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THE WISCONSIN ENGINEER

MAY 1935

MEMBER, ENGINEERING COLLEGE MAGAZINES, ASSOCIATED

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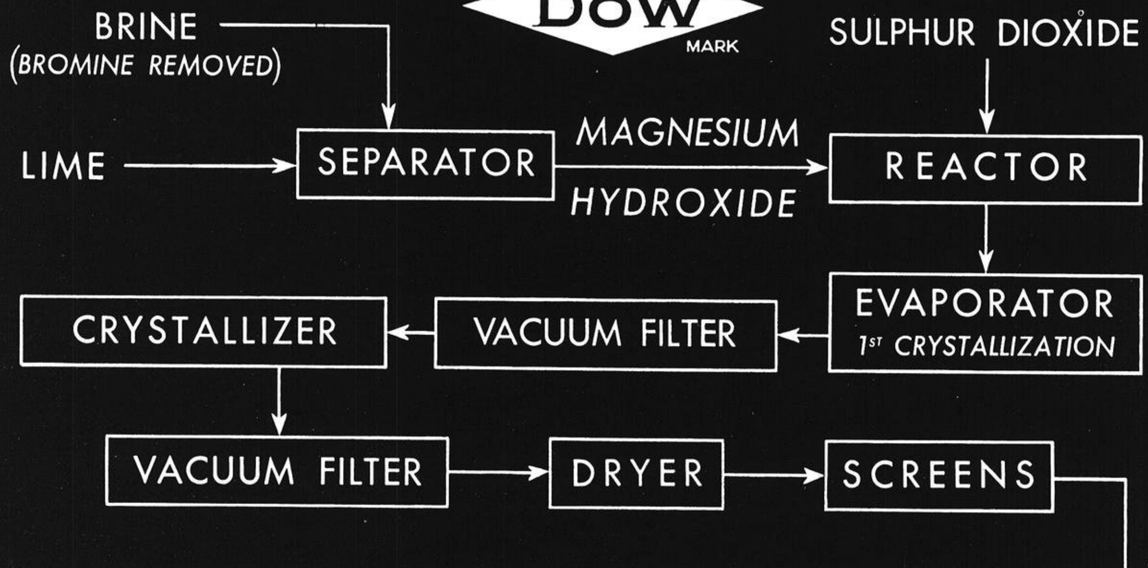

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With the Contributors —

● Ernest Nygren, m'35, tells us about the history of steel and steel tubing and how an accidental discovery pointed the way to an industry which produces more than three million tons of steel products yearly.

● James Van Vleet and Kurt Wendt have taken some interesting pictures of stress distribution in loaded Bakelite models. Here is a new method of determining stresses pictorially. Read and you shall learn.

● Do you know a young man who is interested in engineering as a career? If you do, be sure to tell him to read Mr. G. G. Post's article on "The Engineer's Responsibilty and Opportunity."

● The *Wisconsin Engineer* announces the winners of the annual drawing contest. Next year Alpha Tau Sigma will conduct the competition.

● The frontispiece is an etching of Washburn Observatory by Harold C. Jensen. He has nine other etchings of University of Wisconsin scenes which are available thru the Alumni Magazine.

● In this issue we also give you our fourth annual supplement of pictures and activities of the campus engineering organizations.

● The *Wisconsin Engineer* thanks you for your support during the past year and wishes you a pleasant vacation. See you next fall.

VOLUME 39 MAY, 1935 NUMBER 8

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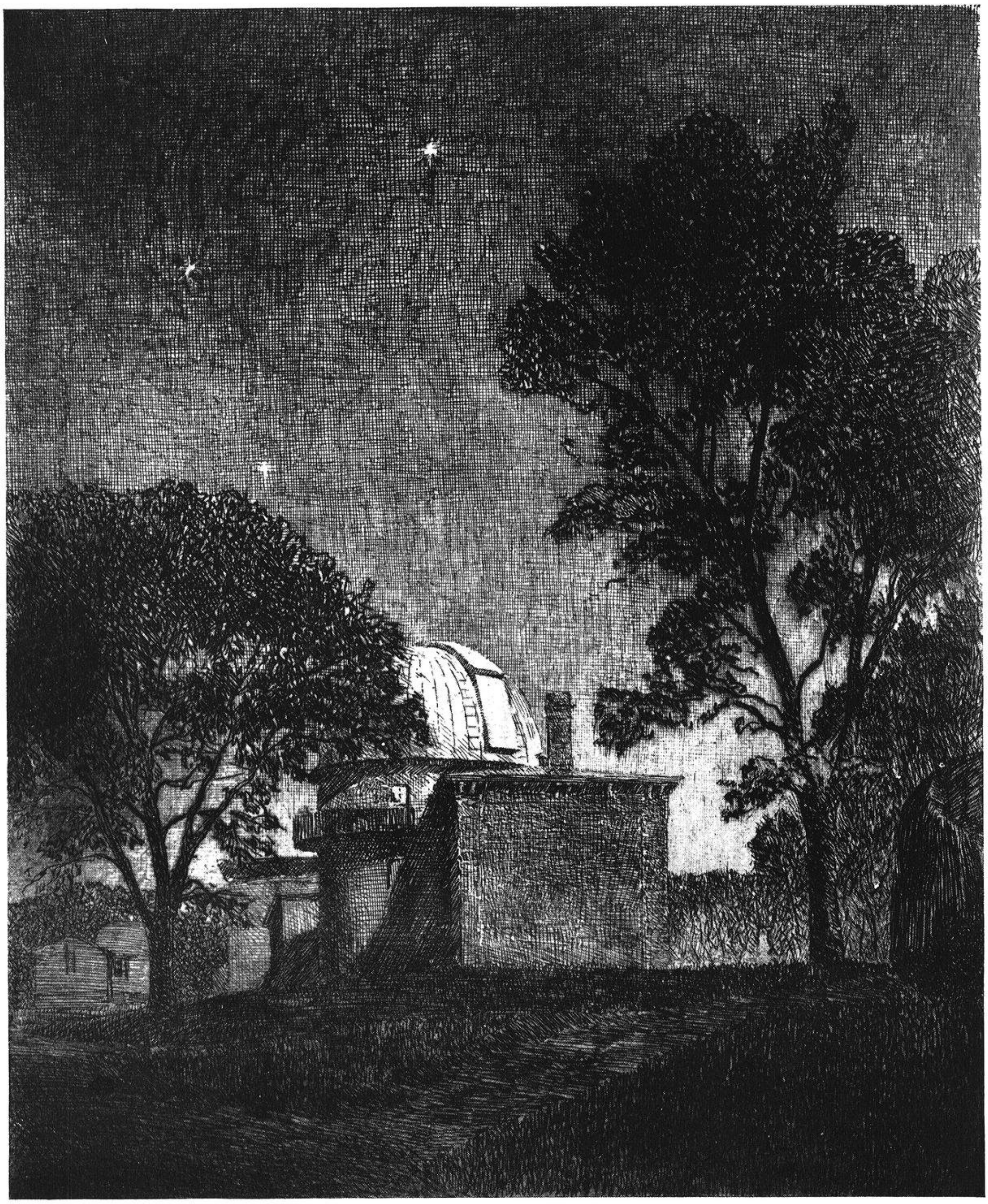


Washburn Observatory

The WISCONSIN ENGINEER

VOLUME 39, NO. 8 MAY, 1935

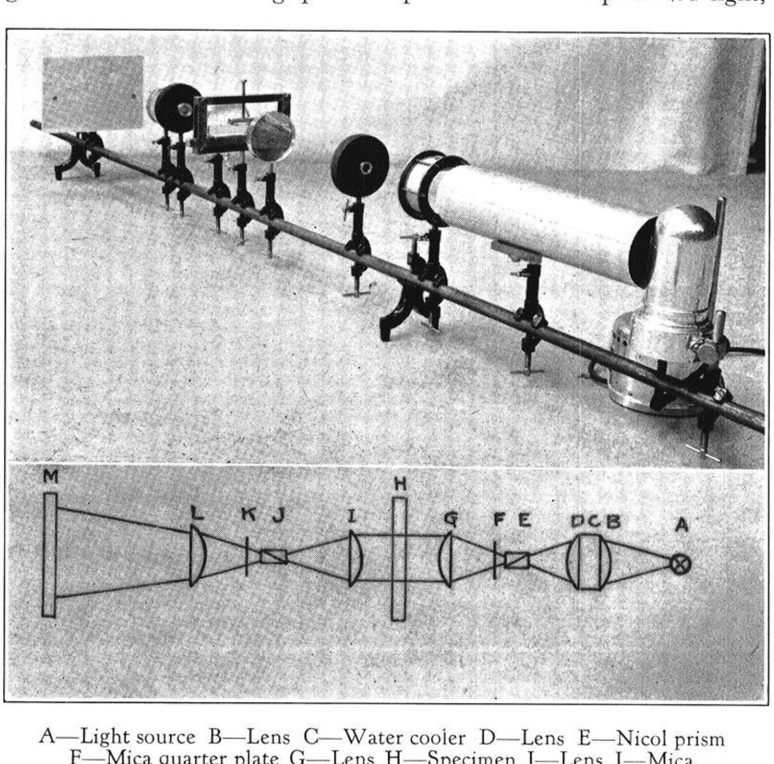
Let's LOOK at Stress

By James G. Van Vleet and Kurt F. Wendt

LOOK at stress? Yes! Instead of making a series of assumptions and laboriously computing for the stress at some point of a structure or structural part, let's make a model, load it, and look at the significant stresses. How? Well, that's quite a long story . . .

The use of polarized light on materials having photoelastic properties is not a recent development. The principle underlying photoelastic investigations was discovered in 1816 by Sir David Brewster. Recently, however, the introduction of transparent bakelite, the use of monochromatic light, and the refinement of apparatus have permitted great strides in the practical application of photoelasticity.

The apparatus used to show the stresses we wish to look at is called a polariscope. Our present polariscope is shown in Fig. 1.



A—Light source B—Lens C—Water cooler D—Lens E—Nicol prism F—Mica quarter plate G—Lens H—Specimen I—Lens J—Mica quarter plate K—Nicol prism L—Lens M—Screen

The light source is a sodium vapor lamp which gives off a very nearly monochromatic light. From the source the light rays pass through a pair of condensing lenses and cooler which remove the heat and bring the light to a focus at the first Nicol prism. This Nicol prism is called the polarizer, as it passes only plane polarized light. This plane polarized light becomes circularly polarized in passing through a mica quarter plate and is then made parallel by a columnating lens. This circularly polarized light passes through the specimen under test and is converged by another lens through a second mica quarter plate into the second Nicol prism or analyzer. The light leaving the analyzer passes through a lens which focusses the specimen on a screen, or, if photographs are to be taken, it passes directly into a camera.

The theory underlying the polariscope will now be briefly presented. Plane polarized light, which is light in which all vibrations are perpendicular to a single plane in the direction of light propagation, when passed through a properly oriented mica quarter plate is refracted into two mutually perpendicular plane polarized light rays of equal intensity. One of these light rays is retarded by the mica quarter plate so as to emerge 90° out of phase with the other ray. The light produced by these mutually perpendicular plane polarized light rays of equal amplitude and 90° out of phase, is called circularly polarized.

Circularly polarized light in passing through a stressed model, loaded in a plane perpendicular to the direction of light propagation in such a way that the stress at all points on any line through the model parallel to this direction is constant, is refracted into two mutually perpendicular plane polarized rays of equal amplitude at right angles to each other. These rays coincide with the planes on which the principal stresses* in the model occur.

*Principal stresses are the maxiumum and minimum normal unit stresses occurring on any plane through a point. See "Strength of Materials," Maurer and Withey, Art. 16.

One of these rays is retarded with respect to the other by an amount proportional to the difference of these principal stresses, and thus emerges out of phase with the other ray. A second quarter wave plate and an analyzer, properly oriented, bring these two mutually perpendicular rays into a single plane, where the difference in phase produces interference, thus forming the stress patterns or fringes in the model on the screen.

A typical fringe photograph is shown in Fig. 2. The dark lines on the stress patterns are spoken of as fringes, they being the loci of points of constant difference in principle stresses (P—Q).

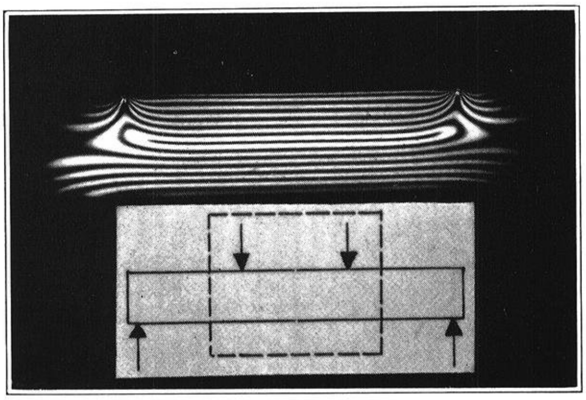


Fig. 2

The phase difference of the two light rays emerging from the analyzer, or retardation "R" of the light in passing through the specimen may be expressed as:

$$R = FO = \frac{t}{FV}(P-Q) \quad . \quad . \quad . \quad . \quad (1)$$

Where:

R, usually called the "fringe order" (FO), is the number of complete wave lengths retardation of the slower light ray in passing through the specimen. It is also the number of cycles of alternate darkness and brightness occurring at any point on the screen as the load is increased from zero to the value in question.

P and Q are the principal unit stresses at any point in the specimen.

t is the thickness of the model, in inches. (The thicker the model for a given unit stress the greater the retardation produced.)

FV is an optical constant, called the "fringe value," and is the value of the difference of the principal stresses required to give the emerging light one complete wave length retardation in a model of one inch thickness, or to change the fringe order by one.

Solving equation (1) for the difference of the principal stresses we get:

$$(P-Q) = \frac{FO \times FV}{t} \quad . \quad . \quad . \quad . \quad . \quad (2)$$

Thus if the fringe value FV, which is the optical constant depending on the material and on the color or frequency of the light source, is known, we can determine the difference of the principal stresses at any point in a model by merely counting fringes to determine the fringe order at that point.

To determine this constant (FV) we usually go to the simplest type of loading, which is axial tension or compression on a specimen of uniform cross section. In the case of axial loading, one of the principal stresses is zero and the other is merely the average unit stress on a transverse section.

$$P = \frac{W}{A} = \frac{\text{Load}}{\text{Area}} \qquad Q = O$$

Thus our formula for this case reduces to:

$$P = \frac{FO \times FV}{t} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (3)$$

This gives us a simple means of determining FV. Light passing through the unstrained model is unchanged, and with the Nicol prisms properly oriented produces no image on the screen. As the load is applied to the specimen, retardation of one of the light rays increases from 0° to 180° producing a picture of maximum brightness. On continuing the loading process, the retardation increases until at 360° the screen is again dark. This darkness is called the first fringe, or is said to be of the first fringe order. As the load is increased further these alternate cycles of darkness and brightness continue, the number of them being equal to the fringe order FO, or the number of complete wave lengths retardation of the slower light ray with respect to the other in passing through the stressed model.

By determining the load on the specimen required to produce say the tenth fringe order FO, we have the necessary information to determine the optical constant FV. Thus in a model of our bakelite ¼ inch thick and ½ inch wide the axial load required to produce the tenth fringe order is 470 lbs. Substituting this in equation (3):

$$\frac{470}{\frac{1}{2} \times \frac{1}{4}} = \frac{10 \times FV}{\frac{1}{4}}$$

from which FV = 94 lb./in.^{2}/fringe/inch of thickness, for our transparent bakelite and sodium light. Having this constant determined, the general equation becomes:

$$(P - Q) = \frac{94 \times FO}{t} \quad . \quad . \quad . \quad . \quad . \quad . \quad (4)$$

and we are now ready to investigate more complicated systems of loading.

Fig. 2 shows a simple beam ¼ inch thick under third-point loading. The heavy concentrations of stress at the load points are clearly evident. Counting the number of fringes above and below the central black line, which is the neutral axis of the beam, we find six and one-half in each case. This means that the unit stresses within the middle third at the upper and lower edges are equal. Furthermore, they are constant for all sections between the loads. The intensity of these stresses from equation (4) is:

$$P-Q = P-O = P = \frac{6\frac{1}{2} \times 94}{\frac{1}{4}} = 2440 \text{ lb./in.}^2$$

Calculations by the usual beam theory using measured loads and dimensions check this value.

Fig. 3 shows a ring subjected to vertical diametral loads. Counting fringes it is evident that the stresses on the inner circumference are higher than those on the outer. The maximum tensile stresses obviously occur on the inner fibers directly under the loads. These and any other boundary stresses may be readily evaluated by equation (4).

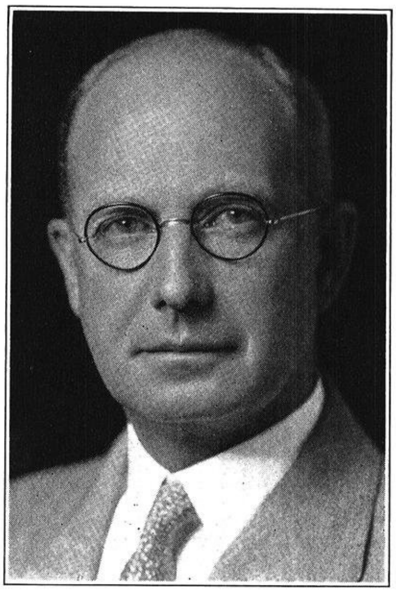
(Continued on page 142)

The Engineer's Responsibility and Opportunity

By G. G. Post, e'04

THE man who recognizes what people need or desire and then satisfies that need or desire is the man whose services are sought and who usually prospers. This is true also of the man who recognizes a fundamental principle and then has sufficient wisdom and initiative to make use of it.

Some years ago, when gas fixtures were being replaced by electric fixtures, some difficulty was experienced by electrical contractors in suitably attaching the new fixtures to the old outlets. A man interested in the fixture business was told by an insurance underwriter that anyone who devised a suitable device for making the attachment would make a good thing out of it. The fixture man made up his mind that he could devise something and did so. He told me afterwards that he had made money out of it. He recognized the need, satisfied the need, and prospered.



G. G. Post

When the automobile industry was younger than it is now, considerable difficulty was experienced by designers in obtaining a suitable groove in which the glass windows could slide. Everything used up to that time resulted in the windows sticking. A salesman for a Chicago glass concern was told by a draftsman in a Detroit automobile plant that the man who devised a groove that would overcome this trouble would have something worth while. The salesman made up his mind that if anybody could do it, he could, so he purchased some of the rubber grooves that were in general use and experimented with lining them with various kinds of fabric. After considerable work he found that the combination which worked best was a lining made of fabric having a short heavy nap. He patented the combination and obtained a royalty on every foot sold. It was so successful that it was adopted by all automobile manufacturers and is still used wherever sliding windows are used. His royalty paid him well, but he had rendered a valuable service to the automobile industry and especialy to the users of automobiles. He recognized the need, satisfied the need, and prospered.

Some years ago the engineer of an important power plant was experiencing difficulty with free water being carried over in suspension in the steam from his boilers to the steam pipes. He was at a loss to understand just how to baffle those boilers so as to prevent the carry-over. Sometimes good ideas come from the most commonplace things. His wife used to make the coffee every morning in an old-fashioned coffee pot. How some women do love those old coffee pots even in this day of percolators and vaculators. Every morning she boiled the coffee but on one particular morning this particular engineer decided that he would surprise her and make the coffee himself. When it started to boil, it boiled all over her nice clean range. And what a tongue lashing he got! He remonstrated that he did it just as she did it. She looked into the pot and said: "No wonder, you didn't have the strainer in it." She put in the strainer, set the coffee to boiling again and everything was fine. Right there this engineer got an idea that all you had to do to prevent carry-over in a boiler was to break up the steam bubbles before they came to the surface, just as the strainer broke up the bubbles in the coffee pot. He applied it in the plant and it worked. It takes a good man to come up smiling, after a tongue lashing by his wife, with an idea that helps him in his job. He recognized a principle, made use of it, and succeeded.

During the decade from 1920 to 1930, a great deal of effort and money were expended in this country and abroad in an attempt to develop a process for carbonizing coal at low temperature (approximately 1000° rather than 1850° as is used in ordinary gas plants). The efforts in this direction were not successful. At the International Conference on Bituminous Coal, held at Pittsburgh in 1931, Dr. R. P. Soule delivered a paper on the subject in which he said:

"Over fifty million dollars were spent in the U. S. alone during the past ten years in a series of fruitless attempts to develop a process that not only would work but — which was found to be equaly important — would pay a profit as well. The expenditure of time and money in so prodigal a manner commands attention and merits some consideration."

One of the unsuccessful experiments which cost those who made it about $750,000 was made in Milwaukee. Two men who had occasion to observe the experiment, which by the way had for its purpose the low temperature carbonization of pulverized coal, detected certain inherent defects underlying the attempted process and decided that they would like to be given permission to see what they could do in this direction. Their company's permission was obtained and they were offered the use of the company's facilities. They were not gas men but had had experience in the burning of coal in various forms. They had observed that the ash after the burning of coal, which had been exposed to the air for a long time, was likely to be fluffy and finely divided, whereas the ash from coal that had not been exposed to the air was more apt to form slag. One object of the process was to produce coke in powdered form without having to grind it, and the thought occurred to them that this might be done if the coal were treated with oxygen before it was carbonized. The experiment they conducted to determine this point was very simple and inexpensive. A small quantity of raw pulverized coal was put into a porcelain crucible, covered, and the gas driven off by heating to incandescense with a Bunsen burner. It was found that the coke remaining was in the form of a hard button. Some of the same coal was then placed in a small oven and heated to approximately 650° F. in the presence of air. This coal was then placed in a crucible and the gas driven off by heating in the same manner as before. It was found that the coke was in a finely divided state, practically as fine as the pulverized coal itself. They acordingly built an experimental apparatus in connection with an existing boiler plant in which the pulverized coal could be treated with 650° oxygen-containing flue gas for a few seconds, after which the coal gas was driven off at about 1000° F., and the residual pulverized coke, without even cooling it down, was blown into the furnace and burned just as pulverized fuel is burned. The gas resulting from the process is much like natural gas while the oil and tar that are produced can be processed in any way that appears feasible or economical. Estimates indicate that a gas plant built on this principle can be added to a pulverized fuel burning power plant with an investment of about 50% that required in building an ordinary manufactured gas plant and that the operating expenses will be approximately the same as in an ordinary plant. The saving of 50% in investment charges is important and worthy of serious consideration when building manufactured gas plants in the future. They recognized a principle, put it into use, and succeeded.

These are only a few specific examples. There is unlimited room for new processes. Great strides have been made in technological development but it is likely that the developments of the future will so far transcend those of the past that what has been done will look like an automat compared with Belshazzer's feast. Anyone who has a mind of his own, good sense, and the initiative to do things should be optomistic in the fields of engineering and technology. Every day brings new developments in these fields. But it seems certain that we are not learning with sufficient rapidity how to distribute the benefits of these developments so that they will be of the greatest value to all the people.

Some years ago, the American Engineering Council adopted this definition of engineering — "Engineering is the science of controlling the forces and of utilizing the materials of nature for the benefit of man, and the art of organizing the human activities in connection therewith." Engineers have devoted most of their attention in the past to controlling the forces and utilizing the materials of nature and in this have done a fairly good job. While man has benefited, it is likely that he has not benefited as much as he should have and it is certain that engineers have not learned the art of organizing the human activities involved in one way or another with technological developments.

The trouble with too many engineers is that they confine their activities to their immediate technical problems. While the correct solution of these problems is important, it is still more important for the engineer to realize that he is a member of society and must do his share in directing the human affairs of men. His horizon should extend beyond the limits of his drafting board, or machine, or process, and he should be able to see how his work fits into the economic and social order and plan to do his work in such a way as to benefit society.

Since engineers work with forces and materials of nature, it follows that they must recognize and obey natural laws if they are to be sucessful in the technological field. To disobey these laws, either through ignorance or for any other reason, is to invite disaster. It makes no difference whether we like these natural laws or not.

If this be true in the technical field, is there any reason to suppose that it is not true in the field of human activities, and may it not be that the maladjustments and confusion and distress in our economic and social life are due to our disobedience, as a people, to certain fundamental natural laws that must be recognized and obeyed if we are to have harmony, happiness, and peace?

Since it is an inherent attribute of the engineer's work to observe the laws of nature, it should be natural for him to endeavor to apply the same principle of law observance to the solution of problems involving human activities, and therein lies the engineer's opportunity to make use of his training for the benefit of mankind. It is a tremendous opportunity, but too few recognize it and still fewer take advantage of it.

SURVEY OF ENGINEERING PROFESSION

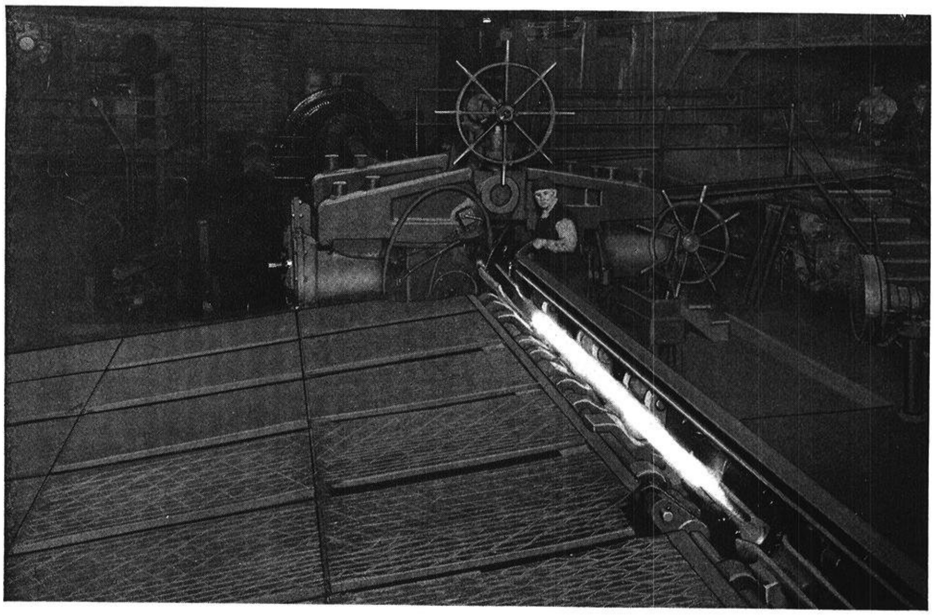
The U. S. Bureau of Labor Statistics at the request, and with the cooperation of the American Engineering Council and the several engineering societies, has sent a questionnaire to all engineers from sub-professional men and recent graduates to chief engineers and consultants. It will be sent to those in all the many branches of engineering.

The object of the survey is to determine the factors which contribute to tenure of employment and compensation, degree of unemployment, and sources of reemployment; to throw light on the influence of education or place of employment upon compensation, to investigate the relationship of engineering employment to that in other professions. Education, years of experience, types of work, place of practice, nature of previous employment, membership in professional or technical societies, registration in states that require it, salaries received in the past, typical duties, and special qualifications — all these elements and many others may have a definite bearing on the present condition of the engineer.

Seamless Steel Tubes

ERNEST NYGREN, m'35

STEEL TUBES! How many people know the romance of an industry that today produces more than 3,000,000 gross tons of steel tubular products? The diversity of uses for steel tubular products is so great that the mere mention of any industry today, will call to mind the dependence in whole or in part of that industry on the modern developments of steel tubes. Almost any modern appliance that you can name such as washing machines, vacuum cleaners, automobiles, airplanes, locomotives, and so on through an endless number, contain steel tubing in varying quantities.



Piercing Mill

In order to understand the development of steel tubing through the efforts of scientists, mechanics, and engineers, we must delve into the story of steel. With the growth of the knowledge of producing steel, came the facilities and better material for producing steel tubes.

Up to the time of Edward III of England, 1312 to 1377, iron was considered one of the precious metals. In the middle ages steel making had reached a high state of perfection, especially at Damascus, Toledo, and Bilbao. Even with our knowledge of steel today we cannot produce any steel that will surpass the steel in the Damascus cutlery. According to Dr. J. W. Richards, the famous Damascus steel was produced by taking a piece of wrought iron and heating it with charcoal to a welding heat to carburize it, then it was doubled over and welded hundreds of times, each time the white hot metal coming in contact with the carbon and absorbing some of it. This process produced several million layers of carburized steel in the Damascus blade, accounting for the beauty and strength of Damascus steels.

All iron was produced by heating with charcoal up until 1611, although many unsuccessful attempts had been made to use bituminous coal, known as "sea coal." In 1611, Simon Sturtevant patented a blast furnace which would burn "sea coal." The first reverberatory furnace for the reduction of steel from pig iron was brought out in 1766 by Thomas and George Carnage, but it was not until 1784 that Henry Cort succeeded in producing good steel from iron by the reverberatory method or puddling process. This steel was really what we now term wrought iron, and was very soft and ductile. The earlier furnaces up to the time of Cort produced wrought iron which was soft, ductile, and malleable. If used for cutlery, the iron had to be case hardened.

With the coming of Watt's and Coulton's steam engines in the latter part of the 18th century came a demand for a better grade of steel. The first boiler plate mill was built at Neuwind, Germany, in 1870, and produced plates by hammering.

The first really successful boiler was made in the year 1828, and was installed in Stevenson's locomotive, the "Rocket." This boiler contained tubes of 3 inch diameter which were made by turning thin plates over mandrels and welding under a trip-hammer. Stevenson's success firmly established the necessity for steel tubes in boiler construction.

William Murdock, a Scottish inventor, gave another impetus to the demand for steel tubes about the year 1815 when he introduced the use of coal gas for lighting purposes in the streets of London. He connected cast off musket barrels to form his piping for the gas.

James Russell, an English engineer, took a big step in production of steel tubing in 1824 by bending the sheet over smooth mandrels, and butt welding at white heat under trip-hammers, and then rolling the tubes by passing them through a round groove in a rolling mill and over a mandrel supported in the pass or opening between the rolls.

Russell's work was overshadowed in the following year by the invention of Cornelius Whitehouse, who merely drew heated flat plate through a bell or die.

Following these developments in the tubing industry, which was now well established, inventors tried to produce tubes without seams. Many attempts were made with the extrusion processes, such as is used in forming tubes of lead and the other more ductible metals. In 1836 an extrusion process was patented by Hanson in England; but it proved to be impractical. The method comprised of pushing hot wrought iron through an orifice formed by a mandrel or punch located and supported in the center of a circular die.

With the advent of the "open hearth" process of making steel, invented by Charles, William, and Frederick Siemens in 1875, the steel industry grew in leaps and bounds. Following the extrusion processes of producing hollow seamless tubes, cupping and drawing from a round disc was tried. This latter method is still used today in the larger tubes.

In 1885 in Dusseldorf, Germany, the two Mannesmann brothers accidentally discovered the piercing process which now bears their name. They were manufacturing steel bars, and were trying to eliminate the difficulty of producing straight bars. They built a rotary straightener with heavy rolls set at an angle, so that the bars would be drawn through under a radial pressure. The strength of the bars was found to be less than before, and upon examination it was found that the center steel grains were fractured and fine hair like cracks radiated outward from the center of the bar. A piece of heated bar was tried, and it showed a decided hole through the axis of the bar. The Mannesmann brothers saw the practical use of this phenomenon, and consequently built a machine like the first, but included means for holding a pointed mandrel at the exit end of the rolls.

In order to see how the modern seamless steel tubes are manufactured, we shall now take a trip through a steel tube mill.

Round steel bars of basic open hearth steel is shipped to the plant on flat cars. The bars are of varying diameters and lengths, and are marked with numbers that correspond to the complete chemical analysis of each shipment. Large electromagnets unload the cars and pile the billets up on racks until used. The bars are then placed on chain conveyors that take them to a large shear which shears them off to the proper length. Another chain conveyor carries the billets to a chain elevator which lifts them up to the charging end of a long heating furnace with a sloping bottom. This furnace heats the billets to a temperature of 2000° F. to 2200° F., depending upon the analysis of the steel. At the lower end of the furnace the white hot billets are pushed out by an air-cylinder and roll down an incline to the Mannesmann piercer. A pneumatic pusher moves the solid hot billets into the piercer. Amid the roar of the rolls of the piercer and clouds of steam from the cooling water, emerges a fiery hollow tube, somewhat rough in appearance, but fairly uniform in thickness and diameter. From the accompanying figure number 1 it can be seen that the rolls rotate the billet, at the same time drawing it forward. The heated metal at the outside of the piece being in direct contact with the roll surfaces is drawn forward, while the center metal tends to lag back, capping the forward end of the billet. At the same time, due to the squeezing action, the center grain structure is ruptured, leaving a decided hole. The pointed mandrel enlarges this hole, forcing the metal to flow up and over the mandrel forming a tube. A 3¼ inch billet, 48 inches long, is

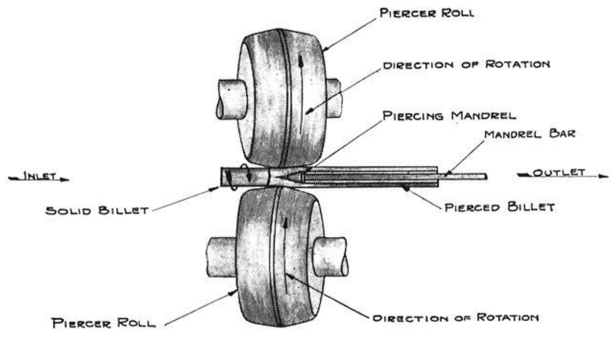


FIGURE 1
Showing Billet Passing Through Piercing Mill

pierced to a 10 ft. hollow billet in the unbelievable time of 10 seconds. Every particle of steel is displaced in this operation, thereby showing the necessity for perfect steel in seamless tubing.

From the piercer the tube is rolled to the rolling mill, wherein the tube is rolled in semi-circular grooves and at the same time forced over a mandrel to reduce the thickness of the walls, and smooth the inside surface.

The fine mandrel scratches on the inside of the tube are next removed by the reeling machine, which is similar in operation to the piercing mill, except that the rolls are very smooth and quite flat, and the mandrel is longer and turned to a smooth finish, but not pointed. Figure number 3 shows the reeling operation. The long, slender, red hot tubes emerge from this machine, smooth inside and outside, and true to required thickness.

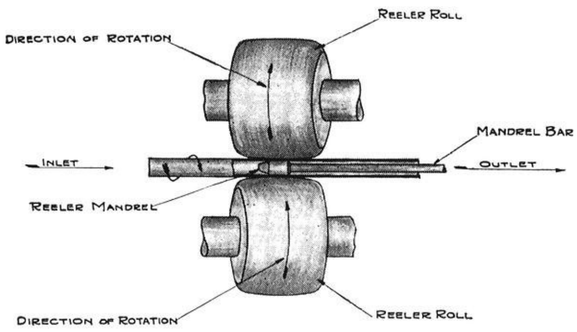


FIGURE 3
Showing Billet Passing Through Reeling Mill

A conveyor takes the tube to the sizing mill, a series of grooved rolls set at right angles to each other, which merely reduce the diameter of the tube. If further reduction of the tubing is desired, reheating is necessary.

The hot finished tubes are conveyed by rolls to a cooling table where they are rolled sidewise slowly until cooled to prevent warping. When cool enough the tubes are straightened by cross rolling, and the ends are trimmed. After hydraulic testing and a thorough inspection the tubes are shipped.

The finishing of tubes to finer tolerances for mechanical purpose is accomplished by cold drawing, in which case one end of the tubes, as they leave the cooling bed, are swaged or crushed to a point, so that they can be inserted through the hole in the die, preparatory to drawing the tube through the die for reduction of diameter. After cooling, there

(Continued on page 143)

ON THE CAMPUS

WORK ON FLUID FLOW

Should you happen to wander into the Chemical Engineering building on a Tuesday or Thursday afternoon you would find senior chemicals swarming over the place from attic to basement, working on their special problems. Down in the basement you would find editor George Cook assembling a glass apparatus for observing the flow of fluids through a square edge orifice. Finely divided bronze powder suspended in a sugar solution will be circulated to show the eddy currents around the orifice. During the first half of the semester George was working with Oscar Fritche, grad, to determine the effect of viscosity on the discharge coefficient of a square edge orifice. The work is being done under the direction of Professor Kowalke.

A PAT ON THE BACK

With the welding conference successfully completed May 3, the mechanical engineering department can review a year of worthy public service to the citizens of Wisconsin, homeowners and industrialists alike. The series began January 31 with a solid fuel and stoker conference followed by a fuel oil convention; then came the lubrication oil sessions and the finale on the ambitious program was provided by the welding conference.

Of particular interest in this last conference were the discussions on arc welding of aluminum and the effects of welding heat on the properties of malleable iron. The latter subject was covered by Scott Mackay, professor of mining and metallurgy, who has been particularly interested in the properties of malleable iron during the current year. The exhibitions and demonstrations were well received and the attendance was unofficially estimated at approximately 400 participants.

CHECK UP ON B. T. U.'s

Prof. D. W. Nelson, Steam and Gas department, has completed a paper on the subject of "Oil Burning Economy in Residences" which will be presented at the national convention of the American Society of Heating and Ventilating Engineers, to be held in Toronto, Canada, June 17-19.

GOOD NEWS

That industry is preparing for the long climb up the prosperity curve is definitely concluded from a survey of the records of June graduates who have already received positions in engineering capacities. The miners lead the list with thirteen graduates and eight having been notified of placement in metallurgical laboratories throughout the country. Laurence Mattek is with the Wisconsin Steel Co. of Chicago, Ed. Ellman, Cutler-Hammer of Milwaukee; W. C. Smyth, Sivyer Steel Casting Co., Phil Rosenthal, Battelle Memorial Institute of Columbus; W. B. Riebert, Continental Roll and Steel Foundry Co. of Chicago; Jack Havard, U. S. Gypsum Co. of Chicago; Robt. Davis, New Jersey Zinc Co. of Colorado; A. Treleven-Youngstown Sheet & Tube Co. of Ohio. According to Prof. McCaffery, senior adviser, the remaining five have excellent possibilities of receiving appointments thus presenting a 100% batting average for the Mining School.

The Mechanicals are hitting a 25% stride with a considerable increase expected by the end of the school term. Alex. Robertson will enter the Fairbanks-Morse Co. of Beloit; Geo. Hausler received an appointment for the highly regarded General Electric Co. training course; Bill Van Ryzin expects to take his Army commission and join the Fightin' Marines; Joe Peat has the same idea regarding the Naval Flying Corps; E. S. Skinner will be located at the Beloit Iron Works; Geo. Androme has been placed in the textile division of the Barber-Colman Co. of Rockford, Ill.; J. Pharo will join papa in the heating business; Bart Albright is going in for air conditioning with the Carrier Eng. Co. of Newark, N. J., "just a 5-cent bus ride from the old homestead," according to Bart.

SUCCESSFUL GRAD SPEAKS

Roy C. Muir, Wisconsin alumnus, and vice-president of the General Electric Co., delivered a lecture on the "Engineering Problems as Related to a Large Manufacturing Co." before a large assemblage of students, Tuesday, May 7.

2 x 10^6

With a joint dinner meeting which the Patent Law Ass'n and engineering faculty will attend in honor of the issuance by the Patent Office of the two millionth patent, the Engineer's Society of Milwaukee will convene Friday, May 17, at 6:30. Speakers on this memorable occasion will be George Haight, President of the Wisconsin Alumni Research Foundation board of trustees.

FOR AULD LANG SYNE

Thirty-three senior mechanicals completed a three day inspection trip on Thursday, May 9, as the final united activity of the 1935 class. The tour consisted of visits to the Fairbanks-Morse plant at Beloit, the Elgin Watch Co. at Elgin, Ill., the south works of the Illinois Steel Co. in Chicago and the Crawford Avenue Power Station. The group chartered a bus for the entire tour and reported a very successful and enjoyable time was had by all.

LUCKY GUYS

The Civils have gone in for state service, with the Highway Commission and Soils Erosion Service claiming the talents of the following: Robert H. Krone, J. R. Donaldson, E. W. Gradt, Harold Trester, Willard H. Hart and Orlando G. Halway.

No report as yet from the Chemicals or Electricals, but they have not been left in the lurch and a goodly percentage of both groups are expected to join the employed ranks after June. To those fortunate and worthy men listed above, we sincerely wish them "Good luck" in their efforts and worthy contributions in furthering the fine reputation established by Wisconsin men in industry.

The topographical engineering department, under the direction of Prof. Ray Owen and F. T. Matthias, is completing two control traverses of Lakes Mendota and Monona for the U. S. Coastal and Geodetic Survey. Four civils are preparing theses based on this work in which they took an active part. The men are Henry, Vogel, Ziehlsdorf, and Goelzer.

« ALUMNI NOTES »

MECHANICALS

HOBART, FRANK G., '86, consulting engineer with Fairbanks-Morse at Beloit, has been with that company for thirty-five years. He says: "The opportunities for advancemet are not over; they have just begun."

CAHOON, ORA B., '04, is an engineer with the American Blower Company. His present address is 1111 Cochrane Road, Mt. Lebanon, Pittsburgh.

PETER, ALBERT G., '13, has been in business for himself since 1933, selling structural steel and ornamental iron to builders in Milwaukee. "Most of this period has proved to be a prolonged vacation," he says, "but the past few months showed encouraging improvement in business."

GEORGE, MARSHALL W., '13, who is with the LaSalle Extension University of Chicago, has the position of sales manager. He and his wife and their daughter, Priscilla, are living at 4846 Kimbark Avenue, Chicago.

BLAINE, JOSEPH ROBERT, '05, died at his home in Oak Park, Ill., recently after a brief illness.

For the past twenty-three years he had been a mechanical engineer with the Miehle Printing Press Manufacturing Co. of Chicago. His research work for the Miehle company was mainly concerned with off-set lithography on which he was considered an outstanding authority.

He is survived by his widow, Attollaa Frost Blaine, a son, Robert, and a daughter, Virginia.

CHEMICALS

MEYERS, PAUL D., '18, is regional aeronautics adviser in the Bureau of Air Commerce. He visited Madison recently in connection with the development of the city's airport facilities.

KINNEY, HAROLD J., '30, received notice on April 7th that he was among the 109 men out of 247 candidates who passed the Pennsylvania State Bar examination. He may now practice in all phases of law, but expects to make patent law his specialty and can be addressed at 1908 Lincoln-Liberty Bldg., Philadelphia, Pa.

RASMUSSEN, ERVING, '31, announces the birth of a son, Warren James, on April 13th at Marinette, Wisconsin. Mr. Rasmussen is employed in the Marinette and Menominee Paper Co.

BRADLEY, HARLOW, '14, writes that he is recuperating from an illness at Casa Cappella, near Nice, France. Under normal conditions, he makes Paris his headquarters for selling Allis-Chalmers Mining Machinery.

GRIFFEY, L. J., '26, represents Hanlon-Waters, Inc., of Tulsa, Oklahoma, dealers in automatic regulators, oil and gas separators, bolted tanks, etc. He lives in Tulsa.

HIGLEY, H. V., '15, brought two of his sons and one of his employees to the campus April 27th to prepare for registration in September. Mr. Higley manages the Ansul Chemical Co., Marinette, Wis., manufacturers of liquid sulphur dioxide for the refrigerator trade.

MINERS AND METALLURGISTS

JONES, T. D., '22, is assistant manager of the American Smelting and Refining Company's plant at Perth Amboy, New Jersey. He is in charge of production of all primary and secondary metals produced in the plant.

EHRLINGER, H. P., '25, is now with the Peru Mining Co., a subsidiary of Illinois Zinc Co., of Deming, New Mexico, as assistant general manager.

CIVILS

SMITH, EDWARD K., '14, died suddenly at his home in Beloit on March 9th. For ten years following his graduation he had been first assistant to the city engineer of Beloit. Later, he became associated with the Portland Cemnt Association of Chicago as manager of the Highways and Municipal Bureau.

KOTZ, SAM E., '29, instructor in hydraulic engineering, was appointed assistant engineer of tests for the Tennessee Valley Authority. He assumed his duties last month at Knoxville.

DEVER, HARRY C., '32, was married on December 22nd to Barbara Marie Tharp of McCool Junction, Nebraska. He has been working on a power project near North Platte since July, 1934.

CHRISTENSEN, NEPHI A., '28, is completing two years of graduate work at the California Institute of Technology at Pasadena and hopes to receive his doctor's degree in September. Prior to taking up work at the Institute of Technology, he taught mathematics and sciences at Ricks' College, Idaho. He expects to continue in the teaching field. He is married and has two boys, one five and the other two years old.

CALKINS, ROBERT S., '31, announces the arrival of a daughter, Susan Diane, born March 8th. Mrs. Calkins was Loraine Patnode of the class of '30.

KUNESH, JOSEPH F., '14, is out in Honolulu where he is assistant chief engineer of the Board of Water Supply for the City of Honolulu. His address is 4934 Mana Place.

ADAM, GEORGE H., '31, is a commercial representative of the Wisconsin Telephone Company, in Madison.

WHITE, OMAR, '25, has a position with the government as an engineer on a soil erosion project near West Salem.

SCHROEDER, FRANK C., '07, is chief draftsman, Way and Structures Department, of the Milwaukee Electric Railway and Light Co. His work has included the design of Sec. No. 8 of the Lakeside Power Plant and Sec. No. 1 of the Port Washington Power Plant.

CUMMINS, FRANK J., '30, is engineer with the U. S. Forest Service in Kentucky, which is his native state. He is classed as a locating engineer, but writes that all other work is considered secondary to fire fighting.

SCHAEFFER, ALBERT C., '30, has again been granted a $500 scholarship for next year at Massachusetts Institute of Technology.

ELECTRICALS

WOLFE, HARRY C., '26, a former editor of the Wisconsin Engineer, has recently been made superintendent of a PWA camp. He is leaving a job with the Soil Erosion Service at Spencer, West Virginia.

RUKA, FREDERICK W., '96, died at his home in Boscobel, Wis., on February 14th. Mr. Ruka followed his engineering work in Chicago until 1903 when he was called to Boscobel by the death of his father. Together with his brothers, he took over his father's interest in the Ruka Manufacturing Co. of Boscobel, till the time they assumed the management of the Boscobel State Bank. At the time of his death, Mr. Ruka was vice-president of the bank.

He is survived by his widow, Mabel Shockley Ruka, and one son, John.

お出になりました、お話し下さい

. . . says Tokyo

Translating the symbols, the Tokyo telephone operator says, "The connection is made—go ahead, please." Meaning that now you can talk to Japan from any telephone in the Bell System.

Interestingly, Japanese was the first foreign language ever transmitted by telephone—when in the winter of 1876-77 three Japanese students at Harvard paid a visit to Alexander Graham Bell in Boston. These three men have lived to see the day when they can talk with Boston from their homeland!

Seeking to put the whole world on such easy speaking terms, Bell System service now enables you to be connected with more than 93% of the world's 33,000,000 telephones.

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THE ENGINEER

Who is the man that designs our pumps with judgment, skill, and care?
Who is the man that builds 'em and keeps them in repair?
Who has to shut them down because the valve seats disappear?
The bearing-wearing, gearing-tearing mechanical engineer.

Who buys his juice for half a cent and wants to charge a dime?
Who, when we've signed the contract, can't deliver half the time?
Who thinks the loss of twenty-six per cent is nothing queer?
The volt-inducing, load-reducing electrical engineer.

Who takes a transit out to find a sewer line to tap?
Who then with care extreme locates the junction on the map?
Who is it goes to dig it up and finds it nowhere near?
The mud-bespattered, torn and tattered civil engineer.

Who thinks without his product we would all be in the lurch?
Who has a heathen idol which he designates research?
Who tints the creeks, perfumes the air, and makes the landscape drear?
The stink-evolving, grease-dissolving chemical engineer.

Who is the man that will draw a plan for everything that you desire,
From a transatlantic liner to a hair pin made of wire?
With "if's" and "and's", "howe'er's" and "but's" who makes his meaning clear?
The work-distaining, fee-retaining consulting engineer.

Who builds the road for fifty years that disappears in two,
Then changes his identity so no one's left to sue?
Who covers all the travelled roads with filthy, oily smear?
The bump-providing, rough-on-riding highway engineer.

—From the *Douglas Air News*.

ON SLEEPING IN CLASS

Being of a scientific turn of mind, I have long felt the urge to put my bent to some usefulness and in some way benefit my fellow being by my efforts. When casting around for a suitable subject for serious investigation it occurred to me that one of the most vital problems, the most serious difficulty, and inconvenience in the lives of my fellow students was entirely without solution. In fact so completely was the matter neglected that not a single text on the subject could be found. So, inspired by this golden opening to distinguish myself in the field of science I set about with great zeal to solve the problem, "How to sleep in class."

The first consideration in the study of this subject is a review of the existing methods and their merits and faults. In my intensive study of all the methods in use in the classes I have attended I have come to classify all these into three major groups. A few more novel methods may deviate slightly, but in general these three headings cover the entire field. In rating these methods for their value such matters of prime importance as Safety Factor, Efficiency, and Adaptability will be considered.

The first method, which is in quite regular use at the present time, is known as the Direct or "Flop" method. In operation the offender comes to his class with his lesson slightly or not at all prepared, puts his books on the floor and arranging his arms for a head-rest goes directly to sleep, taking the full chance of discovery and its probable consequences. This method is admirably suited for lectures, and has a distinct advantage in all classes; that of an opportunity for a long period of sound sleep. Against this, however, are a number of serious disadvantages. If he is called upon to recite while thus employed, he is open to immediate discovery and with no answerable excuse, also he is bound to miss out on any interesting or worth while discussions which occasionally take place in all classes. The too frequent use of this method is apt to cause the serious displeasure of the instructor. While the efficiency is in some cases very high, the Safety Factor of this method is extremely low, calculated at about eight and one-half per cent. We do not recommend this method to the conscientious sleeper.

The second method is the less efficient but safer Impulse or Warning method. This requires an accomplice in the seat beside or preferably the user. He goes to sleep very carefully at the right time, first instructing his helper to warn him at any time when there is serious danger of discovery. The helper is provided with a pin or other sharp instrument suitable for the purpose, and wields it in such a place as to be most effective in bringing the victim to his full senses at a moment's notice. At this point a word of warning is extremely necessary. The sleeper must be unusually careful what the first words are that he utters as he gains consciousness. A single "What?" or other interrogative is sufficient to betray the entire scheme.

There are a number of very excellent things to say here. Something vague but impressive such as "Possibly . . ." is very good. Many others will suggest themselves. Even "Yes" or "No" is all right. This method is moderately efficient, and would have a very high Safety Factor if it were not for carelessness at the point just mentioned, which brings it down to about thirty-five per cent.

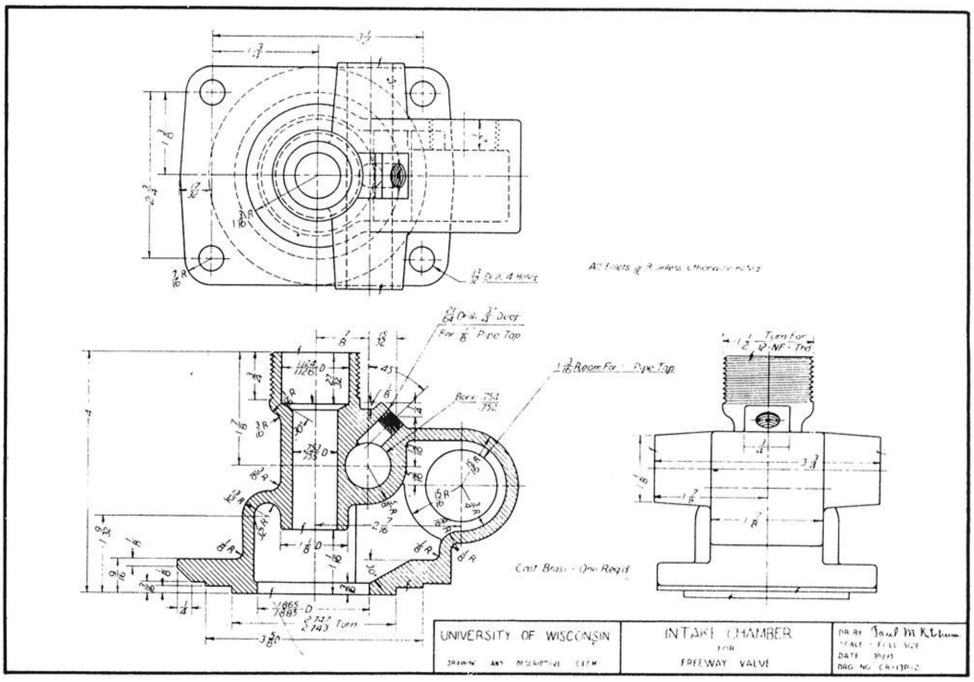
The third method is the doze method. It consists of sitting with the head rested, as comfortably as possible, on one arm, and then letting the mind run to thoughts of such sweet and soothing nature as shall most rest the brain. Although very little actual sleep can be obtained in this way, it is, never-the-less, very frequently used because of its high Safety Factor, which is in the neighborhood of seventy-three per cent.

After reviewing all these methods we see that none of them offer the ultimate solution. Not even a combination of all three can give us all that we require. Only one possible soluiton is left and that is one which has serious disadvantages connected with it also. For the present this is all that I can give you. Remove the cover from your alarm clock and thurst some small obstacle in the way of the hammer; or better still, grasp the clock in the right hand and with a swinging motion propel it out the window. This can be done with the most enthusiasm if it is set for six o'clock in the morning and then operated on immediately upon waking up while it is still ringing. Then sleep through as many eight, nine, and ten o'clock classes as is reasonably possible. By leaving school soon enough before the end of the semester you can enroll again as a Freshman without staying out a semester for your health.

Skill with Pencil and T-square Rewarded in Second Annual Drawing Contest Held by "The Wisconsin Engineer"

By Leslie G. Janett, ch '35

THE second annual mechanical drawing contest sponsored by the *Wisconsin Engineer,* closing on April 30 resulted in the awarding of prizes for drawings submitted as follows: First Prize—Paul M. Ketchum, ch '38, Second Prize—Henry P. Juul, ch '38, Oconomowoc, Third Prize—Lewis L. Sheerar, c '38, Omro, Honorable Mention — Henry Voight, m '38, Sheboygan. All contestants submitted pencil mechanical detail drawings of the part illustrated in the reproduction of the winning drawing shown below. The views were selected by the students in each case, giving them an opportunity to utilize their own ingenuity in describing the object fully. The plates were scored upon the following rating system:



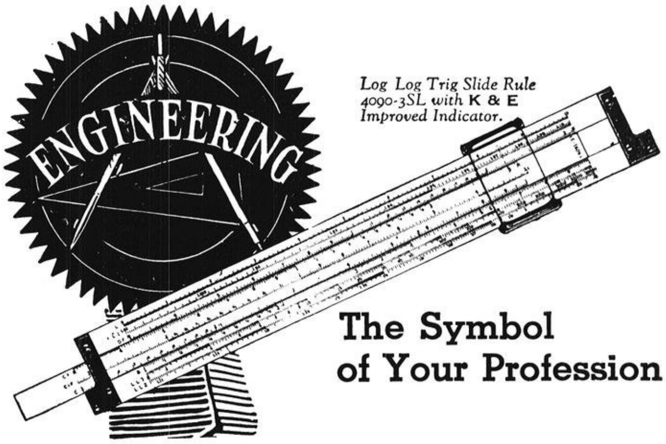
Technique—40%	Lettering—20%
Accuracy—30%	Neatness—10%

W. S. Cottingham, assistant professor of structural engineering, R. W. Fowler, assistant professor of drawing, Extension Division, and P. H. Hyland, professor of machine design acted as judges of the contest. The *Engineer* takes this opportunity to thank these men for their services.

Merchants who generously donated prizes were Photocraft, providing the first prize, an Eastman Kodak; Brown's Book Shop, giving a Wahl Pen and Pencil set for second prize; and Gatewood's, donating a Pocket Slide Rule for third prize. This whole-hearted support of engineering activities is appreciated. The prizes will be awarded at the annual *Wisconsin Engineer* staff banquet to be held during the latter part of May.

Plans are under way to more firmly establish the freshman drawing contest as an annual tradition. *Alpha Tau Sigma,* honorary engineering journalism fraternity is working on a plan to sponsor the annual contest in the future. Professor H. D. Orth and the drawing department staff has co-operated in making these contests possible and it is felt that the event has an entirely justifiable purpose in recognizing, as well as encouraging, freshman students of engineering in their technical achievement.

Arrangements are being made to exhibit the winning drawing for public inspection in the near future. The reproduction of the first prize drawing shown was made from an ink tracing of the original.



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THE CRITICAL ANGLE - - -

In Which Engineers Put Forth Their Comments of the Play on the Stage . .

ARE WE WASTEFUL? Tradition has it that engineers are not on speaking terms with waste and inefficiency, that the quickest way to an engineer's heart is to show him how to better the efficiency of some plant. Perhaps we have been so involved with engine efficiency that we have failed to consider our national wastes. For we have Ralph Flanders, recently Vice-President of A. S. M. E., saying: "The engineers know that if some omniscient dictator were installed as ruler of the United States, they could provide for him raw material, machines, and trained labor sufficient to flood, bury and smother the population in such an avalanche of food, clothing, shelter, luxuries, and material refinements as no Utopian dreamer in his busiest slumbers has ever conceived. The material conditions for productivity are already here, but to control the economic machine we need more than the ability, the means, the raw materials with which to produce."

Can we afford to waste 10,000,000 man-days of labor each day? Labor is not like our resources of coal or oil. When the day is gone, that day's labor is gone, never to return, permanently wasted. Are we so flooded with the things we need to live that we must have these millions cease production?

What of the huge wastes engendered in thoughtless and unnecessary industrial expansion? Rockefeller and Al Smith build towering monuments to their prestige; and half a dozen other office buildings watch a steady stream of tenants heading for a fancier address. Our shoe plant equipment is sufficient to produce 900 million pairs of shoes a year, but we actually make only 300 million pairs. No wonder good shoes are expensive!

Popular belief has it that the lure of gain is what makes our tremendous industrial progress possible. But the Columbia University report on Economic Reconstruction comments: "Some evidence has been adduced which suggests that financial and other vested interests have at times interfered with the promotion and application of new inventions and techniques." Why should Standard Oil let some chemical engineer introduce a cheaper car fuel than gasoline. So such ideas are purchased and pigeon-holded in a hurry.

Engineers have a task ahead of them if they fullfil their mission of bringing mechanical progress, notwithstanding the fixed investments of the large monopolies that have grown up. Elimination of national wastes demands the introduction of national planning of resources. We can no longer afford to waste our man-power and our money on haphazard growth.

PINK LEMONADE OR RED WINE? Not many years ago a student, upon graduation from a law school in this state, went to a learned jurist and asked for a few words of advice that would guide him in his profession. "Son," replied the jurist, "when you go to court to press a case and the facts are not on your side but the law is, build your case upon the law; when the facts are with you but the law is not, build your case on the facts; but when neither the facts nor the law are with you, defile the name of your opponent, slur his reputation, stigmatize his testimony, humiliate him in the eyes of the court until all believe in his ignominy. Therein lies your success when you are on the wrong side."

The recent senatorial investigation undoubtedly began with a sincere desire to clear the university's name of the unjust charges hurled by a well-known newspaper syndicate, but apparently somebody spiked the pink lemonade to make it taste like red wine to our super-patriotic state senators. Their conduct and methods of attack would lead one to believe that neither the law nor the facts are on their side. Certainly we cannot allow its name to be further trampeled on and dragged through the political slime of the present investigation. The damage that is being done will be irrepairable when enrollment suffers a sharp decrease next fall. You as well as the rest of the student body know the falseness and petty ambition behind the charges made by the so-called politicians who libel the university in the eyes of the public.

It is your duty when you go to your home communities this summer to dispel the erroneous beliefs which have been flung into the minds of parents of prospective univeristy students so that decreased enrollment will not be another burden added to the university during these trying times.

HOLD THAT JOB Much as we engineers love to pat ourselves on the backs, we must admit that our foremost achievements lie in the solution of new problems, and that in a society which is just dog-trotting along, there is little place for us. We build new power plants, develop new chemical processes, test new machines, but when we have conquered that particular job, we leave the routine work for others. We are the heralds of expansion.

When we recognize this characteristic of the engineer, we are struck with the thought that modern industry is no longer expanding. Private industry expands wherever there appears to be a chance to reap profits. Without profits plants are closed down even though the goods that they could produce are badly needed. And with the coming of depression then, the engineer is the first to go.

Quite the contrary is true of the government. The function of the government is to do the greatest good to the greatest number of people. Government works, government production, scientific research, proceed apace without regard for the whims of the business cycle in supreme disdain of the lack of profits. So it happens that those who serve their country through working in its employ need not trouble themselves about the security of their jobs.

It is not difficult to see on which side our bread is buttered. If those who produce for profit want us to work for them only when times are good and profits high, they may find that the security of jobs whose basic idea is service has proven too attractive for young engineers to resist. And properly so!

PUBLIC SERVICE ENGINEERS Purdue University has inaugurated a pioneering course in public service for engineers. The student engineers will take the same technical training as heretofore, but they will also master elements of psychology, digest economics, and wrestle with other allied subjects. Commendation is due to Purdue University for their recognition of this crying need in American life, the training of public servants.

Some provision should be made for combining engineering and public service in the proposed University of Wisconsin course of training for public work. Especially some mining, electrical, and civil engineers might find such a combination to their taste as they observe the lack of job opportunity that appears to be prevalent at the present time, indeed, a lack which appears likely to continue. Although Wisconsin cannot lead in this endeavor, it has an opportunity to follow readily the trend of the times.

For young engineers public service holds bright opportunity. Job security, steadiness of employment, regular salary, and the chance to serve one's fellow men, all these are entailed in government employment. The chance to become trained both as engineers and as public servants will be welcomed at Purdue University, at the University of Wisconsin, and at many other schools.

INVESTIGATION OF SUMMER CAMP MESS EXPENSES

Charging exhorbitance in mess expenditures at summer camp, attendance at which is required for graduation of civils, Albert Gollnick, c'4, has circulated a petition demanding an investigation of the records of the camp. The petition, addressed to Dean Turneaure, is signed by civils who expect to go to camp this coming summer.

In answer to the charge, Frank T. Matthias, instructor in the surveying department and summer camp steward, points out the fact that the books are available at any time to interested persons. He says that petitioning students have made no effort to obtain the information they desire. Matthias is preparing a summarized report of 1934 camp expenditures to be submitted to the dean.

Prof. Ray S. Owen, topographical department, was ired to learn that the petition was directed to the dean, instead of directly to him. "I want the fellows that go to camp to get the maximum possible pleasure from their six weeks' stay," he said. "I have assumed that the method of running camp and the mess expenses has been satisfactory to the students because no criticism has before come to my attention.

"Of course, expenses could be cut by discontinuing such luxuries as the prom and the Fourth of July celebration."

A mess committee, elected each summer by students attending summer session, passes on all mess fund expenditures. Prof. Owen says that in the past he has had to exercise a temporizing influence, on the committee, since they have been inclined to ask for more and better foods rather than less. He is willing to let the committee have complete charge of these matters this year if they will take the responsibility.

Gollnick and Luna Leopold, c'3, are contemplating doing their own cooking if the cost of the camp board is not reduced. Board expenses per student have in the past ranged between $9 and $10 per week.

SUCCESSFUL WISCONSIN ENGINEER

HOTCHKISS, WILLIAM OTIS, '03, C. E. '08, Ph. D. '16, who is at present President of the Michigan School of Mines, represents not only a successful Wisconsin engineer, but also one who has distinguished himself in the field of education.

Mr. Hotchkiss began his interesting career by serving as chief of party with the Leith Exploration party for the years 1903 and 1905, the intervening year 1904 being spent with the Donora Mining Company. During the years 1904-1906 he was also instructor in geology at the University of Wisconsin. Between the years 1906-1925, he did a great deal of geological and experimental work, being connected with the Geological and Natural History Survey of Wisconsin and also in charge of the economic geology in the state, of which he was a director from 1919-1925. As early as 1907 he began state highway work in Wisconsin and finally succeeded in having a State Highway Commission formed, of which he was a member from 1911-1925, being chairman in the years 1923-1925. In 1925 Mr. Hotchkiss became President of the Michigan School of Mines, which position he holds at the present time.

He has written numerous technical articles and several books relating to Wisconsin geological explorations and investigations, and has also memberships in various societies, among them being: A. I. M. M. E., Wisconsin Academy of Science, Arts and Letters, National Research Council, and A. A. A. S.

A SLICE OF "PI"

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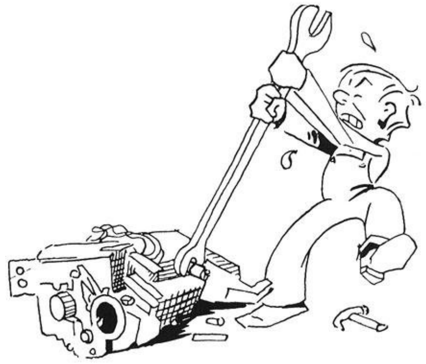

CLASS PROPHECY

By

J. "Slicer" Smithwick

It was in the year of 1975 when I, as president of this fair nation looked forth over the broad expanse of mountains and plains and saw a sight both pelasing and sad. I had just signed an appropriation called the Civil Engineering Benefit and Pension Act whereby the graduates of 1935 would receive two meals a day and lodging for constructing railroads and then building overheads over them. With my telescopic eye, I saw Carl Amundson, a Haresfoot derelict, leaning on a shovel in Squirrel Canyon. Near him, resting on a pick handle, was Tommy Gilbert wondering why in hell he had ever taken Structures 5. Bender and West were sitting on a boulder which they were planning to roll soon. My eye now moved to Mud Gulch where I perceived Tau Bete Wernisch driving a team of dapple grays hitched onto a wheel scraper and quoting formulas as he had memorized in Math 55. My orb transferred its line of sight to the camp to spot Neroda peeling spuds for cook Shorey, who was debating whether to use a 1:1½:3 or 1:2½:4 mixture in the day's menu. Only six men had slumped the day before and he wanted a slump of nine. Peering into the camp infirmary, I saw Zielshsdorf, Vogel, Van Hagan, Gollnick, and Ree writhing in pain from the spud diet. I immediately resolved to hire more cooks of the same caliber, and thereby reduce the number of unemployed.

Focusing my gaze on Gopher Hole, Montana, I sighted Jones constructing a relief station for the members of that camp — his sanitary engineering was aiding him materially. Kummer had designed the structure and already there was a decided lean to it.

Sitting beside a barrel of government inspected beer was La Chapelle, 3 point Randolph, Villemonte, Crandall, Anderson, Ackermann, Olstad, and Price, designing an easier method to kill time while on federal pensions. I suddenly remembered that some electricals had graduated in 1935 also, so I immediately began to look them up. I detected a bunch of them over in Schenectady returning to a transients' home from a parade they had just held in protest against federal apathy in electrical industry. They wanted food from the federal government and not from the city. Sensing danger in this frenzied crowd of hoodlums, I immediately ordered Wendt, Bloom, Johnson, Kaska, Moore, and Zimmerman to be deported as "Reds." I remembered that they had hung a red flag above Bascom in their student days. Poast, a veritable dynamo because of these deportations, had to be placed in a straight jacket from whence he immediately fashioned E. E. textbooks for mechanicals and chemicals.

Passing over Pennsylvania, my eye rested upon a lone man sitting above an excavation. Peering beneath the grime and coal dust, I recognized Bert Gallistel who was debating whether he should strike again or mine some more anthracite.

Attracted by an explosion on Lake Erie, I shifted my gaze over in that direction and got a glimpse of a Scotch marine boiler going skyward. Seated on the top of it was Professor Rose surrounded by Rogers, Jasper, Van Ryzin, Wilson, Hodgins, and Lorenz, chief fireman and oilers of the just was U. S. S. Paducah.

Following closely behind on a smokestack was Bert Zien pouring over a new six-year plan that he had formulated for the University of Wisconsin Engineering College. The specific case of Gene Skinner had prompted this new plan. Shooting throught the air astride a bathtub came Skinner, purple with rage because this explosion had caused him to lose another job.

The presidential eye passed by this scene with no regret and proceeded to pleasanter things.

I then decided to broadcast the glad tidings of my recent survey and so directed vice-president Schink to bring in the microphone. (Schink had been useless in everything he tried so I made him vice-president.)

The various cabinet members then filed in, Secretary of Labor Bardelson, Secretary of Treasury Robisch, Secretary of War Gurda, Secretary of Interior (decorating) Rosten, Secretary of Navy Jones, Secretary of State Kowalke, and Secretary of Agriculture Gay.

The Senators and Representatives, a motley crew indeed, followed. They were fellows whom the home people had grown tired of listening to and so had sent them to Washington. Among this rabble, I detected Elliott, Gapen, Seaborn, Wink, Wiegert, Bogan, Edmund, Schaper, Ginsberg, and Burnham.

The Announcer, a tall, emaciated, bald-headed individual, slunk in nervously handling a few sheets of paper. Knake had received his start as an announcer at a Harefoot Premier back in 1935. A trifle befuddled then, he was more so now but the people liked him and I looked out for the peoples' interest.

After praising the people for rushing toward that corner Hoover had made famous and his successors perpetuated, I sat back to reecive the telegrams of congratulations.

Immediately telegrams (all collect) began to pour in — one from Haslanger, janitor of Chadbourne Hall, Madison; others from Janett, Cook, and Tock who now ran an accountants' office since they had worked all their Ch. E. 116 problems together during School Days. I received a threat from H. Hooey Norton, dictator of Pine Stump, Wyoming, but I was used to them and so passed them off with a benevolent smile as my all-seeing eye passed over my contented people again.

● McGonigle "the Great" Deno and "Parallax" Blong caused a great sensation by carrying a stadia rod into one of Madison's "two by four" busses.

● **Power of the Press**

When Gordy Harmon heard that a story was going to be published about him pushing a sparse growth of fuzz around with his upper lip, he immediately washed it off.

● **A Shocking E. E. Trip**

Whiteside and Welch visited Globe Union six times within an hour, and their interest wasn't technical.

Miedauer blossomed forth as a coatless Jan Garber, directing an orchestra in one of Milwaukee's more refined joints.

Siefert couldn't take it and so deserted Miedauer early in the evening.

While Miedauer was directing the orchestra, Pruet did a dance of the "seven veils."

Pruett, caught in the act of purloining a sign, rushed outside with it only to discover that he had left his overcoat inside.

Harry Wilson met a Milwaukee nurse one evening and he hasn't been the same since.

● **Diplomacy**

The senior mechanical trip schedule called for a free morning Thursday. Pat Hyland, realizing that the White Sox were playing the Yanks that afternoon and not wishing to make his wishes too evident, asked a group of students to circulate a petition requesting that the afternoon be set aside instead of the morning. It worked.

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LET'S LOOK AT STRESS

(Continued from page 128)

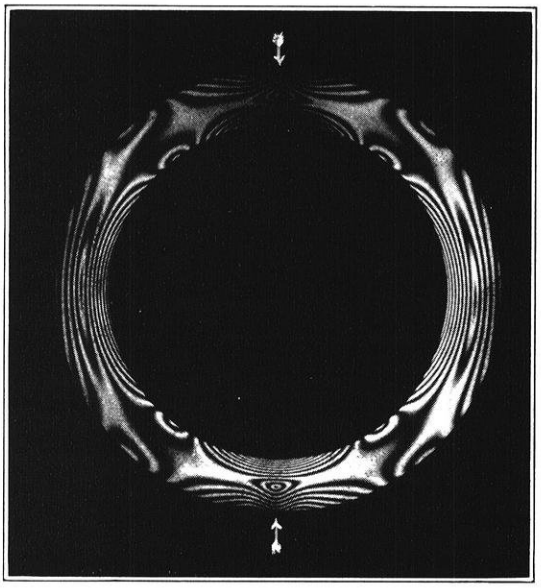

Fig. 3

Fig. 4 is the fringe photograph of a bakelite model of the standard Portland cement mortar briquette specimen. It is loaded through a standard pair of grips as used in cement testing. The four points from which the closely spaced fringes emanate and to which they are tangent are the points at which the grips hold the specimen. The stress in these regions is compressive, and although high, is of little practical importance, as mortar is extremely strong in compression. The critical stresses are tensile and are the ones at the edges of the center cross section. At these points an individual element is subjected to axial loads only, whose directions are tangent to the edge. Thus one of the principle stresses is zero, and knowing the thickness of the model the other one may be readily found by counting fringes to determine the fringe order at that edge. In this photograph the fringes at the edge are of the third order.

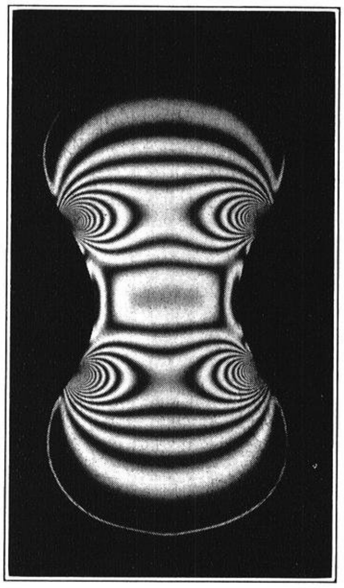

Fig. 4

Our investigations have shown that this maximum tensile stress at the edges is 1.73 times the average value of tensile stress across the section. This factor, 1.73, is called the stress concentration factor for the briquette, and agrees closely with the results of other investigators.

The use of the photoelastic method is finding more and more favor in the investigation of stresses in intricate machine and structural parts. The device in our laboratory is available for students who elect to do thesis work in this field.

HOW'S THE WEATHER?

How can one compare temperatures of one city with another? How hot or cold will you be at the location of your new job? Wisconsin engineers are graduating in June and will go to all parts of the country. Within the last year some have gone to the Tennessee Valley and others who are going are asking about the climate.

Maximum or minimum temperature of the extreme day of the year is one method of comparison, the average temperature for July or January is another, and the average temperature throughout the year a third.

Mr. Lenz of the Hydraulic and Sanitary Engineering Department was in Knoxville last summer and found the temperature records were not so much higher than those in Madison, but it was hot all the time. A study of the Weather Bureau records confirms this observation. He studied the data for cities scattered across the country which have reputations for being hot, cold, or temperate. The results are given in the table below, and are based on the duration of hot and cold temperatures.

TEMPERATURE RECORDS — Oct. 1, 1933 to Oct. 1, 1934

City	Number of Days with Maximum Temperature Over			Number of Days with Maximum Temperature Under		
	100°	90°	80°	30°	10°	0°
1. St. Louis, Mo.	23	69	123	9	0	0
2. New Orleans, La.	0	58	186	0	0	0
3. Knoxville, Tenn.	3	47	144	3	0	0
4. Denver, Colo.	1	41	103	21	0	0
5. Washington, D. C.	2	39	118	16	0	0
6. Los Angeles, Calif.	1	28	105	0	0	0
7. Madison, Wis.	5	28	70	47	8	2
8. New York, N. Y.	0	9	70	25	1	0
9. Portland, Oregon	0	9	50	0	0	0
10. Duluth, Minn.	0	6	32	96	20	7

Last summer was unusually warm, however, so a comparison of last year with the average record for 19 years has been made for Madison. On only one day in the 18 years previous to last year was the official maximum temperature 100° or greater. Last summer this occured on 5 different days in Madison.

TEMPERATURE RECORDS FOR MADISON, WIS.

	Number of Days With Maximum Temperature Over			Number of Days With Maximum Temperature Under		
	100°	90°	80°	30°	10°	0°
Oct. 1, 1933— Oct. 1, 1934	5	28	70	47	8	2
19 Year Average	0.3	10.6	55.9	51.1	8.6	1.6

It is interesting to note from the Madison record that when monthly averages are compared, that in the last 67 months, 45 months have been above the 43 year average while only 22 months have been below this average.

Much of the tabulation of data has been made by W. C. Reesman, a freshman engineering student, working on a WERA appointment at the Hydraulic and Sanitary Laboratory. This work has been done at odd moments when the regular experimental work to which he has been assigned has conflicted with other work at the laboratory.

SEAMLESS STEEL TUBES

(Continued from page 132)

remains on the surface of the tubes a hard brittle scale which must be removed before cold drawing can take place. This is accomplished by laying bundles of tubes in huge vats of dilute acid, a water rinse, and then a lubricating compound for the drawing operation. The drawing is done on chain draw benches. A tool steel die hardened and polished to mirrorlike smoothness is used. The mandrel, likewise hardened and polished, is held in place at the end of a bar to which it is securely fastened. Before drawing begins the mandrel and bar are inserted into the tube, and the tube is drawn over the mandrel and through the die, resulting in a beautiful, long, smooth, bright tube, somewhat hard and brittle, but true to dimensions within slight tolerances. The tubes must then be annealed before they are ready for shipment. Any shape requested by the customers is formed in the tube form department.

The foregoing is by no means the latest in steel tube manufacturing, for the Globe Steel Tubes Company of Milwaukee, Wisconsin, has now perfected a rolling mill invented by Pehr A. Foren that will outdo in production and perfection of product all other mills known. This "Foren Mill" as it is called, combines the rolling and reeling operations into one and is a revolutionary step in the manufacture of Seamless tubing. Thus we see that the industry is constantly moving forward toward better methods and better products and the method of tomorrow may be completely changed from the method of today.

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« CAMPUS ORGANIZATIONS »

A. S. C. E.

Go to a good jeweler and pay a fairly high price for your diamond if you do not know stones and you want a good one, was Mr. Janda's advice to the civil engineers. Mr. Janda's talk was on his hobby "gems" which he began while at the University of North Carolina. He advises all men to have a hobby as a means of clearing the mind of problems and worries.

Mr. Janda brought with him his collection of precious and semi-precious stones and as he passed them around he explained their worth, method of cutting, and the means of distinguishing one stone from another. He also had a number of synthetic stones which cannot be told from the real ones except by an expert.

During the business meeting it was decided to have a picnic with baseball, eats, and "tea" on May 19 at 2 p. m. A short business meeting will be held May 22 for the purpose of electing officers. On May 29 A. S. C. E. will sponsor a showing of the TVA pictures "talkies" as Bascom Hall — everybody welcome.

CHI EPSILON

Five civil engineering students were initiated as members of Chi Epsilon at a banquet held April 10 at the Memorial Union. The men honored were: James R. Villemonte '35, Albert J. Anderson '36, John L. Shipman '36, Joachim Liebmann '36, and Tom Heebink '36. W. S. Cottingham acted as toastmaster and James R. Villemonte, initiate, responded to president William O. Ree's address of welcome. Profesor E. R. Shorey gave an interesting talk on his experiences as a consulting engineer for a Canadian gold mining company. Besides active members of the chapter the banquet was attended by Dean F. E. Turneaure, Walter H. Tacke, L. J. Markwardt and R. S. Hartenburg.

A. S. M. E.

A. S. M. E. held open meeting for all engineers or those interested.

Mr. A. H. Felters, engineer for the Union Pacific Railroad, gave a very interesting talk on streamlined trains.

The reasons for and the advantages of the new type of construction were very well discussed.

The meeting was very well attended. Souvenir Lucky Pieces were distributed.

Lantern slides were shown of the various phases in the construction of the train as well as of the completed train.

Some of the details of the new Diesel engine were described. A new type of automatic brake was also described by means of which there would be no danger of locking the wheels causing flat spots.

MINING CLUB

Professor C. Emmons of the Geology department was the guest speaker at a Mining Club supper held Wednesday, May 1. Professor Emmons delivered an interesting, illustrated lecture on diamonds.

The Mining Club has been notified of its acceptance as a Student Affiliate Chapter of the A. I. M. E. The president and the secretary of the A. I. M. E. are expected to visit Madison sometime this month.

POLYGON

The major accomplishment of Polygon the past year was to install the student activity plan. Aided by the faculty of the college and the staff of the *Wisconsin Engineer,* the activity plan was launched with almost 100 per cent participation by the students.

The first social event of the semester under the new plan was the smoker. Prof. Mathews talked to 450 engineers on "Ballistics." His talk was followed by musical numbers by the Busse Brothers and dances by the "Engineers' Sweethearts," the Williamson sisters. The smoker ended down in Tripp Commons with beer and sandwiches.

The dance was held December 7 and was attended by 700 couples who danced to the music of Larry O'Brien in Great Hall and Ken Simmons in Tripp Commons. The attendance at this affair was second only to Junior Prom and Military Ball.

At the beginning of the second semester an amendment was proposed to the student body for their approval whereby each person obtaining a ticket for the dance, would pay a service charge of ten cents to defray the cost of tickets and other incidentals. The vote was favorable by a five to one majority.

James McDonald, a local lawyer, took heart and entered the lions' den when he spoke at the second smoker of the year. He told the truth about Paul Bunyan. Pat Smith led the singing with his accordion and a very loud time was had by all.

Benny Ehr and Larry O'Brien played for the second dance of the year. This event was also largely attended.

The annual St. Pat's Parade was held under the supervision of Polygon and like the other Polygon activities was a success.

The success of the activity plan this last year speaks well for its future.

The graduating members of Polygon are Bert Gallistel, Ernest Ziehsdorf, Albert Vollenweider, Brewster Buxton and ohn Smithwick. The newly elected officers for next year are: President, Oscar Welker; Secretary, Carl Mathias; Treasurer, Joe Hougen.

Here's to a greater student participation and success of the activity plan for next year.

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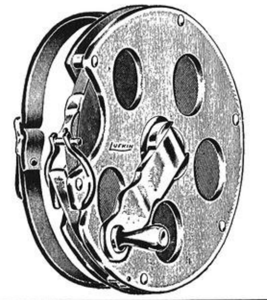

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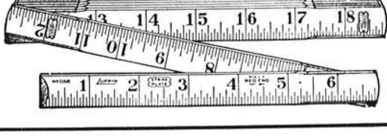
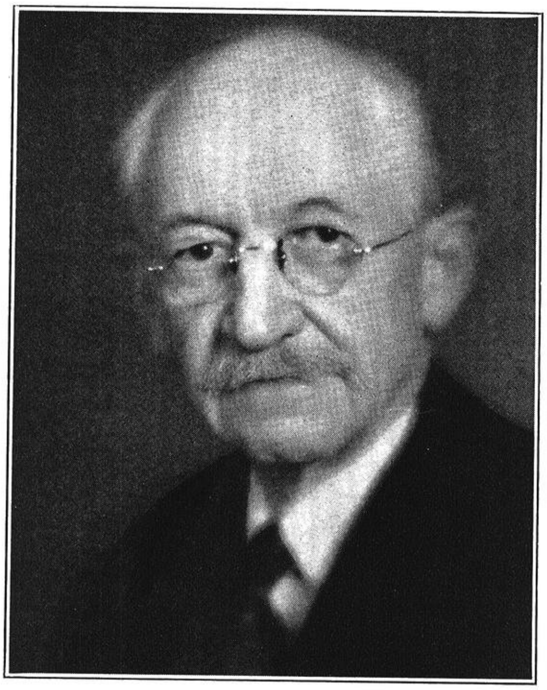


A Successful Year Comes To a Close

DEAN F. E. TURNEAURE

IN the year now ending, there have occurred a number of events of interest to engineering students and which are worth mentioning. The attendance in the College is now on the increase after a decrease for a period of two years. The freshman class is now of the normal size of three or four years ago. Somewhat larger numbers are entering to advanced standing in the sophomore and junior years, transferring from the Extension Division in Milwaukee and from the various state teachers' colleges and other institutions. Some of this increase is doubtless due to the desire on the part of the students to secure a part of their work near home and at less expense. Such transfer students are given every opportunity to fit into the program here with the minimum loss of time. Opportunities for employment are improving, and the continued interest of young men in the engineering profession will, we believe, prove to be justified.



Changes in the curriculum during the year have not been material, but serious attention is being given to the question of increased instruction in subjects of special value to those graduates who are interested in administrative features of engineering practice. In a few schools, special four-year courses have been organized in administrative engineering, but it seems likely that the better program is to offer certain additional courses of instruction along this line which can be made available as electives for students in all courses. A large percentage of our alumni now hold administrative positions, and it is doubtful whether a large amount of time spent on special subjects while in school, to the exclusions of an equal amount of technical subjects, would have been of advantage to these men. As has been clearly shown by addresses given by our older alumni, the engineer's career depends primarily upon his own native ability, supported by sound preparation in the fundamentals of engineering science. This we believe to be a correct statement, and the faculty will make no changes in the curriculum which eliminate fundamental studies. It must be said, however, that the administrative function of the engineer is becoming increasingly apparent, on account of the increased service demanded from the engineer in the construction and operation of works by various governmental units. Touching on this same general subject is the work of a University committee, during the past year, which has been interested in the extent to which the social implication of various university courses has been brought to the attention of the students. This question is very pertinent with respect to the work of the engineer, and the significance of the various fields should be made clear to the student.

The research activities of the College have gone steadily forward during the year. Professors O. P. Watts, M. O. Withey, J. B. Kommers, Edward Bennett, Lewis H. Kessler, and Scott Mackay have devoted their entire time for one semester to research work, being supported therein by the Alumni Research Foundation. A bulletin by Professor Kessler on the Hydraulics of Erosion Control Structures has been published, and has proven to be of very great value in this work throughout the country. Professor M. O. Withey and Mr. Kurt Wendt have published a bulletin on the Strength of Light Steel Joists, containing results of a number of years' tests in the Materials Testing laboratory. A number of other research papers have been published in Transactions and periodicals, and the more important of these have been issued as reprints, with title page indicating the contribution from our laboratories.

The new plan of collecting a student activity fee covering subscription to the *Wisconsin Engineer* and dues to student sections of societies has, it appears to me, clearly proven its value. It should be supported by the students, as it is well worth its cost. It serves directly by giving necessary support to college activities, and indirectly by increasing the intangible but very valuable thing called *esprit de corps* among engineers. Those responsible for the publication of the *Wisconsin Engineer* have been working under difficult conditions during the past two or three years. They have worked hard and have done a good job and merit the hearty support of the facutly and student body of the university.

Wisconsin Engineer

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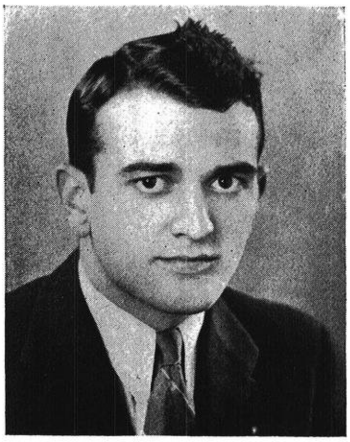

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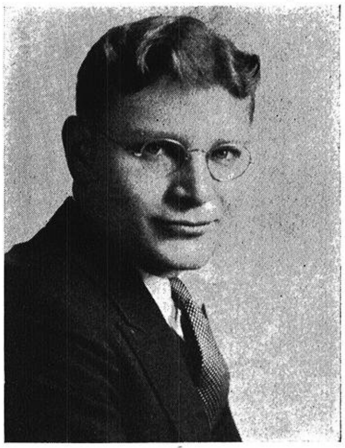

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AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS

The American Institute of Electrical Engineers was founded in the year 1884 for the purpose of bringing together, for the mutual benefit of all, members of the electrical engineering profession. In 1903, provisions were made under which student branches could be established throughout the country. These branches were established for the purpose of aiding in the development of the latent abilities of students by encouraging their participation in the branch meetings. It was under this plan that the University of Wisconsin student branch came into existence.

Under the new plan inaugurated by the Polygon club which assesses a blanket fee of one dollar upon each engineer, entitling him to membership in the society, which carries on its activities in his respective course in engineering, the institute has been able to increase the scope of its activities, in addition to making the organization financially more stable.

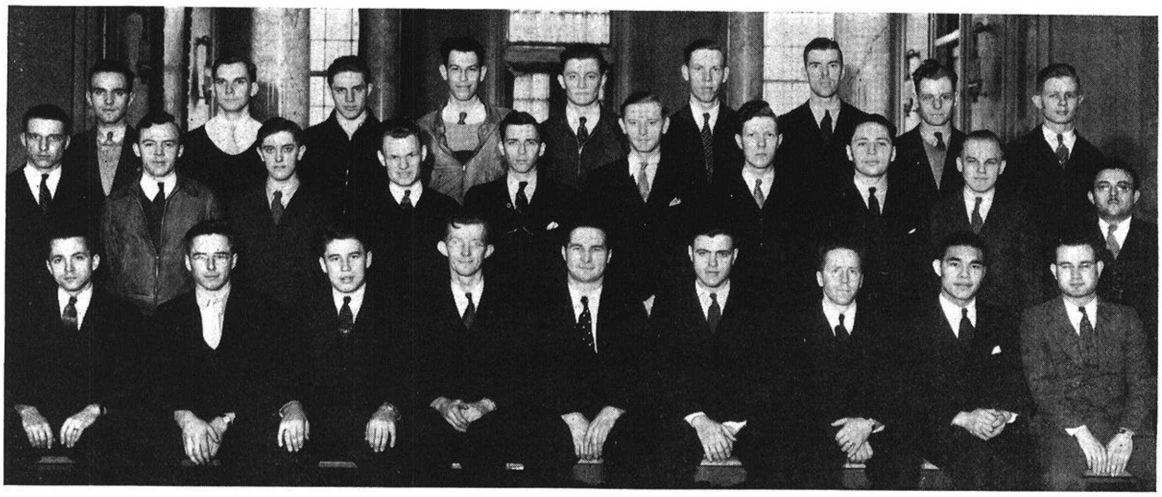
As an integral chapter of the national group, it functions as a distinct and separate unit for the benefit of its student members. During the past year activities of the society were more diversified than those of any previous year. They included the presentation of papers and treatises of interest to the profession and the addresses of well-known speakers on subjects pertinent to the aims of the society. Most of the programs were augmented by moving pictures and slides as well as informal discussions entered into by the students.

The inspection trips made to power plants, laboratories, and manufacturing plants given at periodic intervals proved to be of a highly informative nature.

The activities of the institute are not entirely technical, however. The society lent valuable assistance in making the St. Pat's Day Parade a success this spring, as well as the social activities sponsored by the Polygon Club during the year.

Albert Vollenweider acted as president of the institute during the past year.

☆



1935 Chapter of the Institute

CHI EPSILON

Graduates

Burr H. Randolph — Wayne N. Volk — Joseph W. Zack

Class of 1935

William C. Ackermann
Laurence E. Bidwell
Loris B. Brinkman
Albert J. Gollnick
J. Everett Henry
Edward K. Neroda
Reginald C. Price
William O. Ree
James A. Rhodes
Edwin R. Shorey, Jr.
James R. Villemonte
George R. Wernisch
Paul H. West

Chi Epsilon was founded in 1922, at the University of Illinois as a national honorary civil engineering fraternity. The purpose of the fraternity, according to its constitution, is "to place a mark of distinction upon the undergraduate who has upheld the honor of the department by high scholastic ability, and to provide him with an incentive to greater achievement in the Civil Engineering profession."

The society has co-operated with other engineering groups in instilling in the minds of new students entering the College of Engineering the value of the pursuit of scholastic distinction. One of its most valuable functions is the practice of maintaining a critical survey of the civil engineering school curriculum.

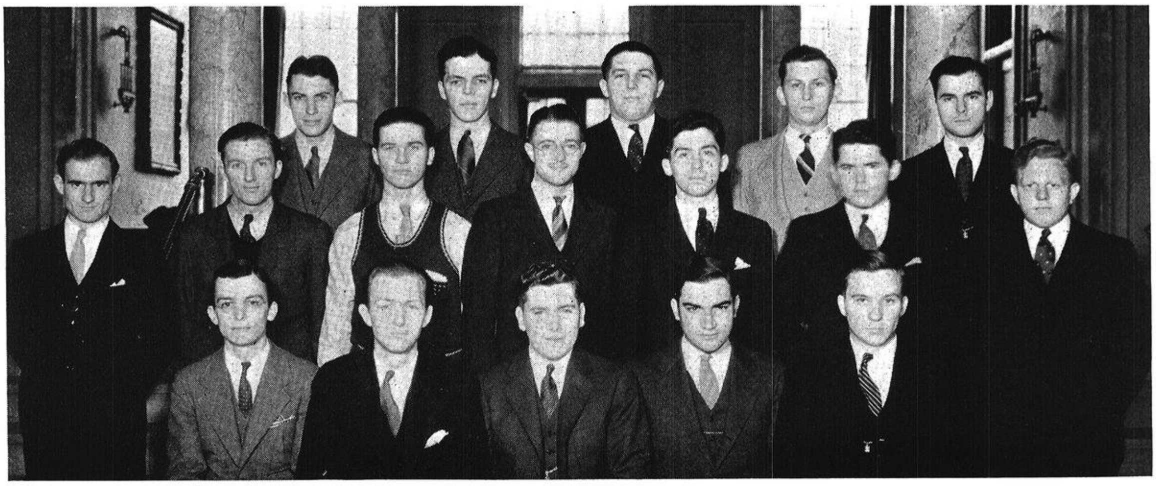
The local chapter, founded in 1925, carries out an active program to stimulate interest in engineering activities. This program includes inspection trips to points of professional interest and monthly discussion groups.

During the past year, William O. Ree acted as president of the fraternity.

☆

Class of 1936

Albert J. Anderson
Lee W. Crandall
Tom E. Heebink
Don H. Kutchera
Luna B. Leopold
Joachim E. Liebmann
Carl D. Matthias
John L. Shipman
Eldon C. Wagner



Gollnick — Henry, Zack, Crandall — Shorey, Kutchera, Ackerman — West, Brinkmann, Ree — Neroda, Price, Leopold — Bidwell, Rhodes, Matthias — Wagner

ETA KAPPA NU

The national association of Eta Kappa Nu was founded at the University of Illinois, in 1904. The organization was founded by a group of Electrical Engineering students to unite those men, who, either in college or practice, had shown exceptional ability and great interest in the field of Electrical Engineering, into a unified group for the common good.

Theta chapter of this national honorary fraternity was founded here in 1910, and is one of twenty-three composing the national membership. Since 1910, it has been growing steadily both in numbers and in spirit. The local organization started by instituting the policy of developing and following a constructive program each year. During recent years, projects of value to the department of electrical engineering have been started by the chapter. The past year's program included dinner meetings, with faculty members present, for the purpose of discussing problems of mutual interest.

During the past year Albert Vollenweider acted as president. Faculty members who are honorary members of Eta Kappa Nu are Edward Bennett, John R. Price, and James W. Watson. Other members of Eta Kappa Nu on the faculty include Royce E. Johnson, Grover C. Wilson, Ludvig C. Larson, R. Ralph Benedict, Frederick A. Maxfield, Vernon M. Murray, and James G. Van Vleet.

☆

Class of 1935

Albert Vollenweider, Jr.	Robert Bennett
Harold Goldberg	Maurice Jansky
Harold Jury	Elmer Mohaupt
LaVerne Poast	John Soule
Nean Lund	Richard Jones
Fred Kuehn	Charles Fiedelman
Joseph Kuzela, Jr.	Evan James

Karlton Krasin

Class of 1936

Richard Davis	Roland Hertel

Soule, Jones, Hertel, James, Kuzela, Krasin, Davis, Mohaupt
Jansky, Lund, Vollenweider, Bennett, Goldberg

PI TAU SIGMA

Class of 1935

Lester G. Ahrens
Harold W. Alyea
Roald Amundson
Fred J. Bechtel
George M. Hausler
William P. Hodgins
Cletus Jasper
Thomas V. Johnson
C. Bradford Kniskern
Irving R. Kraemer
W. Russ McMahon
Harold C. Mittelstaedt
Harlan D. Pfanku
Wilfred Pollock
Alex F. Robertson
William J. Van Ryzin
Roger K. Smith

Class of 1936

Allen W. Cole
James J. Cadwell
Leroy Griffith
Edward Gross
Leo S. Nikora

Pi Tau Sigma is an honorary national fraternity for students of Mechanical Engineering and others practicing that profession. The object of the organization is to foster the high ideals of the engineering profession, to stimulate interest in mechanical engineering departmental activities, and to promote the mutual professional welfare of its members in college and in practice.

Early in 1915, simultaneously, and unknown to each other, local honorary mechanical engineering fraternities, were organized at the University of Wisconsin and at the University of Illinois. On March 12, 1916, in Chicago a meeting of honorary and active members of both Wisconsin Alpha and Illinois Alpha resulted in the joining of the two local brotherhoods into a national organization under the name of Pi Tau Sigma.

Pi Tau Sigma now has 15 active chapters with a total membership of 1,775 on September 1, 1934.

☆

Amundson Jasper Kraemer Griffith Hodgins
Peot Ahrens Hausler Cadwell Robertson Johnson
Gross Nikora Alyea Kniskern Smith Mittelstaedt Van Ryzin

American Institute of Chemical Engineers

The American Institute of Chemical Engineers is a national society of high standing. It has grown rapidly in spite of the fact that this is the youngest of the engineering societies. The requirements for active membership are extremely rigorous and there are only about a thousand such members in the United States. From the start the institute has been chiefly interested in fostering and improving chemical engineering education in the United States. To further this aim, student chapters have been established at many of the leading engineering schools.

The local chapter has been in existence since June 27, 1923 and its membership includes with only a few exceptions, all of the students in the chemical engineering course. The institute has conducted meetings at which speeches of a highly informative character have been given.

The aim of the American Institute of Chemical Engineers is primarily to demonstrate to the undergraduate chemical engineer just what sort of a profession he is seeking to enter. It is with this aim in mind that the society has chosen the speakers for its meetings. They have been successful young men; in industry long enough to achieve something, but not too long to have forgotten what the start was like.

Neal P. Olson and Willis F. Parrott, Sophomores, tied for the highest scholarship in the course in their Freshman year, were awarded certificates and badges by the society.

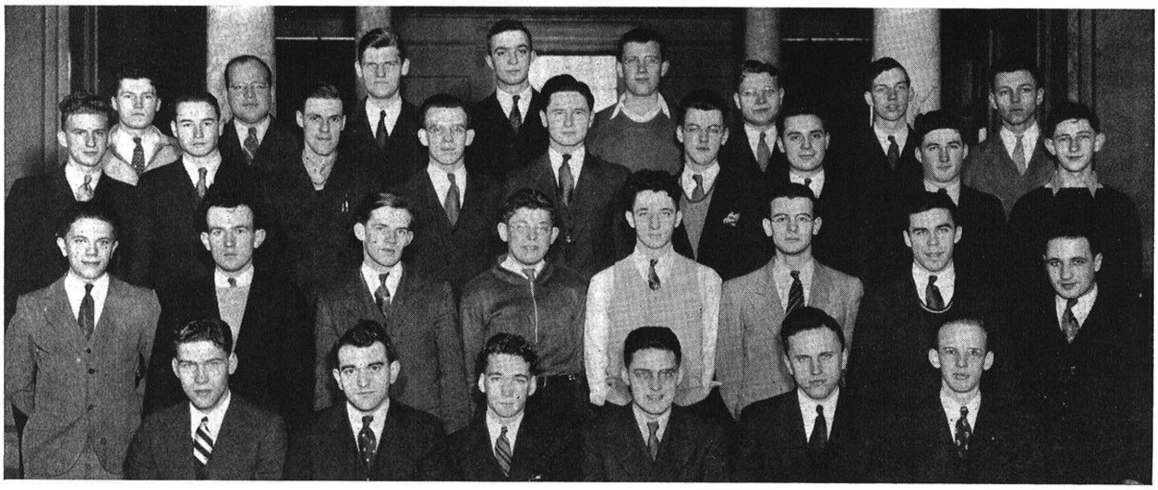
☆

Class of 1935

Margaret A. Bardelson
Charles M. Beach
John S. Bogen
Thayer W. Burnham
George H. Cook
John Dedrick
Eugene L. Eastwood
James M. Edmund
George Elliot
William Fluck
Clark Gapen
William Gay
Saul Ginsberg
Ray Grange
Ralph Hammann
Robert Haslanger
Leslie Janett
William Jones
Robert J. Knake
Phil Koch
Harry J. McCauley
Philip Morris
Roland Ostrander
Glenn Pelton
Robert Ricker
Sylvester Robisch
Ralph N. Schaper
Norbert Schink
Blaine Seaborn
Edward Shealy
Joe H. Smart
John T. Smithwick
Wilfred H. Tock
Lester O. Wiegert
Kenneth R. Wink

Class of 1936

Carl B. Beck
Erhart W. Brandt
Kenneth M. Brown
Bruce J. Buhmann
Harvey D. Burke
John Crossett
Michael Domanik
James Gillies
Donald Gordon
Charles Gruber
Charles Halamka
Bert Head
Merten Hemstead
Roger Hoffmann
Lyle B. Hoskins
Joel O. Hougen
M. Lee King
Joseph W. Koresh
Edward G. Kornreich
Howard M. Kumlin
Robert K. Kusel
Milton A. Lefevre
John McCall
Harrison C. Mayland
A. A. Mohaupt
Lawrence C. Pagel
Robert A. Parson
Norbert J. Peplinski
Edward A. Pfistor
David C. Phillips
Robert Rapp
Werner Riegler
Robert Ritchie
Fred Schwanberg
Earl Senkbeil
William Senske
Charles Sine
Jannis O. Theune
S. R. Urschel
Richard J. Van Dyke
Donald E. Werve
Henry S. Williams
Tom J. Williams



Hougen Theune Rosten Knake Wiberg Tock Pelton Senske
Grauer Ritchie Elliot Herzog Smithwick Juul Fluck Conway Ginsberg
Hamman Jones Gay Herning Goetz Beals Wiegert Domanik
Schink Janett Burnham Wink Robisch Cook

AMERICAN SOCIETY OF MECHANICAL ENGINEERS

The American Society of Mechanical Engineers was founded in 1880. It was soon found that a link between the practicing engineers and engineering students was needed, and it was with this in mind that the national society undertook the formation of student branches. The plan was distinctly successful from the start.

The Wisconsin student branch of A. S. M. E. had its inception in 1909. The group has been exceedingly active this year, and has had bi-monthly meetings at which talks and films of technical interest have been presented. Last fall the Wisconsin branch held a joint meeting with the Marquette branch. On April 16, the society heard a talk by the chief engineer of the Union Pacific Railroad. The meetings aren't entirely technical, however, for the members of the mechanical engineering school have been invited to the society's smokers.

C. Bradford Kniskern acted as president during the past term. Other officers were: Reginald T. Saue, vice-president; Alexander F. Robertson, secretary; Roald H. Amundson, treasurer.

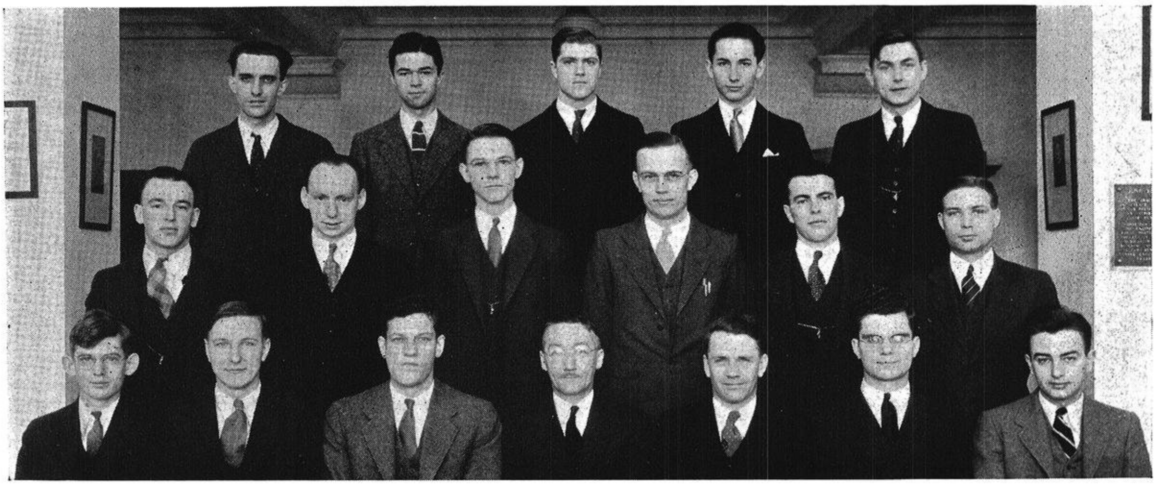
☆

Class of 1935

Harold R. Albert — Alexander F. Robertson
Roald H. Amundson — Roger K. Smith
Cletus L. Jasper — William J. Van Ryzin
C. Bradford Kniskern — Rushen A. Wilson
William W. Meade — Burton J. Zien

Class of 1936

Edward C. Jungmann — Otto Mueller
Robert W. Mortenson — Reginald T. Saue
James Van Vleet



Wilson, Gross, Van Ryzin, Hausler, Smith
Peot, Meade, Cadwell, Ahrens, Johnson, Alyea
Robertson, Amundson, Kraemer, Colbert, Kniskern, Mittelstaedt

If there is a single group on the campus that remains distinctly homogeneous in all of its endeavors, it is the Engineers. Responsibility for that solidarity of feeling can in a large way be attributed to the organization known as Polygon Club.

The society started as a central committee a number of years ago with the purpose of coordinating the various groups in the engineering colleges, and forming a closer union between the students and faculties.

An unusual experiment was attempted last fall and to all appearances has proved the success that was anticipated. The plan involves the assessing each engineer a dollar fee which is put in a central fund controlled by the Polygon Club. Polygon thus acts as a coordinating agency and allots funds to the various engineering societies in order that they may carry on their activities more efficiently. Besides entitling each engineer to become a member of his respective engineering group, his dollar also brings him a subscription to the *Wisconsin Engineer*. The new plan has stimulated interest in engineering organizations to great heights.

During the year the Polygon Club undertook the active direction of two dances, two smokers, and the colorful St. Pat's Parade. Under centralized supervision such as existed during the past year, these activities proved unprecedented successes.

Gilbert Nieman acted as president of Polygon during the past year, assisted by John Smithwick, secretary; and Ernest Ziehlsdorff, treasurer.

☆

POLYGON

Members of the Organization

Civil Engineers

CARL MATTHIAS — ERNEST ZIEHLSDORFF

Chemical Engineers

JOEL HOUGEN — JOHN SMITHWICK

Electrical Engineers

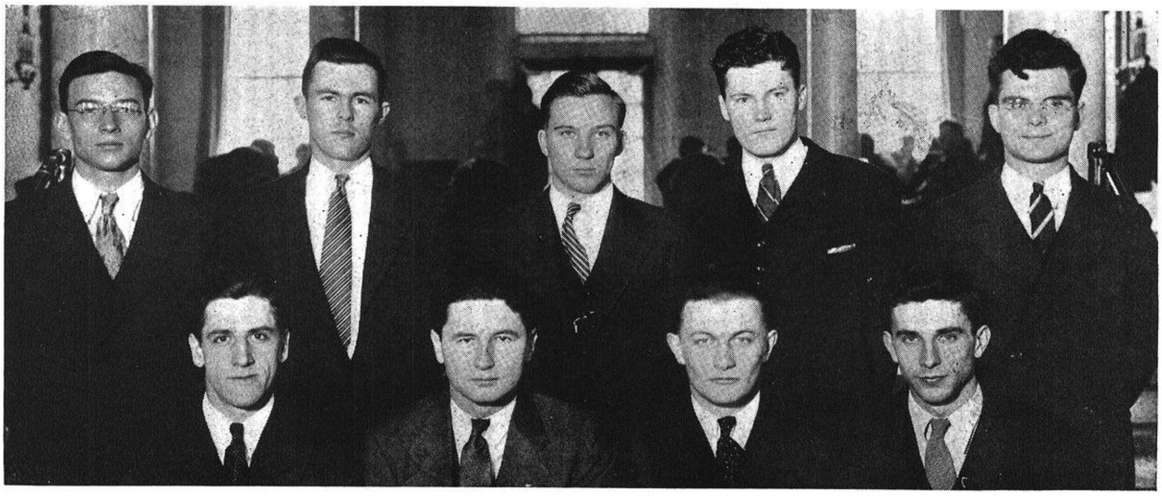
ALBERT VOLLENWEIDER — OSCAR WELKER

Mechanical Engineers

BREWSTER BUXTON — LEO NIKORA

Mining Club

ALBERT GALLISTEL — GILBERT NIEMAN



Gallistel, Nieman, Buxton, Smithwick, Matthias, Welker, Hougen, Ziehlsdorff, Nikora

AMERICAN SOCIETY OF CIVIL ENGINEERS

Class of 1935

William Ackermann	Harris LaChapelle
Carl Amundson	Glenn Laurgaard
Jack Bender	Edward J. Maurer
J. E. Berchens	Edward K. Neroda
Laurence E. Bidwell	Victor Pape
Loris B. Brinkman	Vernon O. Peterson
William Bush	Burr H. Randolph
Alton Cardinal	William O. Ree
Lee Crandall	J. A. Rhodes
Byrl Enerson	Leo K. Ruenger
G. J. Gfall	G. R. Schipporeit
Vernon G. Goelzer	Edwin R. Shorey, Jr.
A. J. Gollnick	Edward Stanek
Z. O. Gordor	William J. Sterba
Gerry M. Halverson	F. Michael Sutton
Willard H. Hart	Charles E. Van Hagan
J. Everett Henry	James Villemonte
Orlando G. Holway	George Wernisch
Richard G. Huzarski	Paul H. West
Victor Kneevers	Joseph W. Zack
James Kurth	Ernest R. Ziehlsdorff

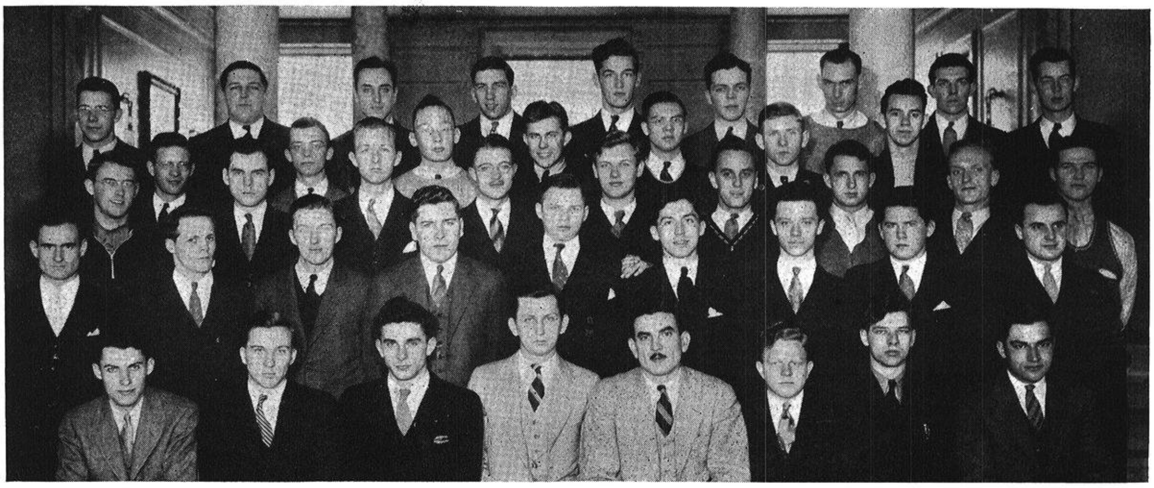
The local A. S. C. E. is a student chapter of the national American Society of Civil Engineers, which was founded in 1852 for the purpose of stimulating and supporting research and guarding professional interests. The Wisconsin chapter is the second largest of the 106 student chapters of this society. It offers civil engineering students an outlet for writing and public speaking; an opportunity to form friendships between the classes; and an easy transfer, upon graduation, to the natural organization, which means engineering recognition.

In the past year the chapter has enjoyed talks by Walter Jessup, field secretary of the organization, L. F. Van Hagan, Lee Crandall, and a talk on China, by Earl K. Loverud, accompanied by moving pictures. Through the courtesy of John L. Savage, the group was able to see motion pictures of the construction of Boulder Dam. The members have been active in the affairs of Polygon and have contributed materially to the success of the St. Pat's day Parade.

☆

Class of 1936

Meyer S. Bogost	Joseph A. Liska	Tom B. Heebink	Robert E. Stiemke
Gilbert J. Dresser	Carl D. Matthias	Paul Hunt	Frank H. Stone
Arnold M. Elsinger	Reinhardt E. Peters	Don H. Kutchera	Bernard H. TerMaath
George S. Faulkes	G. H. Rolich	George Lemke	Ralph H. Vogel
John C. Fenno	John L. Shipman	Luna Leopold	Edwin J. Voss
Karl W. Fuge	Cornelius C. Siettmann	Joachim E. Liebmann	Eldon C. Wagner
Robert E. Hawley	Arthur F. Sperling	Frederick Lincoln	Harry E. Wild



Voigt West Stanek Amundson Culbertson Shorey Sterba Enerson Peterson
Goelzer Crandall Lueker Mockrud Eppler Ohnstad Olson
Bennett Bidwell Ackermann Brinkman Faulkes Voss McDonald Neumann Kutchera
Gollnick Hunt Zack Ree Brusewitz Price VanHagan Rhodes Liska
Henry Matthias Ziehlsdorff Neroda Pape Wagner Vogel Leopold

TAU BETA PI

Honorary All-Engineering Fraternity

Founded 1885
Lehigh University

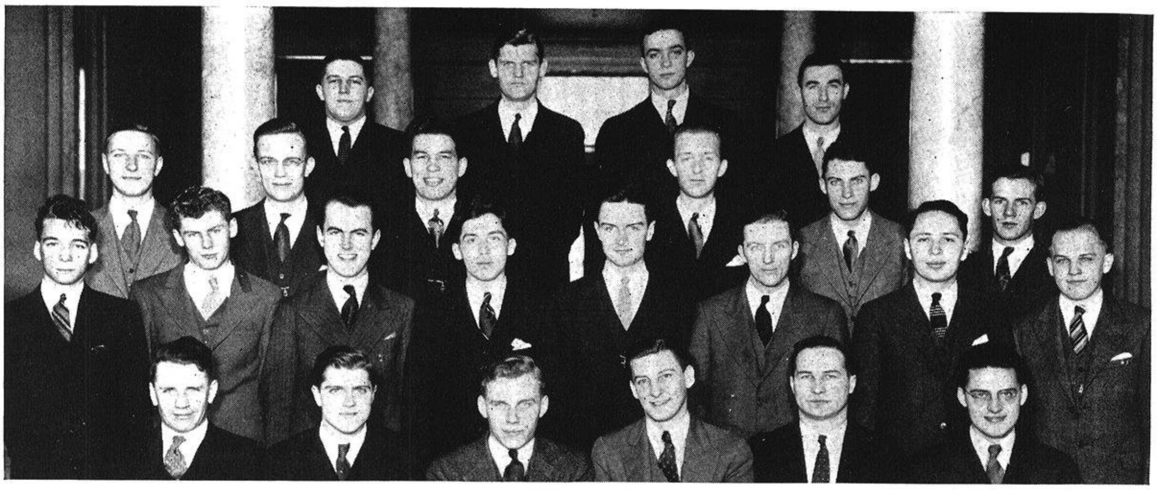
Wisconsin Chapter
Established 1898

Class of 1935

William Ackerman
Lester Ahrens
Roald Amundson
Robert M. Bennett
Laurence Bidwell
Thayer Burnham
Jan Edelman
William Gay
Harold Goldberg
J. Everett Henry
William Horton

Kermit Johnson
Harold Jury
Robert Knake
Bradford Kniskern
Frederick J. Kuehn
Joseph Kuzela
Luna B. Leopold
Elmer Mohaupt
Harry McCauley
Rolland Nelson

Allan Newbury
Roland Ostrander
Reginald Price
Phillip Rosten
Blaine Seaborn
William Smyth
William Van Ryzin
Albert Vollenweider
Paul H. West
George Wernisch
Kenneth Wink

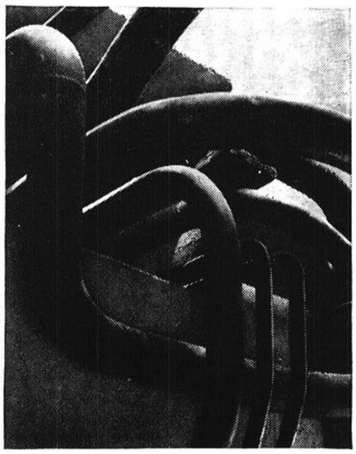


Amundson, Burnham, Kniskern; West, Johnson, Ahrens, McCauley, Van Ryzin; Rosten, Ostrander, Price, Nelson; Knake, Ackerman, Bennett, Horton, Wernisch; Kuzela, Henry, Goldberg, Vollenweider; Gay, Mohaupt, Wink

Streamlined Piping

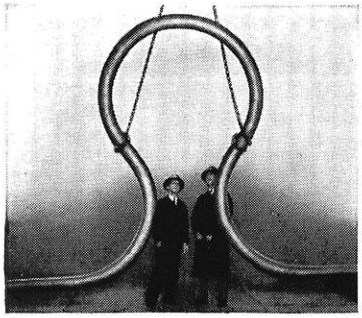
Oxy-acetylene welding and cutting add a new note of grace and efficiency in modern piping systems.

By G. O. Carter*



SINUOUS CURVES of welded pipe sweep from floor to floor carrying steam, water, gases and liquids.

NOWADAYS everything is being "streamlined" — airplanes, automobiles, trains, ships, approach their greatest degree of grace and efficiency through this design principle. Usually their streamlining is all on the outside. Piping joined by welding is streamlined both inside and outside.



WELDED ASSEMBLIES such as this loop in a steam line are easily made.

100,000 Miles Installed

Welded joints were first used for river crossings in oil pipe lines. They proved strong and sturdy enough to withstand the shocks of this difficult service. Soon welding came into general use for every joint in the line. Today over 100,000 miles of welded pipe carry oil, gas and gasoline over the country.

The economies which welding brought to the construction and maintenance of pipe lines led to its adoption for power plant and industrial piping. Now it is the first choice of many engineers for all kinds of piping.

Prevents Leakage Loss

Streamlined welded piping has many attractive features besides its smooth lines. Welding is sound, safe, and in the final analysis, the most economical way of putting pipe together.

Welding makes a "jointless" job—insures the owner from future maintenance. Permanence is so positive that in the Cathedral of St. John the Divine in New York, welded piping has been installed in masonry walls fourteen feet thick. In other instances coils of welded piping have been set directly in plaster in the ceilings and walls of beautiful residences. Modern skyscrapers enclose mile upon mile of welded piping. In one building group in the East there are over 85 miles of welded steam piping alone.

Avoids Friction

Pipe joined by welding is smooth inside and outside—truly streamlined. The smooth outside makes insulation less costly and easier to apply. The smooth inside makes friction negligible and reduces power losses. Welded piping is now used for gases and liquids of all sorts and for many solids—requiring pipe of every size and of almost every metal.

Permanent but Flexible

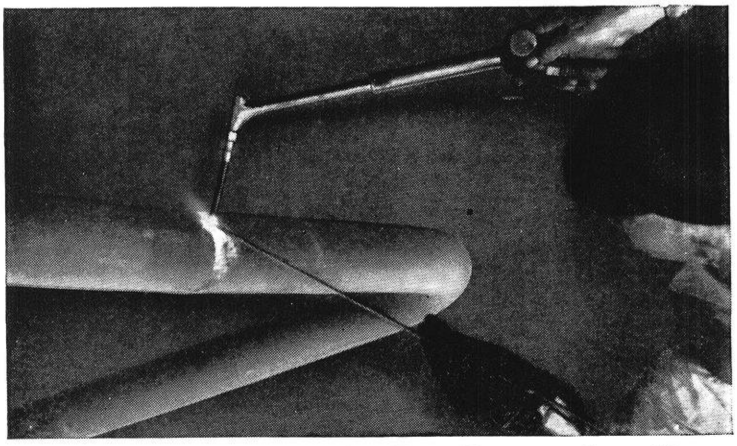
To be a sound investment today, buildings must remain relatively free from maintenance. Piping must be permanent, strong, leakproof and reasonable in cost.

Welded piping is permanent. But alterations can be made easily when desired. The oxy-acetylene cutting blowpipe gives the ready means of making an opening. The addition is then tied-in simply by means of welding. This is especially important in the modernization of old buildings.

Installation Facilities Everywhere

The Linde Air Products Company, a Unit of Union Carbide and Carbon Corporation, has pioneered many applications of the oxy-acetylene process in pipe welding. Without cost or obligation to you, it will gladly furnish complete data on welded piping methods. It will make available also such further technical assistance your engineers or construction men may require. Linde Sales Offices are located at Atlanta, Baltimore, Birmingham, Boston, Buffalo, Butte, Chicago, Cleveland, Dallas, Denver, Detroit, El Paso, Houston, Indianapolis, Kansas City, Los Angeles, Memphis, Milwaukee, Minneapolis, New Orleans, New York, Philadelphia, Phoenix, Pittsburgh, Portland, Ore., St. Louis, Salt Lake City, San Francisco, Seattle, Spokane, and Tulsa.

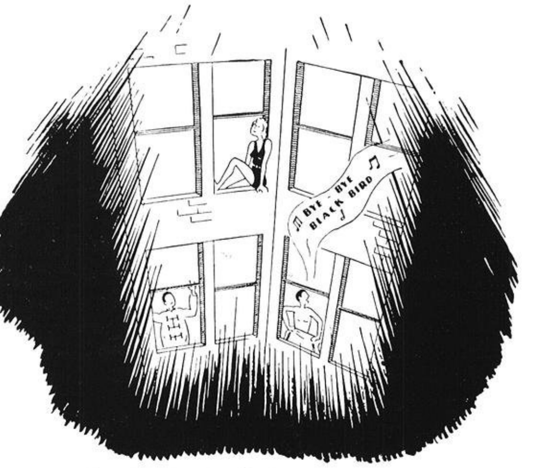
Everything for oxy-acetylene welding and cutting — including Linde Oxygen, Prest-O-Lite Acetylene, Union Carbide and Oxweld Apparatus and Supplies—is available from Linde through producing plants and warehouse stocks, everywhere.



"JOINTLESS"—With a safe, simple and portable oxy-acetylene welding and cutting outfit and suitable welding rods, pipe of any size, any commercial metal, is assembled rapidly into sound jointless piping systems.

*Consulting Engineer, The Linde Air Products Company, Unit of Union Carbide and Carbon Corporation.

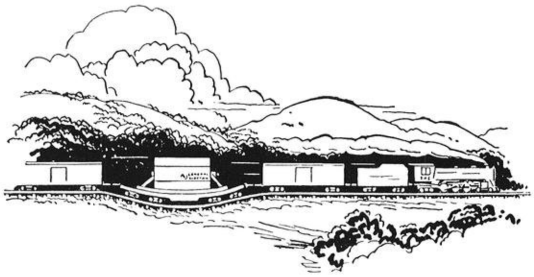
G-E *Campus News*



SYNTHETIC SUNLIGHT

THE people whose apartments faced the lower levels of the ventilating shafts in a 14-story New York apartment house had long ago given up the hope that direct sunlight would enter their windows. Imagine their astonishment one morning not long ago to find light—lots of it—streaming in. When they looked, they found not the sun, but 18 of the sun's able little imitators—General Electric floodlights. They had been mounted on the ninth-floor level.

The engineers were thoughtful of the tenants' feelings. For when the switch is thrown no sudden glare of light paralyzes unaccustomed householders in the act of brushing their teeth or doing setting up exercises, pastimes which were formerly cloaked in intimate gloom. A fully automatic synchronous-motor time switch actuates a dimmer, and the floodlights do not attain full brilliancy for 15 minutes.

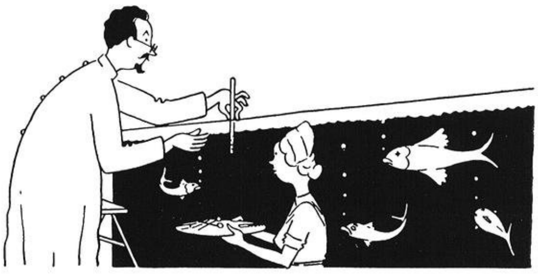


GROANING RAILS

A FEW weeks ago, the rails between Schenectady and Benning, D. C., groaned under what is believed to be the heaviest load ever transported on a single car. The load consisted of the generator shaft, rotor, and poles for a General Electric frequency-converter set being installed at the plant of the Potomac Electric Light and Power Company to deliver 25-cycle, single-phase power to the Pennsylvania Railroad.

Because of weight and clearance requirements, however, the route of the shipment was round about. A check of practically every foot of the way was made to determine if temporary obstructions could be removed to allow the load to pass. From Schenectady to Wilkes-Barre, Pa., the car traveled on the Delaware & Hudson. From Wilkes-Barre, the car was sent to Hagerstown, Md., on the Pennsylvania Railroad, where it was turned over to the Western Maryland Railroad. After an extensive detour, it was delivered back to the Pennsylvania on its main line just south of the Baltimore tunnels, which were the principal reasons for the complicated routing. From there it was carried directly to the power company's siding in the District of Columbia.

The equipment weighed 367,000 pounds. The special car added another 104,300 pounds, making the total weight on the rails 471,300 pounds.



FISH LIFE SAVER

THE people in the New York Aquarium were very unhappy. Many of their rare fish were dying of a mysterious malady. An investigation showed that the water pumped into the tanks contained contaminating metal salts, and that these salts came from the metal pumps in the system.

They appealed to the H. A. Smith Pump & Motor Company for help. Mr. Smith began testing all the nonmetallic substances available for making pumps. He tried 14 materials and found that General Electric Textolite was the only one that would prevent this pollution of the water and at the same time make a satisfactory pump.

Engineers of the General Electric Plastics Department were called in, and a new pump was designed, using five different grades of Textolite. The pump was so constructed that no water can come into contact with metal.

96-149DH

GENERAL ELECTRIC