Capsule......................Ans. 2.

Westinghouse *"The name that means everything in electricity"*

ON THE CAMPUS

with Bob Diehl, e'43

EXPO DOPE

The weekend of March 27, 28, and 29 has been set aside for the 1941 Engineers' Exposition and all efforts are being directed toward the Mechanical and Mining Engineering Buildings, where the gala celebration will take place. Thus far 25 industrial exhibits, including Ford Motor Co., Dupont, General Electric, Allis Chalmers, Westinghouse, have been registered with the committee. **Final date for student registrations has been set for March 8, and all organizations and student exhibitors must get their entries in before the deadline.** The prizes awarded are:

Individual Student Prizes

1st	$15.00
2nd	10.00
3rd	5.00

Society Prizes

1st	$25.00
2nd	15.00
3rd	10.00

The attractiveness of the awards should merit the attention of any and all individuals and societies. The decision of the judges will be based on the originality, quality, and educational value of the exhibits. Societies should remember that their participation in the Expo will be repaid in proportion to the quality and number of their exhibits.

The St. Pat dance will be held on the eve of March 28, at the Memorial Union. Each society will select a St. Pat candidate, the winner to be determined by the sale of buttons and Expo tickets during the period of March 12-25. Victorious St. Pat will choose a queen and a court of honor of six manly knights. The number of tickets and buttons sold by each organization will be rated in proportion to the membership of the various engineering schools.

So get on the ball, fellows . . . arrange your exhibit . . . register before March 8 . . . get a date for the St. Pat dance and then you'll be all set for the Engineers' Exposition of 1941 . . .

PRIZES FOR TECHNICAL PAPERS

The American Institute of Electrical Engineers is sponsoring a prize contest for technical papers this Spring. The prizes will be $25.00 for first place, and $15.00 for second place. The rules are as follows:

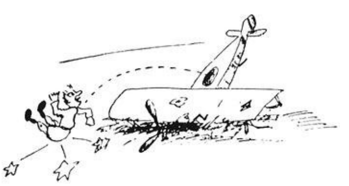
1. The contest is open to all enrolled members of the University of Wisconsin Branch of the AIEE.
2. Papers to be submitted must be original but can be on any technical subject related to Electrical Engineering.
3. Papers must be submitted in triplicate before April 14, 1941.
4. Basis of grading will be that specified below.
5. Final grade on paper will be determined by averaging the grades given by three judges.
6. Only those papers with an average grade of 50% or more will be considered for prizes.
7. Only those papers with an average grade of 75% or more will be considered for the first prize.
8. All those entering the contest must register with Prof. R. R. Benedict, 204 Electrical Laboratory, before March 1, 1941.

The basis of grading papers will be this: 10% for analysis of subject; 10% for logical presentation; 10% for its originality; 10% for its unity; 30% for the value in its field; and 30% for its value to Electrical Engineering.

STEAM AND GAS

Once again we find the usual amount of casualties at the end of exam period. Some flunks, some passes, and some "A's," but an education is being acquired by most of us. We walked down State Street one night during the crucial exam time, and saw not a single engineer out carousing. A very good sign, and we hope that same studious atmosphere will prevail most of the time. Not that we are prohibitionists, but after all, fellows, there is a national emergency, so the papers say, and we must all keep our heads clear.

Strangely there weren't too many engineers attending Prom, the biggest dance of the year (aside from the engineers' formal). Where were they all? Dunno, but it sure looked dead with only L and S students, teachers, and President Dykstra. Dick Jurgens has a swell band, but the real hit was Bob Strong, an up and coming young orchestra.



And the old story of aviation at Wisconsin. Now is the time, in view of the world conditions, to introduce a few good basic and specialized courses in aeronautical engineering. Wisconsin has always been with the leaders in all fields, and a good aeronautical school would help keep us up on top. Airplanes will win the present war, say the experts, and engineers to build the winning planes are needed badly. How about it, Wisconsin?

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ASCE

Held its annual election of officers on Thursday night, January 16. The new officers are Charles Belik, President; Melvin Ree, Vice President; Robert Hogensen, Secretary; and Willard Warzyn, Treasurer.

The next meeting will be held on February 27 at the Hydraulics lab. Announcements about Badger pictures will be made.

•

The Senate has passed the bill calling for compulsory ROTC for freshmen and sophomores at the University, and the bill is now being considered in the Assembly. We remain neutral in the controversy arising out of the relative merits and disadvantages of the bill at the present time. One thing we would like to know, though, and that is where, oh where, will all of the fellows drill? The Bascom reading room is crowded as it is!

•

Good bets for the future: Wisconsin has done a bang-up job in basketball this season, and now the boxing matches are getting under way. Ought to be some real bouts this season. The expo is only a month off, and the great dance following will feature the crowning of King Pat, the engineer with the best beard. So get your date, and let your beard grow long—the privilege of the engineer!

•

WISCONSIN IS SIXTEENTH

On the basis of full-time undergraduate enrollment for 1940-41, the College of Engineering of the University of Wisconsin ranks sixteenth among the 155 institutions reported in the December number of The Journal of Engineering Education. The 155 institutions report a total full-time undergraduate enrollment in engineering of 96,038. The top sixteen schools are as follows:

1. Purdue	3487
2. Texas A. & M.	3101
3. University of Illinois	2290
4. Georgia School of Technology	2198
5. University of Minnesota	2091
6. University of Michigan	2052
7. Mass. Institute of Technology	2050
8. Iowa State College	1956
9. University of California	1876
10. Ohio State	1800
11. Penn State College	1718
12. Virginia Polytechnic Institute	1695
13. Oklahoma University	1551
14. Northwestern	1483
15. Texas University	1476
16. University of Wisconsin	1472

S.A.E.

Chief item of business at the January 20th meeting of the S.A.E. was the election of a member to the Polygon board. Jim Rogers, an ME 3, was chosen to represent the organization, and though the choice was a difficult one, it was agreed that a good man had been selected.

In addition to this election, two members of the group, Ben Rowe and Frank Roberts, read papers on the "Super-Charging of Strato-Liners."

•

THE WAY WE FEEL ABOUT IT

Engineering is a swell profession. It's clean, honest, hard living. It's the power to mold raw cast iron and wood and steel into huge machines to bash out autos by the million or into delicate precision tools to fashion fine accurate watches. Engineering is an inspiring, driving, all absorbing task, but it is likely to become monotonous, to become just a routine of computations, slide - rule pushing, handbook thumbing and long hours of brain work We engineers need a medium of relaxation for self-expression and enjoyment. If you're musically inclined, fine. Painting and drawing are good, too, but for us—we like writing—it's fun, it satisfies the ego, it offers service keys, Alpha Tau Sigma membership, banquets, trips, editorships, college credits, and may prove profitable in the future If you'd like to see what you can do, to find if you've got something, and to develop it if you have, drop in and see us. We're serious about this. We need good men on the staff. If you find you haven't time after you've tried it, that's all right with us—we know how it is. But—give yourself a chance, will you? What have you got to lose?

NAVAL ENGINEERS NEEDED

One of the most picturesque men in the navy, Admiral Harry E. Yarnell, addressed the Junior and Senior engineering classes on Friday, February 14, at Ag Hall. An enthusiastic man with a twinkle in his eye, Admiral Yarnell appealed to the engineering students to consider positions in the navy. He and four other naval officers are on a tour of 18 universities and colleges, seeking engineers for navy construction activities.

Admiral Yarnell was commander of the Asiatic fleet for three years until he retired in November, 1939, and previous to that he had been very active in the Pacific, especially at Hawaii and as the first commander of the Saratoga, initial U. S. aircraft carrier. Now past the retirement age, he nevertheless declared he enjoys his present work of meeting a new navy problem—the shortage of trained engineers to design and supervise construction of the huge two-ocean fleet now being created.

This is the plan worked out by the navy: The navy is offering posts as naval reserve ensigns to seniors in engineering school who pass physical examinations and are recommended by their schools. Junior students are offered probationary commissions contingent on their graduation from college. These engineers will be called into active duty as needed—and about 1,000 are now needed to work in three Washington bureaus of naval engineering. Men who are accepted will receive base pay of $183 monthly when they start service.

The four naval officers who came with Admiral Yarnell held consultations with the individual students in the afternoon. They were Commander J. R. Lannon, of the bureau of navigation, or the personnel department; Captain W. R. Van Auken, of the bureau of ordnance, or guns, who needs young engineers to keep up with the program; Lieutenant J. A. Hartman, of the bureau of ships, who needs many engineers for hull design, machinery, turbines, generators, radio equipment, etc.; and Lieutenant E. R. Godfrey, of the bureau of aeronautics, who needs men for design, procurement of materials, and maintenance of aircraft.

Those who can qualify may request a particular locality. The three general qualifications stressed by Admiral Yarnell were personal loyalty to the United States, professional ability, which will be fulfilled automatically upon graduation from any engineering college, and physical requirements, which are not quite as rigid as those for active sea duty.

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LOAN FOR M&ME STUDENTS

Professor Shorey, of the Mining and Metallurgy School, informed us that the Wisconsin section of the American Foundrymen's Association has introduced a $500 loan fund for students in metallurgy at Wisconsin. This loan fund, which was started last fall, is an investment that can't go wrong.

•

ICE NOT THICK ENOUGH

Bill Faulkes, CE 4, and Gerald Slavney, M&ME 2, erstwhile sailors, went iceboating on Sunday, February 16th. Of course, they didn't realize just how hard the wind was blowing, or they wouldn't have tipped over. But they did, and near the Yahara river, too. Net result, complete ducking (the ice gave way) for two engineers. It was cold, and two stiffs (frozen variety) were seen walking home. Moral: either go iceboating or sailing, but never combine the two.

HEAR YE! HEAR YE!

Polygon announces a smoker for Wednesday, February 26th, at the Memorial Union. Ray Erickson will give a preview of the Expo, and the guest of the evening will be Coach Harry Stuhldreher, whom we heard a little about last fall during football season. After the program in the Union Theater, refreshments will be served in Great Hall. All engineers are invited. Let's turn out, fellows, a real evening's entertainment is in store for you.

FOUNDRY CONFERENCE

On Thursday morning, February 20th, Dean Johnson opened the annual Foundrymen's Conference at the Schroeder Hotel in Milwaukee. These yearly conferences are sponsored jointly by the American Foundrymen's Association and the Mining and Metallurgy Department of the University, and have received a great deal of attention as an extremely worthwhile enterprise.

This year Professor E. R. Shorey and Associate Professor Joseph F. Oesterle, of the Mining and Metallurgy School, acted as a committee to represent the University at the conference.

The program, which covered two days, included the discussion of steel, malleable, non-ferrous, and grey iron foundries, gating, risers, sands, bonds, and all the things dear to the foundryman's heart.

"STATIC"

with Nathan Itzkowitz, c'41

Tsk . . . Tsk . . . Tsk

. . . 190 pounds . . . 6′ 3″ . . . red hair . . . manly Dan Gaffney was isolated during exam week due to an attack of . . . yes . . . believe it or not . . . chicken pox . . . gosh . . . Dan . . . you'll have to watch what kind of company you keep . . .

•

And if anybody wants to know why the gals just go goo-goo over Carl Hessler . . . you can blame it on his purse-onality . . .

•

The rising generation retires about the time the retiring generation rises.

•

Although any man can have a wife, only the ice man has his pick.

•

Cave men used to knock girls senseless, but that is no longer necessary.

•

Wife: How do you like my new gown? I got it for a ridiculous price.

Hubby: You mean you got it for an absurd figure.

Retraction

An apology is due Prof. Kinne . . . last semester's smoke screen in the west wing of the M.E. building couldn't have been due to the prof's changing brands of cigars . . . just learned he's been using the same species for years . . .

•

Kissing your wife is like scratching a place that doesn't itch.

•

I wish I were a moment
Sitting in my professor's class,
No matter how idle a moment may be
It always seems to pass.

•

Skidding is the action
When the friction is a fraction
Of the vertical reaction
Which won't result in traction.

•

A city and a chorus girl
Are much alike 'tis true;
A city's built with outskirts;
A chorus girl is too.

•

Cackle, cackle, little hen,
Thus you fool the wisest men,
How to know they long have tried
Whether you have laid or lied.

•

She: Thanks for the hug.

He: The pressure was all mine.

STAFF CHANGES . . .

(continued from page 9)

Directorate, House President's Council, and intramural sports. He has earned most of his expenses as a university night telephone operator and as an employee of the Gisholt Machine Company.

George Kuetemeyer, mechanical, has been circulation manager for the past year. George claims he has licked 50,000 stamps during his term of office, and while this may be an exaggeration, the job involves such routines as answering letters of irate subscribers, addressing envelopes, and collecting unpaid subscriptions. George, another Milwaukee product, is a member of Tau Beta Pi, Pi Tau Sigma, Alpha Tau Sigma, and the construction crew of the Exposition.

Before we formally retire, we wish to express thanks to the **Wisconsin Engineer** Board of Directors for their interest and help, and especially Mr. R. A. Ragatz, secretary of the Board and faculty adviser, for the great amount of time he has devoted to the magazine and the helpful assistance he has given to both the editorial and business staffs. We wish also to express thanks to all the members of the staff for their work and cooperation, and to wish the new executives the best of luck in their work. We hope they'll have as much fun as we've had.

BEN BENNETT
PHIL DESCH
JOE O'NEILL

THE ZEST OF WINTER BRINGS *the Glow of Health!*

Winter brings both the enjoyment of sports with skates and skis and the healthful stimulation of a zestful season. Young and old find the countryside inviting—the fields blanketed with snow, trees sparkling with crystals.

No longer is the season regarded as too formidable for outdoor recreation. The advances of medical science and chemistry have minimized the former hazards of winter cold.

We can enjoy winter with confidence today largely because of chemistry's contribution to the preservation of good health. For the chemist is behind both doctor and pharmacist who prescribe and dispense the drugs that safeguard us.

In this field Dow has long been active producing such products as:

Acetyl Salicylic Acid and Acetphenetidin, both widely used by the medical profession to combat common colds, influenza and muscular distress—Chloroform, a common sedative agent in cough remedies—Epsom Salts that recreate the therapeutic values of England's Epsom waters—Glycine, Iodine, Carbolic Acid. These and more than thirty other pharmaceutical chemicals form a major division of Dow's widespread activity.

Here is a field in which Dow is recognized as an outstanding leader—a field of chemistry which has an exceedingly important bearing on the maintenance of America's good health.

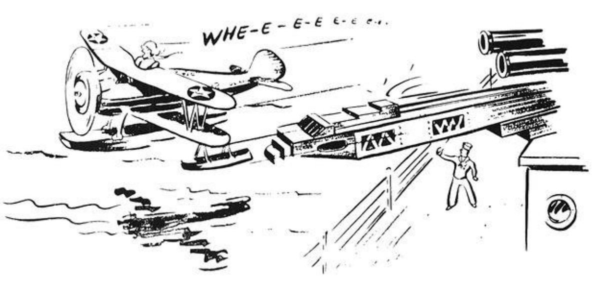
DOW

CHEMICALS INDISPENSABLE TO INDUSTRY

THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

Branch Sales Offices: New York City—St. Louis—Chicago—San Francisco—Los Angeles—Seattle

G-E Campus News



SPEED INDICATOR

WHEN an airplane catapult hurls a plane into the air too fast, the pilot may be injured and unnecessary strain put on the plane. If the plane takes off too slowly, it will drop into the water. In the past, barrels have been substituted for planes for testing purposes.

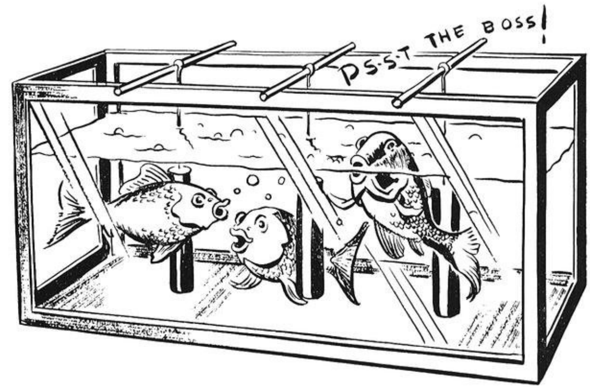
A new speed indicator, designed by the General Electric Company, checks the adjustment of the catapult without risking pilot or plane. The skid is shot down the track empty; if it registers the proper speed, the plane can then be placed on it and launched into the air at the correct speed. With some changes the equipment may be used to time other moving objects.

EYES FOR DEFENSE

PEOPLE in and around Schenectady, N. Y. are looking up these nights, watching the beams from giant searchlights being tested at the General Electric plant. In other parts of the world whole cities huddle underground, while sirens wail and bombs crash—but these Americans watch without fear. The sharp fingers of light sweeping silently across the sky are reassurance, symbols of security. Industry is on the job, providing the eyes of defense.

Searchlights are not the only defense items being built in Schenectady and in the other plants of General Electric. Great steam turbines are under construction, totalling millions of horsepower, to drive the ships of America's expanding navy; intricate controls will direct the operation of warships, tanks, planes, and guns; radio equipment will facilitate communication on land and sea and in the air.

And playing a vital part in these defense preparations are Testmen, young student engineers just off the campus, whose responsibility it is to test these machines.



INDUSTRIOUS FISH

SAMUEL JOHNSON, a chemist in the General Electric plastics research laboratory at Pittsfield, Mass., has three fish as helpers.

A large glass jar, used in the laboratory to keep a constant temperature bath for measuring the viscosity of plastic materials, collected scum inside, making the glass opaque. Since it was necessary to look through the glass, the jar had to be emptied and scoured once or twice a week. This was a tedious job, because the scum stuck. Acids didn't work. Snails were even put in the jar as scavengers, but high temperatures killed them. Then, just by chance, Johnson tried three goldfish from the "five and ten."

The fish took to the scum like a kitten takes to milk; within two or three days the jar was as clean as a whistle. It has remained so ever since.

GENERAL ELECTRIC

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