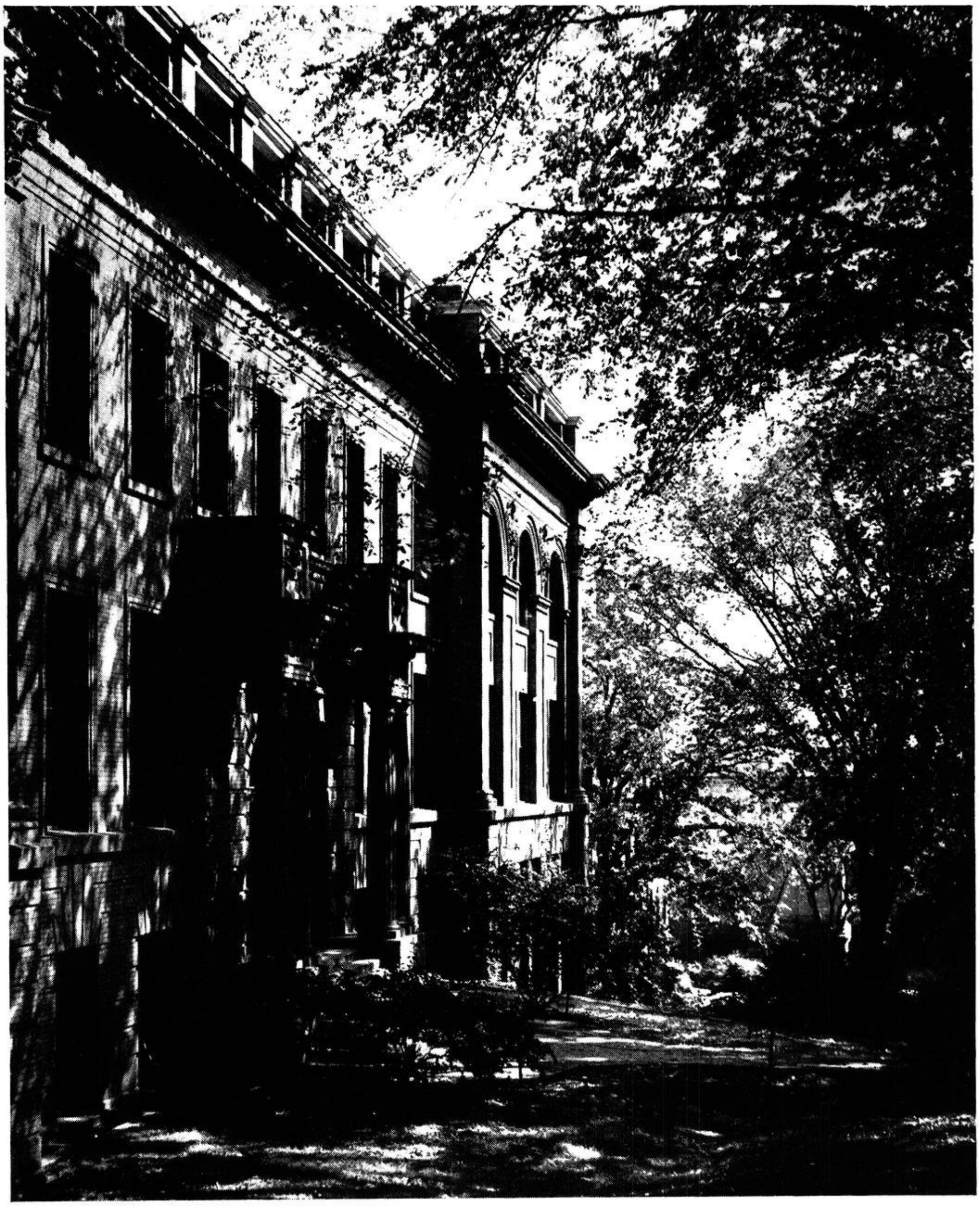
The Wisconsin engineer. Volume 41, Number 8 May 1937

Madison, Wisconsin: Wisconsin Engineering Journal Association, [s.d.]

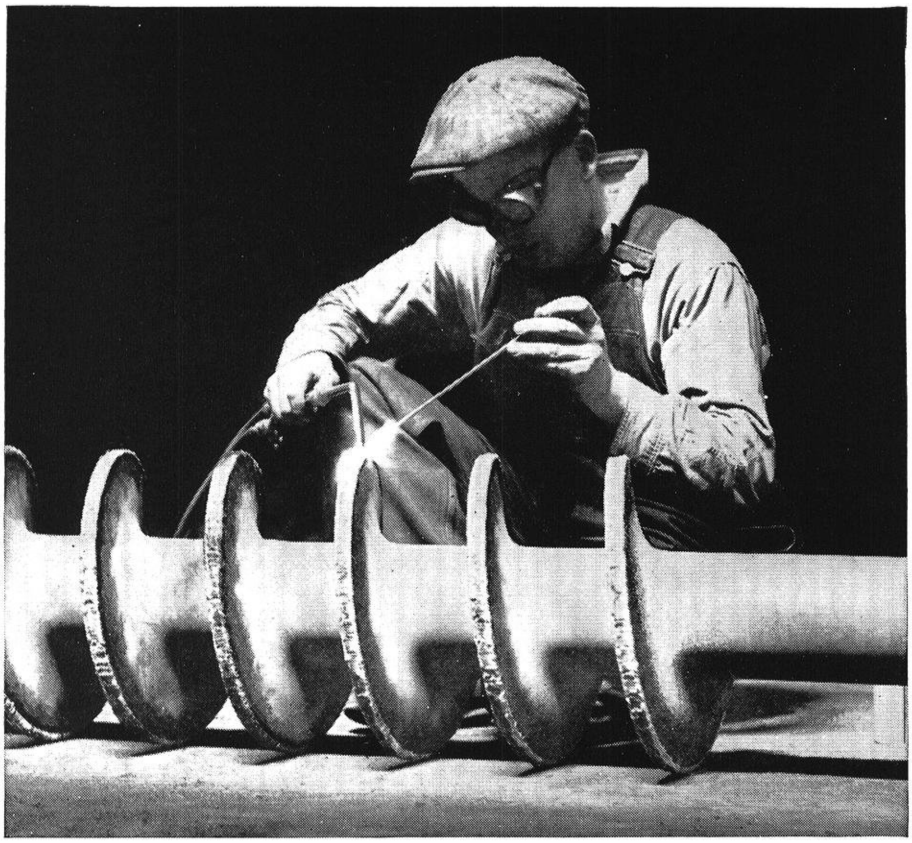
https://digital.library.wisc.edu/1711.dl/7P3DBZ6M5SIJV8I

THE WISCONSIN ENGINEER



MAY 1937

Member, Engineering College Magazines, Associated



WORN SCREW-CONVEYOR flights rebuilt by bronze-welding save replacement costs.

Build up the worn down . . .

Previous habits in the metals field reversed by new welding technique

UNTIL a comparatively short time ago, when metal parts were worn below the limit of tolerance, they were discarded. Further cutting down could not make them fit the job again. This method wasted both time and money.

With the introduction of welding, this picture has been entirely changed. It is easy now to build up metal at low cost. Parts, worn too small to be useful, can be returned to original size and shape. By the oxy-acetylene welding process, new metal is put on where the old has been worn away. The original investment may thus be salvaged by a small additional investment in repair by welding.

Welding Means Low-Cost Repairs

Welding has made rapid strides in the repair and rebuilding of worn parts. In every industry where metal is used and wear occurs, welding methods are saving money. Oil-well drills can now be kept in cutting shape long after their normal life span is past. Railroad shops repair and rebuild worn parts of rolling stock and track by welding as a regular procedure. Factory tools and machinery are kept in shape through welding as one of the surest ways to low-cost, profitable operation. Contractors and engineers rely on welding to rebuild worn drill bits, picks, shafting and wearing parts on shovels and digging equipment. The list of repairs made by welding is growing rapidly.

A Friend in Need

Welding is indeed a friend in need. For example, when work is being done on time contracts, it is of vital importance that worn or damaged equipment can be repaired quickly on the job. Suspension of operations until new parts could be obtained would be fatal to speed and profit. With welding, such interruptions are prevented since machinery and equipment are kept continually in operating trim. The scrap piles are kept at a low ebb. Worn metal parts, from shovel dipper teeth to truck axles, are reclaimed by welding. It can be depended upon to give satisfactory results in repair, maintenance and fabrication.

Welding Savings

$2,000 budgeted for new saws was saved by welding. Before any money was spent, the company checked into the possibilities of welding. Saw-repair by welding was developed, and now saws with broken teeth, cracks or other damage are restored at a fraction of the cost of new saws.

* * *

Welding of the copper kettles used for boiling wax in chemical and dye manufacture has become a regular routine that saves a chemical company many hundreds of dollars. After being in service for some time, the bottoms of these kettles become very thin. As the kettles have both an inner and outer shell, it was found best to weld in two new bottoms.

* * *

Welding was used by a midwestern creamery to rebuild the teeth on a large gear. The gear was worth $600, and the rebuilding work cost less than $50. This one job alone far more than paid for all necessary welding equipment.

* * *

Welding saves thousands of dollars each year for a large western railroad. Battered rail ends, caused by constant hammering of the car wheels at the joints, are rebuilt by welding. The rail ends are welded in place without traffic interruption. This saves taking up the rails, sawing off the ends, redrilling and relaying.

* * *

Welding is used to reclaim worn and broken reamers from automobile shops. The reamers, which cost from $2.50 to $16 each, reclaimed by welding are as good as new, at an average cost of 40 cents. Breakage and loss of teeth on this type of tool are extremely high. The tooth bill in these shops has shown a healthy reduction since welding methods have been used.

* * *

In a wood-products mill, welding is used to rebuild the steel shafts in pulp grinders. These shafts, originally a foot in diameter, wear rapidly and continually at the collars holding the stone. A small amount of play makes it difficult to keep the collars drawn up tight. Under these conditions, wear happens fast. Common practice, before the advent of welding, was to change the collars and bearing four to eight times as the shaft wore down and was remachined. When the shaft was too small, about eight inches in diameter, it was discarded. Now by welding, the shaft is built up to original size as soon as it wears. Many thousands of dollars in new shafts, collars and bearings are saved annually.

* * *

Tomorrow's engineers will be expected to know how to take advantage of this modern metalworking process. Many valuable booklets describing the oxy-acetylene process are available without obligation. For further information write any Linde office.

The Linde Air Products Company

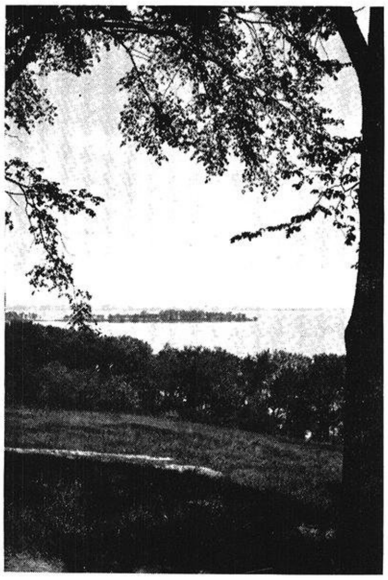
Unit of Union Carbide and Carbon Corporation

UCC

New York and Principal Cities

In Canada:

Dominion Oxygen Company, Limited, Toronto



With the Contributors . . .

- The mail-order home was long the butt of jokes, until Uncle Sam's technicians stepped in. You'd never know the old place now. Get the lowdown on today's prefabricated house from Mr. L. J. Markwardt, principal engineer of our own U. S. Forest Products Lab. Page 146.
- For those who hope graduation will erase all their connection with the routine of mechanics lab., let Walter Liedke, ch'39, offer his picture, page 148, of a modern industrial laboratory. It's sadly familiar.
- We thought the T.E. classes finally had the campus pretty thoroughly surveyed, but on page 172 we find Mr. Cnare's version of what Wisconsin still needs in the way of mapping.
- The classy insert, pages 155 to 166, lending the rogue's gallery effect to this issue, carries on an old tradition. Yep, the gang's all there. If you don't recognize 'em, it's because they're all wearing neckties for a change.
- If you've wondered why "inspection trips" are taken, see page 151 for student viewpoint.
- And just so you won't tear the magazine apart in your eagerness to find it, "Static" is on page 167.
- The big frosh drawing contest is over, and the plate which survived the competition can be found on page 152.

WISHING YOU A PLEASANT VACATION
—The Staff

The Wisconsin Engineer

Published monthly from October to May, inclusive, by the Wisconsin Engineering Journal Association, 219 Engineering Bldg., Madison, Wis.

Founded 1896 **Telephone U 236**

Volume 41 **MAY, 1937** **Number 8**

CONTENTS

Organization pages in center of magazine are reproduction of 1937 Wisconsin Badger pages

MEMBER OF ENGINEERING COLLEGE MAGAZINES, ASSOCIATED

Prof. Richard W. Beckman, *National Chairman*
Iowa State College, Ames, Iowa

Arkansas Engineer	Nebraska Blue Print
Colorado Engineer	North Dakota State Engineer
Cornell Engineer	N. Y. U. Quadrangle
Illinois Technograph	Ohio State Engineer
Iowa Engineer	Oregon State Technical Record
Iowa Transit	Pennsylvania Triangle
Kansas Engineer	Purdue Engineer
Kansas State Engineer	Rose Technic
Marquette Engineer	Tech Engineering News
Michigan Technic	Villanova Engineer
Minnesota Techno-Log	Washington State Engineer

Wisconsin Engineer

National Advertising Representatives
Littell-Murray-Barnhill, Inc., 101 Park Ave.
New York

Entered as second class matter September 26, 1910 at the Post Office at Madison, Wis., under the Act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in Section 1103, Act of October 3, 1917, authorized October, 1918.

Subscription Prices:
$1.00 per year **Single copy 15c**

Prefabricated Houses

by L. J. MARKWARDT, c'12, C.E.'22

*Principal Engineer, Forest Products Laboratory**

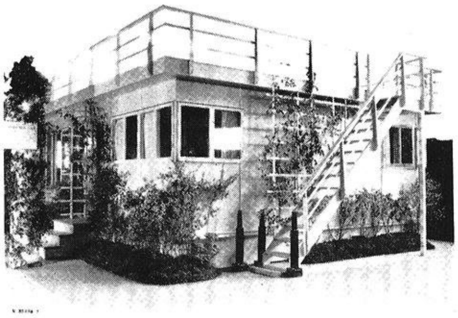
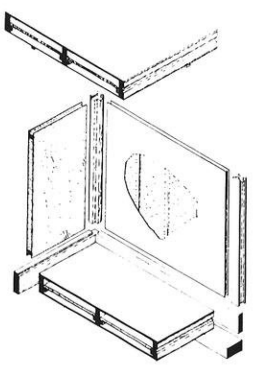


FIG. 2—*Complete all-wood prefabricated house erected in 21 hours by 7 men.*

AS A United States government research organization engaged in improving the efficiency of the utilization of wood and wood products, the Forest Products Laboratory in 1935 worked out a system of prefabricated all-wood construction in line with modern structural research and modern wood fabrication. The system represents new methods of manufacture and assembly that have their greatest advantage under the industrial order of the present and future; it is not intended for general production by ordinary carpentry in the traditional manner.

The system is based on the use of standard units, sections, or panels that can be made most advantageously in large quantities by factory methods and then assembled quickly and without waste on the site. Its ultimate success will depend on close technical control in production, accurate dimensions of units, and efficient painting practice to insure lasting weatherproof service.



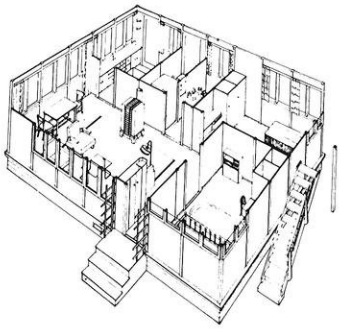


FIG. 1—*Interlocking wall, floor, and roof panel assembly.*

FIG. 3—*Sectioned perspective of one-story prefabricated all-wood house.*

In order to study the adaptability of the system and the manufacturing and assembling problems, the Laboratory some time ago constructed a small one-story house of the modernistic type. The construction system employed was found to be entirely feasible and practical. The system, which may be regarded as still in the development stage, has recently been extended as a demonstration of its flexibility to two-story houses with gable roof, double-hung windows, and a conventional style of architecture.

*Maintained at Madison, Wis., by the U. S. Dept. of Agriculture, in cooperation with the University of Wisconsin.

Unit Panels

The unit panels employed in the system are approximately four feet in width and up to 15 feet in length. (Fig. 1) All panels utilize the "stressed covering" principle, so successfully applied in aircraft construction to secure strength and lightness; that is, plywood sheets forming the panel faces are glued to both sides of the structural framing and thus become a definite part of the load-carrying system instead of being an additional load on the supports as in ordinary nailed construction. In this way the framing members can be materially lightened without any sacrifice of strength or rigidity. Joists, for instance, have been reduced in height from the conventional 10 inches to 6 inches. The 4-foot module was used because commercial plywood is produced in this width, but the system is adaptable to any other module that it may be desirable to employ.

The outer wall panels, by utilizing effectively the strength of the exterior and the interior plywood, have sufficient structural strength and good insulation properties when made as thin as 1-7/8 inches, instead of the customary wall thickness of 6 to 8 inches. This wall thickness

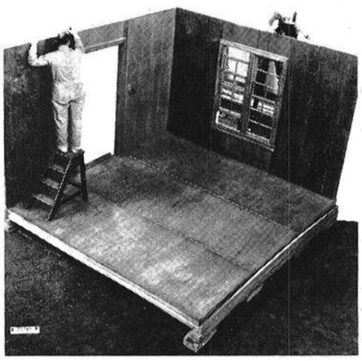


FIG. 4—*Erecting first-floor panels.*

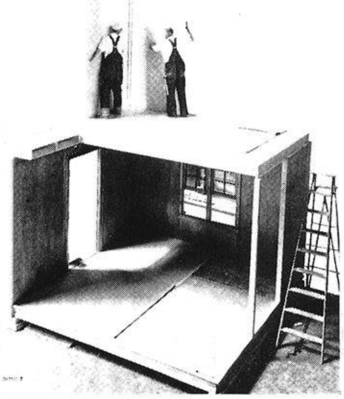


FIG. 5—*Erecting second-story panels.*

FIG. 6—*Erecting attic panels.*

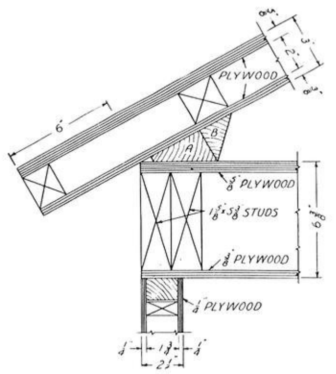


FIG. 8—*Joint connections for pitched roof.*

was used in the house shown in Figs. 2 and 3. By increasing the wall thickness to 2¼ inches it was possible to accommodate especially designed double-hung windows.

Secure but easy-fitting joints are provided by upright mullions. (Fig. 1) The mullions may be of the type with double grooves (Fig. 1) to receive the edges of the inner and outer plywood, thus forming a batten effect on the inner and outer walls; or the mullion may be designed to omit the batten effect on the inner wall. In the latter, the mullion at the junction of the two panels extends from the unexposed face of the interior plywood to ⅞ inch beyond the outer face. Consequently no part of the mullion extends into the room and hence the edges of the inner plywood sheets are adjacent to each other. The edges of the panels may be rounded to improve the attractiveness of the rooms.

All panels are insulated; the wall, roof and lower floor panels primarily against heat and cold, and the partitions and floor panels between stories against sound. All necessary electrical wiring and outlets for servicing the house are built into the units. The entire system is being developed with a view to quick and ready assembly on the site. (Figs. 4, 5, and 6.)

The upper surface of the floor panel may be used as a wearing surface if desired, and to improve serviceability the upper layer of veneer in this panel may be made of a hardwood. If additional expense is acceptable, prefabricated finished floors may be laid on the top of the floor panels. The small pieces of which they are made are factory-produced and assembled on 4-foot squares of plywood, so that all that remains to be done on the site is to lay them in place and secure them to the floor panels by means of the parting strips which surround each square. (Fig. 7.)

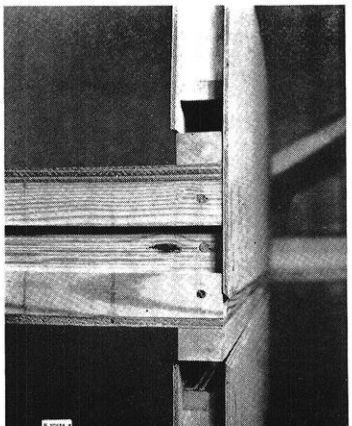


FIG. 10—*Portions of first-story wall panel, floor panel, and second-story wall panel, which are slightly separated to show how parts fit together.*

Flexibility of Design

The fact that the system utilizes standard parts does not mean that any two houses so built must be identical in design and appearance. By interchanging various units, different conditions can be met. The use of standard factory-made parts does not mean "standard" houses identical in every part. Prefabricated houses of widely different designs can be built with the same standard panels, provided a few minor changes are made. Industrialization of all-wood housing would substitute prefabricated wall, floor, and roof panels of wood for the rough materials, timbers, sheathing, siding, rafters, lath and plaster.

FIG. 7—*Laying a hardwood floor. T-shaped hardwood strips hold the prefabricated squares solidly to the panel subfloor.*

Pitched Roofs

Houses with pitched roofs as well as flat roofs can be constructed with the type of panels employed by the Forest Products Laboratory. Fig. 8 illustrates a suggested joint between the roof and attic floor panels. This joint consists essentially of a triangular strip "A" approximately 2 by 3 by 3½ inches in cross section securely nailed to the top story ceiling panel, and a triangular strip "B" approximately 2 by 2 by 2¾ inches in cross section securely nailed to the roof panel. After the roof panels are assembled, strip "B" bearing against strip "A" keeps the roof panels firmly in place. When the erection is completed strip "B" is nailed to strip "A" to prevent the roof from being lifted by heavy winds. The connection at the roof board is of the conventional type as illustrated in Fig. 9.

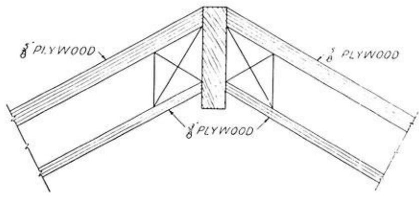


FIG. 9—*Connection of roof panels at ridgeboard.*

The thrust exerted by the roof loads must be resisted through the floor panels. Since the panels are not continuous from roof line to roof line, but extend only from one roof line to a bearing partition, it is necessary to have a tie between the panels. Splines are used between all panels to cause them to deflect together under load. Through adequate nailing these same splines are utilized to obtain the proper tie in the direction of the thrust. The splines extend ½ inch into the floor panel joists and are 1⅞ inches high.

Two-Story Houses

In prefabricated houses there is a decided tendency

FIG. 11—*Architect's drawing of a small house employing Forest Products Laboratory system of prefabrication. This home is not on the market today, nor have floor plans been made for it.*

toward one-story homes. It is, however, both practical and feasible to erect two-story houses with prefabricated panels as constructed by the Forest Products Laboratory. A connection between the first and second stories at the outside wall is shown in Fig. 10. This figure includes portions of the wall of the first floor, the floor panel between the first and second stories and a portion of the wall of the second floor. In this illustration the several parts are slightly separated.

Essentially the construction resembles the platform type of conventional frame construction in that the second-story floor panel rests upon the first story wall panels and the second-story wall panels are placed directly on top of the floor panels. The wall panels are grooved by extending the plywood faces beyond the edges of the framework 1¼ inches forming a groove 1¼ by 1¾ inches. A strip which will exactly fit this groove is nailed to the top and the bottom of the floor panel along its outer end, and the wall panels fitted over these strips as shown in Fig. 10.

Fig. 11 is an architect's drawing of a small house employing the Forest Products Laboratory system of prefabrication. No floor plans have been made nor are contemplated.

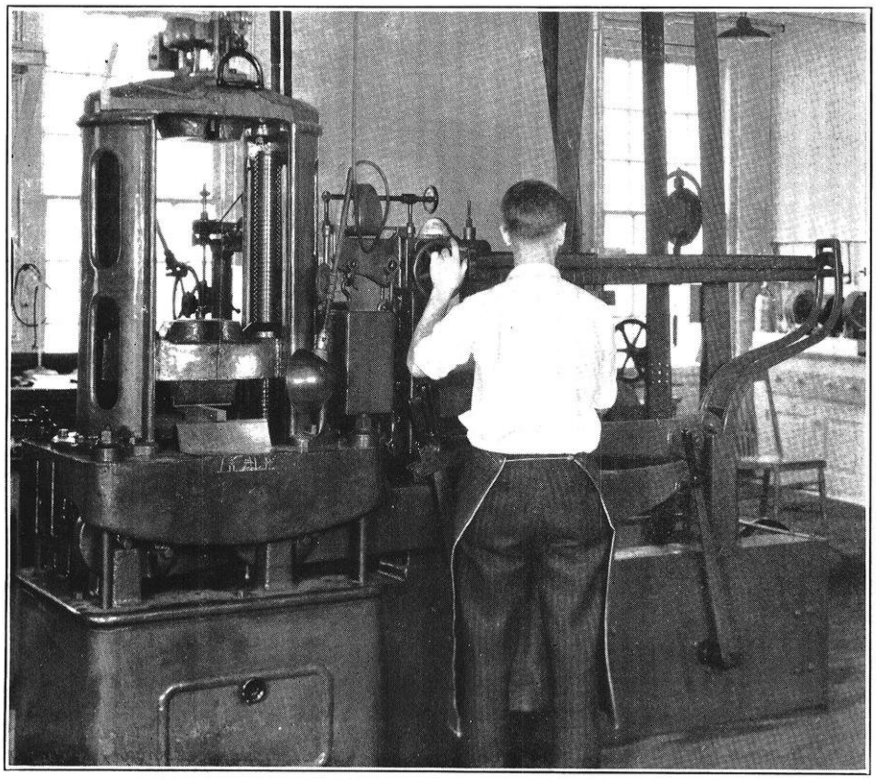
Neither this house as shown nor any other like it is on the market today. It is an illustration of a logical next development in the nation-wide housing movement, and it indicates possibilities which industrialized wood fabrication has to offer in economical and efficient home building.

The Industrial Laboratory

by **WALTER LIEDKE, ch '39**

Illustrations courtesy J. I. Case Company

WHAT is really done in a commercial laboratory is a mystery to most people. The word laboratory brings to the mind of the uninformed a picture of boiling retorts, smoking solutions, and fancy, flashing electrical devices. These impressions are largely gained from the movies, fiction, and advertisements. It has been the author's fortune to be employed for the past summer in the laboratory of the J. I. Case Company of Racine, Wisconsin. It is the purpose of this article to bring to light the work done in a commercial laboratory and also stress the importance of the laboratory in industry.



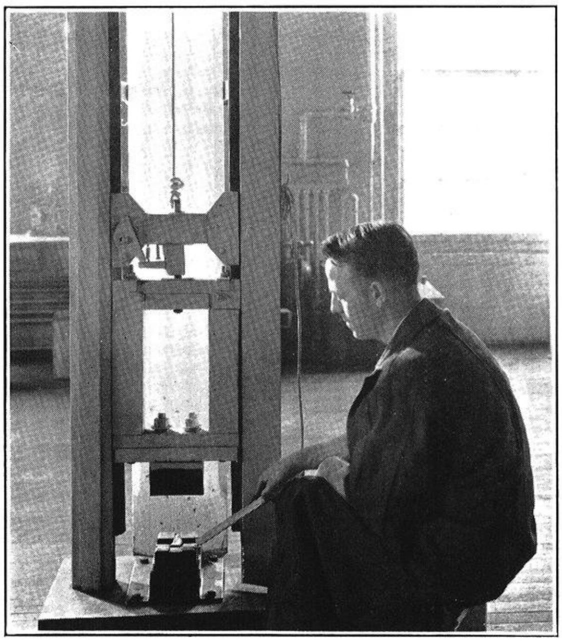
Finding the transverse strength of the metal.

The company publishes a series of specifications in pamphlet form. Leather and rubber belting, steel, bearing metal, brass, bronze, paint, and paint materials are all bought on specification in terms of physical or chemical analysis or both. As each shipment of material arrives at the factory, a representative sample is chosen and analyzed properly. This process of taking a representative sample is an art in itself, and if the sampling is not done properly, the resultant analysis is meaningless. If the material fails to come up to the standards set by the specifications, the material is rejected. It can readily be seen that careful purchasing in this manner saves the business thousands of dollars monthly.

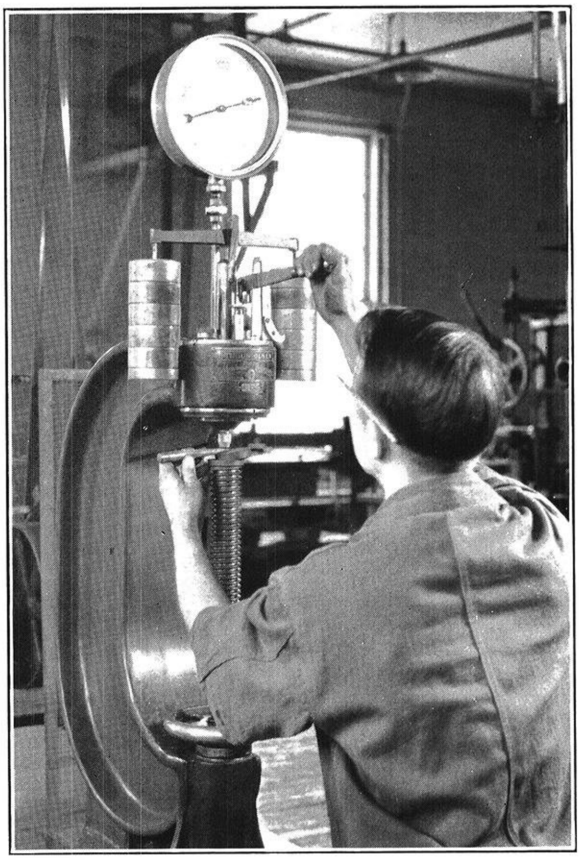
Specifications are also set up for the various parts manufactured by the company. Parts which do not fall within the limits of the specification are not allowed to leave the factory. The determination as to whether a piece can leave the factory or not can only be done by the laboratory with an expert engineer at its head. The laboratory thus guarantees an excellent, uniform product which gives the buyer satisfaction and the product a good reputation.

The Case laboratory is split into two divisions; namely, a physical laboratory and a chemical laboratory. What is the difference between the two? Recalling from chemistry the definitions of a physical change and a chemical change, the differentiation is plain. In a physical laboratory during the process of the test that is made the material changes shape or size, while in the chemical laboratory some new substance is formed during the course of the test. Both of these laboratories are mutually bound closely together, the material tested usually passing from the physical laboratory to the chemical laboratory.

Since most of the material tested begins in the physical laboratory, tests made in this laboratory will be dealt with first. Iron test bars from both the cupola and furnace are received daily. These bars, which are 13½ inches long and one square inch in cross section, are first put into a special micrometer which measures the amount that the metal has shrunk in passing from the molten to the solid condition. Next the bar is placed on a testing machine. This testing machine is similar to weighing scales of large capacity, based on the principle of the lever. The bar is supported at each end and a load is gradually applied to the center of the bar until it breaks. This type of test gives a measure of the transverse strength of the metal. The deflection of the point just below the load is a measure of the ductility and flexibility of the iron. The specification for this tranverse unit stress is from 2,700 to 3,100 pounds per square inch and deflection from 0.14 to 0.19 of an inch. One of the broken pieces of the bar is then drilled at the broken end and the borings sent to the chemical laboratory where quantitative determinations are made of silicon, manganese, sulphur, combined carbon, and graphitic carbon. These substances present in the iron are determined by standard gravimetric, volumetric, and colorimetric methods. The physical properties are sharply dependent



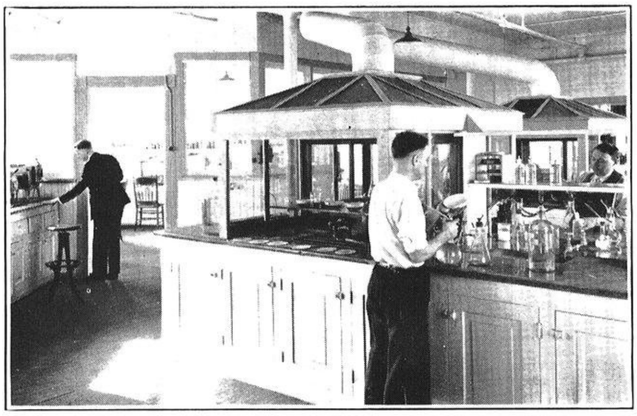
Drop test.



Brinell test.

upon the relative proportions of each of the quantitatively determined elements. The other broken half of the bar is ground smooth at the broken end and on a side just adjacent to the broken end. These smooth surfaces are then Brinelled at a specified position. The Brinell test consists of pressing a hardened steel ball into the object to be tested by means of a fixed load. This load on the ball causes an indentation in the metal, the larger the indentation the softer the metal. The diameter of this indentation is read with a simple microscope which has a millimeter scale graduated on glass which can be seen through the eyepiece. If the number of kilograms making up the load be divided by the area of spherical surface of the impression expressed in square millimeters, a number is obtained expressing the pressure per square millimeter of ball impression. This number is, therefore, the unit stress applied to the metal. A standard ball with a diameter of 10 millimeters and a load of 3,000 kilograms are used to make comparison possible.

Other means of determining the hardness of a material can be made with a scleroscope and Rockwell machine. These machines are used for work which is too small for the Brinell machine. One great advantage of the scleroscope and Rockwell machines is their portability; they may easily be carried about the shop. The scleroscope test consists essentially of allowing a small diamond pointed hammer drop from a fixed height onto the polished surface of the metal to be tested. The height of rebound of the hammer is a measure of the hardness of the metal. The height of rebound is observed on a centimeter scale adjacent to the chamber in which the hammer is confined.



The chemical laboratory.

The Rockwell machine records the depth of penetration of a special tool.

It has been found from past experience that cylinder teeth, which are used in threshing machines, must be heat treated very carefully. A strict specification must also be placed upon the steel used for the teeth. If these precautions are not observed, the teeth have been found to break easily or wear excessively. The laboratory determines the quality of the finished tooth. Daily one of the men in the laboratory goes to the heat treat department and takes 10 cylinder teeth from the heat treat machine. The teeth are brought back to the laboratory and each tooth is ground smooth and Brinelled in the same spot. Next the drop test is applied to three of the teeth which vary in hardness as shown by the Brinell test. The drop test consists of supporting the tooth at each end in a special die and dropping a weight of 27 pounds from a height of six feet onto the middle of the tooth. At every odd blow the tooth is turned over. The machine used for the drop test is somewhat like a guillotine in appearance, the weight dropping along vertical ways. For a specified tooth a minimum number of blows are required before breaking if the teeth are acceptable. This test measures the ductility of the teeth and their ability to withstand sudden shock.

At various times gears, pipes, wooden staves, sheet metal plates, and other objects come into the laboratory to be tested. Special setups on the machines are then necessary to obtain a significant test.

At frequent intervals samples of rubber belting and rubber ply pulley covering must be tested. The leather and rubber pulley covering are cut to a uniform size using a standard die as a pattern. These standard pieces are then placed in a special testing machine which grips the pieces at the ends and pulls in opposite directions. The force at the breaking point is observed. For rubber material the stretch for a specified increment in load before breaking occurs, over a two inch gage length is also measured. For ply materials the force required to pull the center plies apart also is recorded.

Weekly a representative sample of coal is tested for moisture, sulphur, ash, volatile matter, fixed carbon, and the heating value (B.T.U.'s). The amount of money paid by the company for a ton of coal is based directly upon the analysis obtained from the laboratory.

In case of some serious trouble with a ferrous metal the photomicrograph is used. A small piece of the metal is ground and polished with various grades of emery cloth and then whiting and finally rouge. The polished specimen is then etched in a solution of 5% nitric acid to 95% alcohol. The piece is then placed under the microscope. The expert observer can readily see the crystalline structure of the steel or iron and thus gain valuable information which can be used in correcting the disorder.

Standard methods are used for testing gasoline and oil. For oil the degrees Baume (measured on a hydrometer with a linear scale), specific gravity, viscosity, and the flash and fire points are obtained. The viscosity is measured with a viscosimeter. This test consists of finding the time required for a certain volume of oil to flow through a standard orifice at a specific temperature. The flash point is determined by heating the oil in a small metal cup with a thermometer immersed in the oil and placing a small flame repeatedly over the surface of the oil. The temperature at which a flame shoots across the surface of the oil and goes out is known as the flash point. The temperature at which the oil catches fire is known as the fire point. Knowledge of where these two points lie is of use when the oil is used for Diesel engines. For gasoline the amount that condenses during distillation over a given time interval is noted. The amount of residue left, which consists chiefly of gum, is also of importance.

For each test that is run a printed form is filled out, and a copy is sent around the plant to various men who are directly concerned with the results of the test.

During these days of close competition every possible means must be taken to save and still turn out the best product. A laboratory is a means to this end. During the lean years the cry is "Cut the overhead." The cost of operating a laboratory should very definitely not be considered an overhead, but an irreplaceable link in production. During the past depression it will be observed that the companies which have sunk more money in their laboratories instead of cutting down on laboratory costs have been the most progressive and profitable companies.

Seven Mistakes of Life

1. The delusion that individual advancement is made by crushing others down.

2. The tendency to worry about things that cannot be changed or corrected.

3. Insisting that a thing is impossible because we ourselves cannot accomplish it.

4. Attempting to compel other persons to believe and live as we do.

5. Neglecting development and refinement of the mind by not acquiring the habit of reading fine literature.

6. Refusing to set aside trivial preferences, in order that important things may be accomplished.

7. The failure to establish the habit of saving money.

—Anonymous

Inspection Trips

by **ENGIN EARS**

ONCE MORE the denizens of Milwaukee and its suburbs, Kenosha and Chicago, are taking down the storm shutters and emerging from cyclone cellars with sighs of relief. For the annual inspection trips of the junior engineers are over and the events of April 14th through 17th are history.

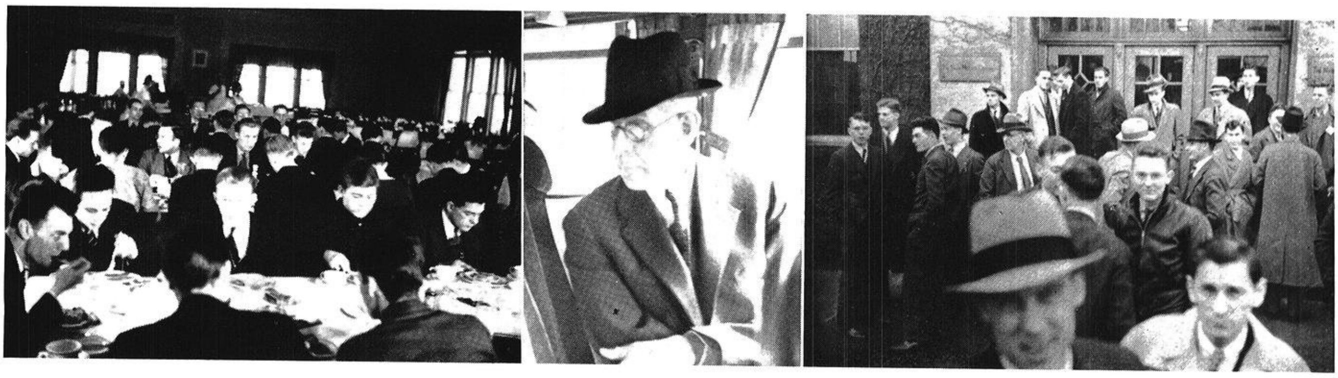
On April 14th the entire third year groups of Electricals and Mechanicals were let off the reservation, supposedly to obtain a speaking acquaintance with power stations, assembly lines, production layouts, electrical control systems, and heavy machinery as produced and operated at Allis-Chalmers, Nash, A. O. Smith, Falk, Lakeside, and other Milwaukee industrial units. Simultaneously, the Civils were turned loose on an unsuspecting Chicago for the purpose of gaping at the wonders of sewage systems, and soaking up some professional inspiration from an assortment of highway and bridge projects.

These objectives were duly accomplished. It is perhaps trite but still true to state that, with few exceptions, the plants visited and processes inspected were both instructive and thought provoking. Hand picked for this reason, they were working illustrations of the application of engineering principles, organization and perspective. From the ingenious lay-out features and intricate timing of the assembly lines of A. O. Smith and Nash to the massiveness and adaptability of the Falk and Allis-Chalmers equipment, the trip was invaluable in opening student eyes to practical application of things they are apt to classify as mere class-room ritual.

Not that these reflections at all dampened the ardor of the "inspectors." The stamina of the true Engineer was reflected in the way they scampered from one point of interest to another all day, pockets loaded with souvenir rivets, ball bearings, auto and radio parts, ducking cranes, shying from air hammers, eyeing girl operators, consuming innumerable candy bars, then cleaning up for supper, and dashing off to the "Gayety" or "Rialto." Unfortunately, most of the really interesting parts of the trip cannot be printed. All of which added a few gray hairs to the heads of our chaperon-professors. To satisfy a universal curiosity, it is certified that none of the faculty escorts were seen at either of the above mentioned burlesque houses, and they seem to have good alibis for their evenings. Professor McNaul went to town on all the candy vending machines along the line, trying to corner the chocolate bar supply. Professor Watson developed considerable skill at ducking traveling crane buckets, but Professor Kelso, besides getting lost continually, had considerable trouble deciding whether to wear or carry his rubbers from building to building. And speaking of getting lost, Larry Meyer wins the tissue paper dog leash for the most times lost per plant. The Mechanicals claim that their Allis-Chalmers guide called them the best behaved gang that he'd ever wet nursed around the place—but others doubt that tale. About a third of these boys "forgot" to show up at Riverside.

Bogue and Westerman had to help.

Souvenir lifting proved best at American Brass—Bob Dansfield claiming that he intended to melt his collection all down for a brass bar rail (he had plenty). Collections dropped off as pockets grew heavy and feet sore. What the Civils did all week remains a mystery. It doesn't seem likely that they behaved themselves but that is the only possible conclusion. Fred Alexander did sound off in the bus, referring to a passerby, "I **hate** guys with mustaches," and then discovered three instructors wearing just that sort of accessory seated around him. Which isn't very good apple polishing. For further information on the trips, see Willard Hanson, who took enough notes to write a text . . . and probably will.



Scenes with the electrical juniors.

DRAWING CONTEST

by **PAUL M. KETCHUM, e'38**

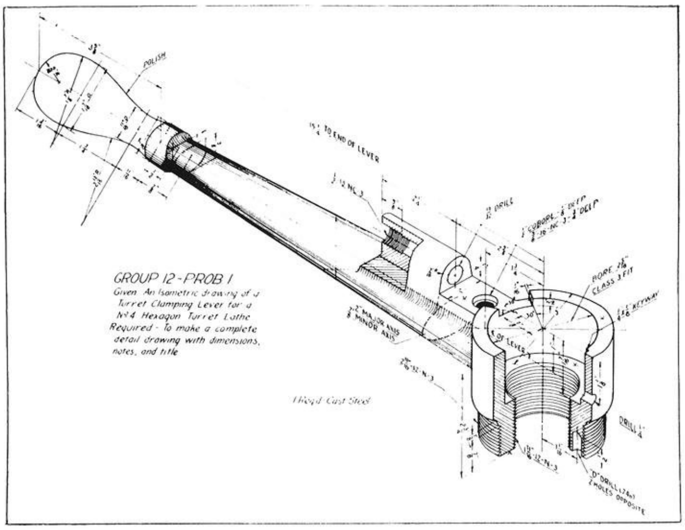
CLOSING just before spring vacation, the fourth annual **Wisconsin Engineer** drawing contest for freshmen, sponsored by Alpha Tau Sigma, national honorary engineering journalism fraternity, wound up with about five times as many entries as were ever received before. The winners with their respective instructors are:

First—DONALD S. DE MUNCK, m'40 . . . Jedeka
Second—JOHN M. ROEBUCK, ch'40 . . . . Shiels
Third—CARL E. PROTT, m'40 . . . . . . Peot

Honorable Mention

FRANCIS L. KUREK, ch'40 . . . . Jedeka
LEONARD E. BROBERG, m'40 . . . . Worsencroft
JOHN A. BLATECKY, m'40 . . . . Jedeka
BERTRAND J. MAYLAND, ch'40 . . . . . . Peot

To encourage all freshmen enrolled in the first year drawing class to enter the competition, the drawing department gave an isometric drawing of a turret lathe clamping lever—reproduced above—as a required problem. The men were to make a complete working pencil mechanical drawing and an ink tracing. If they so desired, they were to enter the pencil drawing and tracing in the contest—and a good percentage of them did. The tracing and pencil drawing were judged as a unit, on the basis of technique and theory, accuracy, lettering, and neatness, the first receiving the greatest weight.



They started from this isometric drawing.

Judges were Messrs. J. W. McNaul, W. S. Cottingham, and R. W. Fowler. We wish to express our sincere appreciation for the effort they spent.

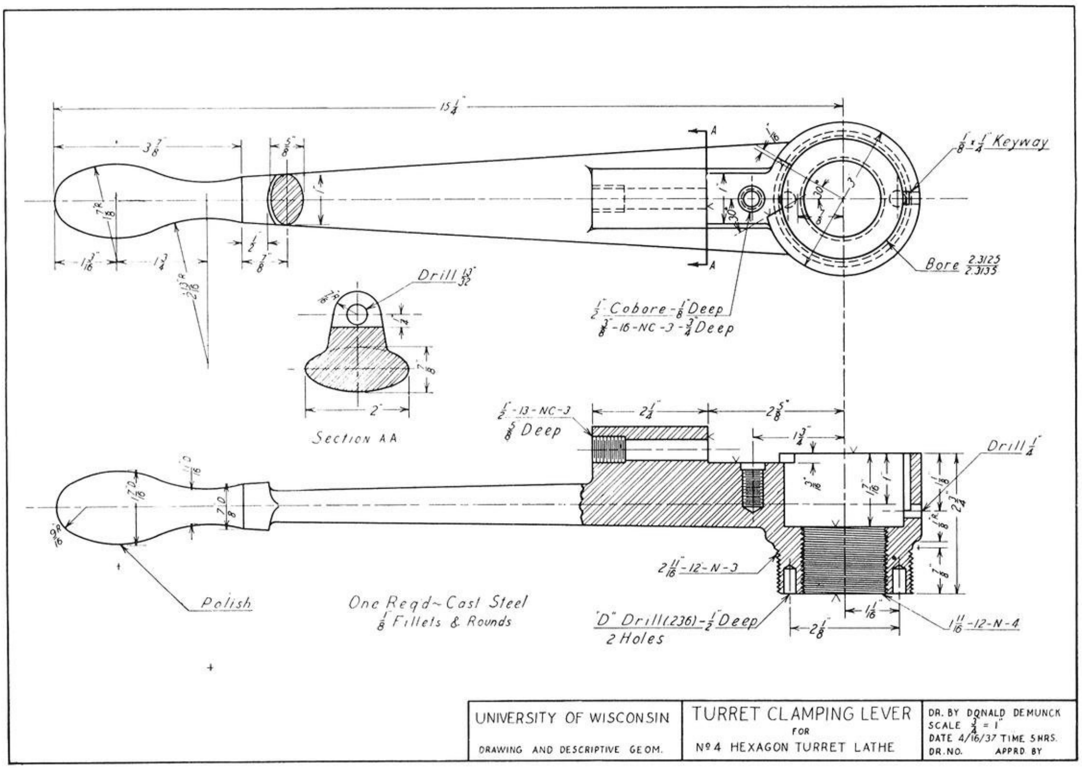
With brief inspection, the isometric drawing may look rather simple, but when it comes to deciding what views and scale to use, several difficulties arise. The winner's interpretation is shown below—lack of space prevented the use of any of the others.

Through the courtesy of three State Street merchants, we were able to award material prizes for the first three places. The awards are:

First—One Kodak Bantam Camera, or $5.00 in trade, donated by Photocraft, 670 State Street.
Second—One Automatic Pencil, donated by Rider's Pen Shop, 605 State Street.
Third—$1.50 in trade at the Netherwood Printing Company, 519 State Street.

The manner in which these merchants support engineering activities is greatly appreciated.

Next year, Alpha Tau Sigma, in addition to sponsoring the **Wisconsin Engineer** drawing contest again, is planning to sponsor a contest for the best student written article submitted for publication in this magazine. The article ought to be short—about 2,000 words in length—and should be accompanied by pictures if possible. Full details will be given next fall. We will appreciate an indication of the number who will be interested in something of this sort.



The winning drawing.

ALUMNI NOTES

Civils

BUSH, WILLIAM L., '35, in April joined the engineering staff of the Oliver Iron Mining Co. of Duluth and has been assigned to work at Virginia, Minn.

CLARK, CHARLES O., '34, on April 12, joined the engineering staff of the U. S. Engineer's office at Louisville, Ky.

CULLINANE, JOHN E., '29, was married on April 20 to Eve Irwin of Waupun, a graduate of the nurses' training school of the Madison General Hospital. Johnny is engaged in contracting in Madison.

FIEBRANTZ, RAYMOND C., '30, is a wholesale dealer in poultry in Milwaukee under the firm name of Fiebrantz Commission Corp.

JOHNSON, A. PAGE, '29, was defeated in the April elections when he ran for city commission at Fond du Lac. As a result of the defeat, he is now out as city engineer, which position he had successfully filled for two years.

PETERS, HERBERT H., '24, has been appointed county highway commissioner for Ozaukee county. In addition to serving in the state and county highway department, Mr. Peters is the surveyor of the cities of Port Washington and Cedarburg.

STANCHFIELD, GEORGE H., '92, has been with the WPA at Green Bay since last fall.

WHITESIDE, JAMES M., '26, visited the college on April 13. He received the degree of J.D. in law from De Paul University in 1930. He married Ruth Norris of Chicago, a De Paul graduate, and they have one son, Robert, born November 8, 1931. Whiteside practiced law until December 1, 1936, when he became a sales representative for the Bigelow-Liptak Corp. of Chicago.

WICKESBURG, ALFRED W., '31, is an engineer with Greeley and Hansen, consulting engineers in Chicago. Early in March he was transferred to Buffalo where work will begin on a large sewage treatment plant.

WINZENBURG, ERWIN H., '26, is an engineer in the U. S. Engineer's office at Chicago.

WINZENBURG, HENRY E., '26, is engineer with the Chicago Park Board on the construction of the Outer Drive bridge and approaches. He and his twin brother, Erwin, live together at 30 W. Chicago Ave.

SHORY, E. R., '35, who has been in training with the Shell Petroleum Corp. in the Kansas district, has been transferred to the Tulsa office of that corporation.

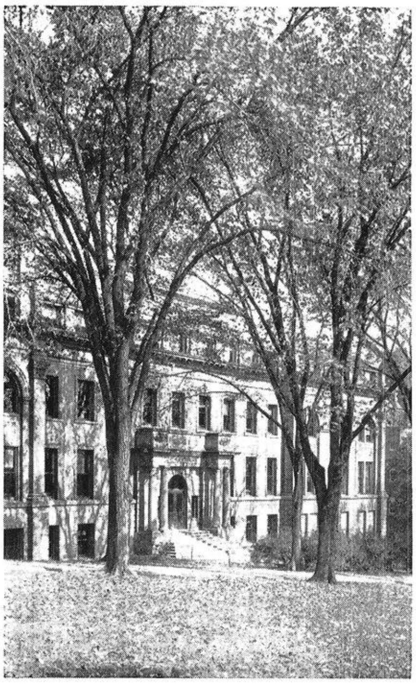
Chemicals

BEACH, CHARLES M., '35, is with the Marinette and Menominee Paper Co., of Marinette, Wis.

BONE, WINSTON W., '34, has a new position as industrial chemist with Brown Brothers, Berlin, N. H. He is working in the laboratory of this large paper and heavy chemical manufacturing concern.

BUHMAN, BRUCE J., '36, is working for the Marathon Chemical Co. at Rothschild, Wis. This company is doing work on the Howard Process for treating waste sulphite liquor from paper mills.

CROSSETT, JOHN, '36, recently obtained a positon as assistant metallurgist at the shops of the Chicago, Milwaukee, St. Paul and Pacific Railroad, Milwaukee, Wis.



ELLIOTT, GEORGE C., '36, is also with the Marathon Chemical Co., Rothschild, Wis.

HOUGEN, JOEL O., '36, is employed in the Research and Development department of the Pan-American Refining Corp. of Texas City, Tex.

MACK, D. J., '31, M.S. '32, recently stopped at Madison for a brief visit after conducting an inspection trip in the Chicago area for a group of Purdue students. During the current school year, he holds a graduate assistantship in the Chemical Engineering department at Purdue, and is working for his doctor's degree.

NOVOTNY, GLENN, '32, is working in the Lithographing department of the American Can Company, Chicago, Ill.

SKOGSTROM, D. E., ex'35, has a position with the Nuts and Locks Co., Rockford, Ill.

A number of chemical engineering graduates of Wisconsin are employed at the South Chicago Works of the Carnegie-Illinois Steel Company. R. A. Grange '35, R. A. Parson '35, R. W. Ritchie '36, J. T. Smithwick '35, G. E. Pelton '35, J. I. McCall '36 report that the boom the steel industry is experiencing has made their laboratory a very busy place.

•

Electricals

BOLTE, ROBERT E., '36, formerly with A. O. Smith Corp., now has a position with Allen-Bradley Co., Milwaukee.

GERLAT, T. G., '36, is working for the Western Electric Co., Chicago, Ill.

LOEWE, ROBERT, '30, was recently recalled to work by the Westinghouse Electric and Manufacturing Co., Sharon, Pa.

TUSLER, STANLEY R., '35, is employed by the Naylor Pipe Co., Chicago, Ill.

TUTTLE, L. H. '34, is now connected with the Western Electric Co., Chicago, Ill.

•

Mechanicals

GUNTHER, LAWRENCE, '36, has left the Berlin Chapman Co. to join the engineering research department of the Norge Co., Detroit.

KRON, JERALD D., '33, M.S. '34, is in charge of all design at Leick Observatory in California.

•

Miners and Metallurgists

BEECHEL, GRAYDON R., '36, has been made mining geologist for the Mountain City Copper Co. at Mountain City, Nev. Beechel has been a sampler for this company for the past year.

PETERS, ADOLPH, M.S. '35, has also secured a position with the Smith Steel Casting Co. as a metallurgist.

SCHAPER, RALPH, M.S. '37, is production metallurgist for the Smith Steel Casting Co. of Milwaukee.

SMYTHE, W. O., '35, M.S. '37, has joined the Smith Steel Casting Co. as sales engineer. Smythe has been metallurgist for the Ladish Drop Forge Co., Milwaukee.

ON THE CAMPUS

NYA PROJECTS

The fellows working on NYA jobs in the mechanics department are becoming well acquainted with the business end of a shovel. As a matter of fact, none of the jobs with NYA in the engineering department seem to be the soft snap most of the world thinks they are. The boys are putting in real back-breaking labor shoveling sand, gravel, and cement as well as running internal and external vibrators, hand mixing and hand placing concrete, and measuring absorption, expansion, and strength determinations in connection with the various projects under way.

Started under CWA and continued with NYA assistance is the investigation of mortars for reinforced brick masonry. Progress along this line was considered important enough to warrant publication of a report which was read at the annual meeting of the American Society for Testing Materials in 1935. Tests which the fellows are making include tensile bond, shear bond, suction rate, strength, and expansion.

The study of vibrated concretes also helps to keep the boys in condition, for it is here that there is plenty of work mixing and placing concrete for test. This subject seems to be quite perplexing since they have been working on it for several years now. The speed, time, and amplitude of vibration and their effects on the ease of placement are being studied. Strength, absorption, permeability and volume constancy of hand rodded and vibrated concretes with various types of cement are also being tested.

Some machine shop work is also being done in connection with the preparation of specimens to study the properties of a certain new low-alloy, high yield strength steels.

And so, in general, we find that the mechanics department has more than enough physical as well as mental labor to keep the engineers in its employ busy for quite some time to come.

'Way out there in the Mining Building we find the miners employed by the NYA busy cataloging metals, preparing specimens for classroom work, and making celluloid models of equilibrium systems. Three of the men are working on a map of the service lines in the building, which have been under investigation now for two years. These include the electric light lines, the steam lines, hot and cold water, and telephone lines. A good deal of drafting is also being done of flow chute charts and comparison charts.

•

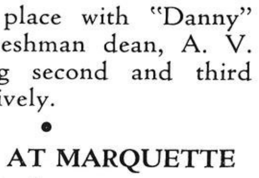
FACULTY CUTS UP

With Dean Turneaure as the guest of honor, the engineering faculty let loose for an hour and a half last April 7 and managed to have one hilariously good time at the largest meeting of Pentagon ever held. An attempt to break away from the traditional dinner-dance was made, and from all reports, the break was complete. Dean Turneaure gave a talk on "Deaning," a magician entertained the guests, and then the fun began with the stunts. An obviously set up affair was the tall story contest in which the Dean copped first place with "Danny" Mead and freshman dean, A. V. Millar, taking second and third places respectively.

•

LECTURES AT MARQUETTE

W. S. Cottingham, assistant professor of structural engineering, has been speaking on consecutive Tuesday evenings at Marquette University on the "Analysis of Concrete Building Frames" with special reference to the needs of structural engineers who are engaged in the design of buildings. Mr. Cottingham's lectures began April 13 and were held under the auspices of the Milwaukee Section of the American Society of Civil Engineers.



JOBS FOR CIVIL GRADUATES

Forty-one civil engineers will be graduated between January and the end of summer session this year. These men are facing an employment situation as bad as or worse than that of 1934, which was the worst year the civils have faced so far. Within recent weeks many civil engineers have been thrown out of work by the termination of the activities of WPA. These men swell, to abnormal proportions, the ranks of those who are looking for jobs. WPA is being liquidated on the theory that industry has now become active enough to absorb the men now on government-supported work. The theory, however, does not apply to civil engineers, who find their field of employment usually in construction work. The job situation in the immediate future is not a rosy one; but the abnormal features are not expected to be permanent. The men who are well-equipped, energetic, and fortunate will find themselves in the money.

•

MORE JOBS FOR THE GRADUATES

With the possible exception of the civils, this year seems to mark the beginning of a new day for the graduating engineers. Once again there are enough jobs to go around and maybe a few left over. Prof. J. W. Watson, who has charge of placing the electricals, states," While quite a few of the electricals have not been placed definitely as yet, I expect them to be entirely placed by the end of the school year." Some of the larger companies which have signed or have made offers which have not been accepted as yet by the electricals are the Milwaukee Electric Railway and Light Company, Westinghouse, General Electric, and Cutler-Hammer. Mr. Watson added that the class of 19 electricals this year is the smallest since 1917-18, which only adds to the opportunities available to the electricals.

You're About Through With School, Seniors

AND NOW WHAT

Will You Do To Continue Your Professional Training?

Soon college days will be over for you seniors and you will be going to work on that first job. Does professional training and development stop now? A recent study of the development of the engineer—how he acquires knowledge, experience, and judgment—has revealed that his growth usually proceeds at a fairly steady rate from high school age until finishing college, and then, after leaving school, his progress stops and he stays at the same level for four or five years. Later his development is again resumed. This period of "marking time" is during the young engineer's start in industry—while he is finding himself. The survey also showed that the men who availed themselves of some kind of professional training immediately after graduation did not enter this "slump" period, but their growth continued at about the same rate as in school.

In the last few years, the national professional societies have begun to realize that the way to increase the standards of the engineering profession is to inaugurate some plan of helping the young engineer continue his education after his start in industry. Late in 1932, representatives of five professional societies, together with those from the Society of the Promotion of Engineering Education (S.P.E.E.; its 1936 convention was held on this campus last June) and those from the national body representing the licensure of engineers by the state formed a single cooperative group dedicated to raising the professional status of the engineer. The group was named the Engineers' Council for Professional Development—E.C.P.D. for short—and its seven constituents represent the professional, the educational, and the public or legal aspects of engineering.

Since there are four normal stages in the life of the engineer, (1) pre-college, (2) the engineering school, (3) early experience as junior engineer, and (4) professional practice, E.C.P.D. designed its work to fit in with each of them. One of its committees has helped direct guidance service for the student entering engineering college, with an eye to cutting down the high mortality of engineering students found by surveys a few years ago (40 per cent in freshman year; only 30 per cent graduating at the end of four years).

Another group has been accrediting engineering curricula. The country was divided into seven regions, containing approximately equal numbers of engineering schools, and prominent engineers in each district have agreed to serve on accrediting committees. By October, 1936, engineering schools in the New England and Middle Atlantic States regions had been accredited, and it is planned to finish the other five regions by the fall of 1937. (On May 6 representatives of this E.C.P.D. committee visited Wisconsin for the purpose of reviewing the quality of curricula offered, the adequacy of the instructional staff to present it, and the completeness of the physical plant. Later, they will decide on whether Wisconsin is to be accredited or not.)

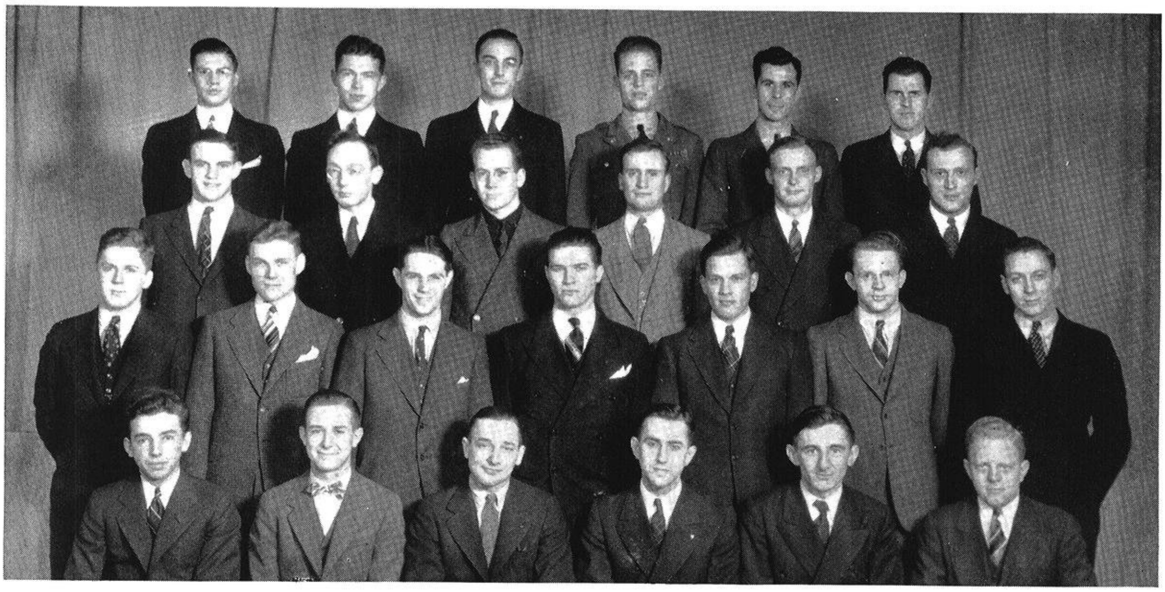
At Providence, R. I., the Providence Engineering Society, which cooperates in the activities of the local sections of the major societies, undertook with the cooperation of E.C.P.D. to organize a program for the professional development of the young engineers of Providence and vicinity. Now, a general meeting is held each month at which some engineer or business man talks on a subject of particular interest to young engineers with an open discussion led by the speaker following the talk. In addition, there are five smaller study and discussion groups on management, marketing, public speaking, machine design, and civil engineering which meet bi-weekly. These groups set up their own programs for the year and with the aid of some of the older engineers as technical consultants the programs have been made very effective.

Generally stated, the aims of a group development program are as follows: (1) to afford an opportunity for acquaintance of young engineers with each other and with older men who are outstanding in the community and the engineering profession; (2) to acquaint the young engineer with certain important general principles, policies and practices which must be observed in industrial and business relations; (3) to provide incentive and facilities for study through group discussions and cooperative technical and non-technical courses; (4) to encourage practice in clear thinking, self-expression and leadership, through their own activities.

During the current year, the E.C.P.D. committee on professional training is giving helpful stimulation to programs similar to that at Providence in an increasingly large number of centers having local sections of the constituent bodies and a sufficient number of junior engineers to form the basis of operations. In addition, some of the national professional societies are also extending their junior activities; for example, A.S.M.E. has active junior groups in 36 cities. They carry on programs similar to that at Providence.

Since a good deal of E.C.P.D.'s work has to do with aiding the development of the young engineer, the organization has several pieces of printed matter along this line. A pamphlet "Suggestions to Junior Engineers" was printed last year and contains a self-appraisal blank and a general reading list for junior engineers. The Council has prepared a brief bibliography of outstanding books on technical subjects, also published last year. In 1935, the Council took a nationwide survey of university extension and correspondence courses which are available to young engineers desiring to carry on educational work individually and on a more formal basis. The facilities included in the report are mainly in non-technical fields and are designed to satisfy the desire of the junior engineer for a broader non-technical culture which is so necessary for attaining the higher ranks of the profession.

To every engineer E.C.P.D. can offer something of value. Particularly to those graduates who are embarking upon the most critical period of their professional careers can it be of some real and practical aid. The Council has no fees, dues or charges other than a nominal charge for its publications. Members of the constituent organizations voluntarily give of their time in carrying on this work. The 1936 report of the Council's activities, any of the aids described in this article or any other information or help which it is possible to give may be obtained simply by request to E.C.P.D. headquarters at 29 West 39th Street, New York City, in the Engineering Societies Building.



TAU BETA PI

HONORARY ALL-ENGINEERING FRATERNITY

First Row: Lacher, Rudolf, Simon, Sager, Rohlich, Wagner. Second Row: Hafstrom, Brown, Wright, Kutchera, Sohns, Gother, Sabee. Third Row: Zwettler, Luecker, Norris, Davy, Olson, Parrott. Fourth Row: Eppler, Risser, DeNoyer, Riggert, Liebmann, Miller.

OFFICERS

Gerard A. Rohlich .... President
Gerald J. Risser .... Vice-President
Neal D. Olson .... Corresponding Secretary
Arthur Luecker .... Recording Secretary
F. W. Parrott .... Treasurer
Joachim Liebmann .... Cataloger

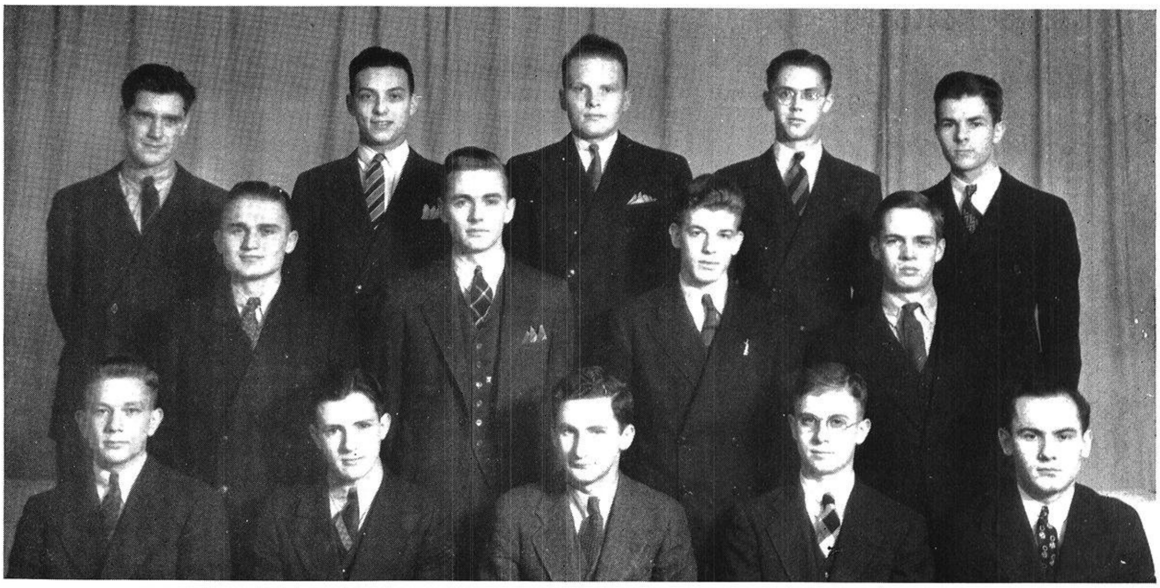
Founded 1885
Lehigh University
69 Chapters

Local Chapter
Alpha
Established 1899

Graduate Members: Joachim E. Liebmann, Gerard A. Rohlich.

1937: Charles W. L. Burroughs, Philip S. Davy, John F. Eppler, Francis E. Fontaine, Leroy W. Griffith, William F. Gother, Arthur R. Luecker, Harrison C. Mayland, Donald B. DeNoyer, Neal D. Olson, F. W. Parrott, Marvin C. Riggert, Gerald J. Risser, Eldon C. Wagner, Kenneth M. Brown, Ronald L. Daggett, J. Robert Hafstrom, Phillip H. Kern, Donald H. Kutchera, Richard W. Lacher, Charles L. Miller, Spaulding A. Norris, Chester D. Rudolf, Karl E. Sager, Lawrence Simon, Carl B. Sohns, Frederic Utter, Everett C. Wallace, Gerhard A. Vater, Robert F. Zwettler.

1938: Reinhardt Sabee, William N. Wright.

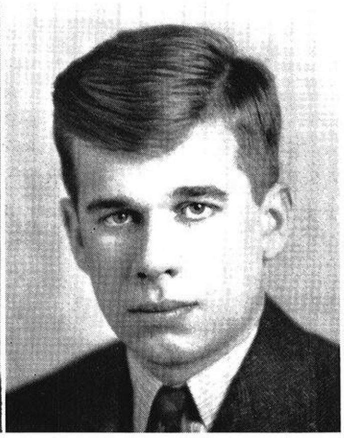


First Row: Kommers, Leviton, Alexander, Ketchum, Heuser. **Second Row:** Jankus, Pamperin, Walter, Thorkelson. **Third Row:** Senft, Anoff, Hopkins, Stanley, Krahn.

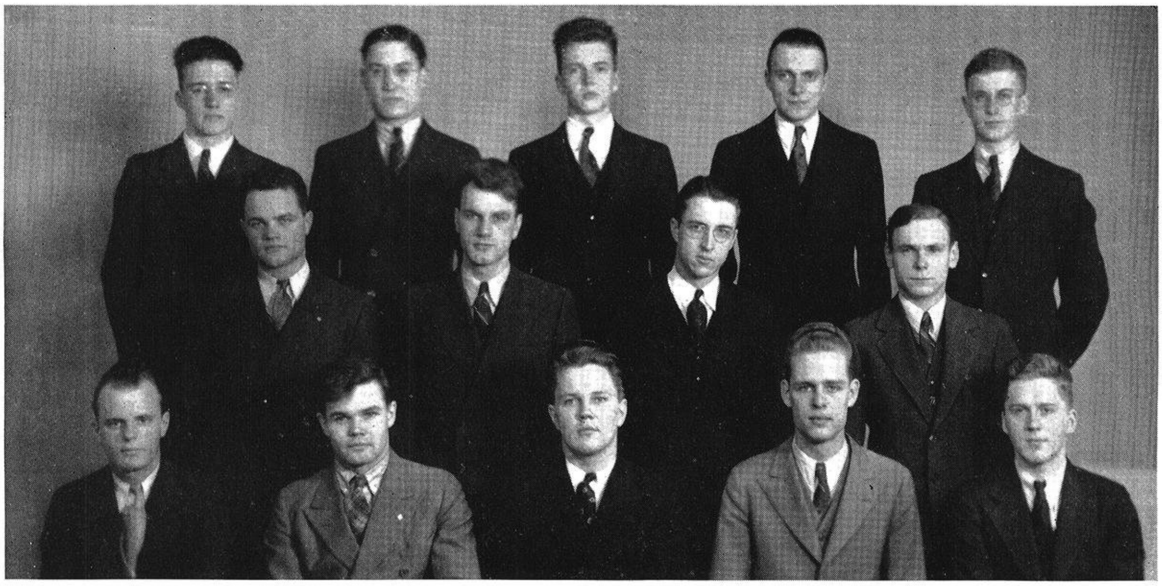
THE WISCONSIN ENGINEER

PAUL KETCHUM
Editor

LYLE YERGES
Business Manager



Editor, Paul M. Ketchum; Business Manager, Lyle F. Yerges. Editorial Staff: Roger Stanley, Alumni Editor; William Hood, Campus Notes Editor; Carl Walter, Humor Editor; Robert Hopkins, Staff Photographer; Herbert Sanford, Organization Editor; Jack Heuser, Editorial Assistant; John Pamperin, Feature Editor and Biographer; John Senft, Biographer; Leo Herning, Harold Leviton, Alan Jankus, Seymour Anoff. Business Staff: Walter Liedke, Circulation Manager; William Thorkelson, Circulation Manager; Richard Krahn, William Kommers, Robert Richardson. Board of Directors: G. F. Tracy, Chairman; F. E. Volk, R. A. Ragatz, J. B. Kommers, R. S. McCaffery, K. F. Wendt, G. L. Larson, P. M. Ketchum, L. F. Van Hagan, L. F. Yerges.



ETA KAPPA NU

HONORARY ELECTRICAL ENGINEERING FRATERNITY

First Row: Heinrichsmeyer, Schultheiss, Luoma, Riggert, Hafstrom. **Second Row:** Otis, Neumann, Davies, Ross. **Third Row:** Mitchell, Zawasky, Lingard, Vater, Ketchum.

OFFICERS

Herbert Luoma.........................President
Marvin C. Riggert.........................Vice-President
Robert J. Hafstrom.........................Bridge Secretary
Everett C. Wallace.........................Corresponding Secretary
Edmond F. Heinrichsmeyer.........................Recording Secretary
Carl E. Schultheiss.........................Treasurer

Founded 1904
University of Illinois
26 Chapters

Local Chapter
Theta
Established 1910

1937: Robert J. Hafstrom, Edmond F. Heinrichsmeyer, Herbert Luoma, Stanley J. Otis, Marvin C. Riggert, Gerhard A. Vater, Everett C. Wallace.

1938: Everett H. Davies, Paul M. Ketchum, Aldro Lingard, Wayne T. Mitchell, Fred C. Neumann, Alan K. Ross, Carl E. Schultheiss, Lee M. Zawasky.

CHI EPSILON

HONORARY CIVIL ENGINEERING FRATERNITY

First Row: Jensen, Norris, Miller, Voss, Langteau, Alexander, Wagner. **Second Row:** Yerges, Sheerar, Krejchek, Luecker, W. Johnson, Wilson, Zwettler, Kutchera. **Third Row:** Davy, Schmitt, Polk, H. Johnson, Newbury, Eppler, Voelker.

Founded 1922
University of Illinois
13 Chapters

Local Chapter
Wisconsin
Established 1925

1937: Edwin J. Voss, R. Russell Langteau, Spaulding A. Norris, Charles L. Miller, Howard R. Jensen, Wayne W. Johnson, Ray F. Voelker, Russell H. Newbury, John F. Eppler, Arthur R. Luecker, Eldon C. Wagner, Philip S. Davy, Francis C. Wilson, William H. Polk.

1938: Robert F. Zwettler, Lewis L. Sheerar, Don H. Kutchera, Milton O. Schmidt, Lyle F. Yerges, Norman E. Van Sickle, Herbert E. Johnson, Glenn C. Krejchik, Frederick C. Alexander.

PI TAU SIGMA

HONORARY MECHANICAL ENGINEERING FRATERNITY

First Row: Stanley, DeNoyer, Prof. G. L. Larson, Hanson, Myers. Second Row: Wefel, Sohns, Lawrie, Gother, Kranc, Behrens. Third Row: Losse, Spence, Ibisch, Sabee.

OFFICERS

Donald B. De Noyer	President
Roger U. Stanley	Vice-President
Willard G. Hanson	Secretary
John R. Myers	Corresponding Secretary
Stanley J. Kranc	Treasurer

Founded 1915
Universities of Wisconsin
and Illinois
15 Chapters

Local Chapter
Wisconsin Alpha
Established 1915

1937: Stanley Austin, Russell Baum, Charles Behrens, Charles Burroughs, Ronald Daggett, Donald DeNoyer, Franz Ibisch, Edward Faust, William Gother, Leroy Griffith, James Lawrie, Robert Losse, John Myers, Edward Rosecky, Carl Sohns, Ellison Wefel.

1938: Daniel Dobrogowski, Stanley Kranc, Arthur Krumhaus, Frederick Johnson, Harold Leviton, Fred Loebel, Willard Hanson, Robert Sharp, Roger Stanley, Rinehardt Sabee, Everett Utecht.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS

OFFICERS

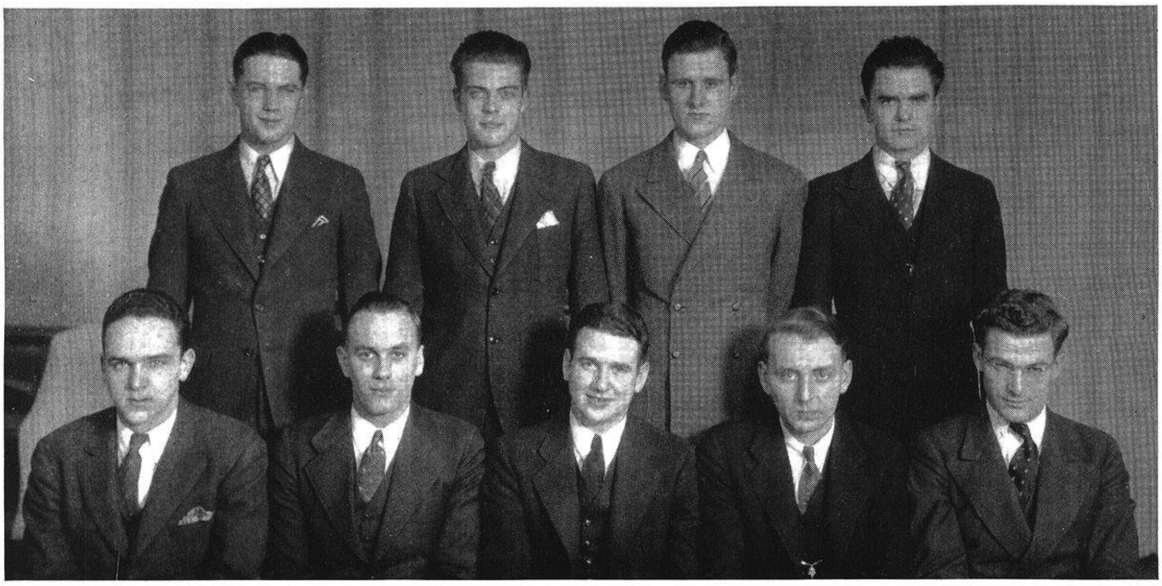
Eugene M. Kirtland	President
Carl B. Sohns	Vice-President
William F. Gother	Secretary
George Langley	Treasurer
Paul Andree, Clifford Sawyer	Polygon
Professor Thomas P. Colbert	Faculty Advisor

1937: Adams, Andree, Barlow, Berry, Goetz, Gother, Gunther, Horneck, Ibisch, Kirtland, Langley, Lippert, Losse, Munro, Myers, Severson, Sharp, Sohns, Swifka, Thom, Wenman, Pfeffer.

1938: Boettcher, Brindley, Dansfield, Dobrogowski, Freund, Grether, Kranc, Leviton, Lindergren, Melms, Mitchell, Sawyer, Schaal, Stanley, Stiegler, Orthey, Oscar, Thiele, Volkman.

1939: Amery, Bauer, Buchberger, Dettman, Evans, Henneman, Kommers, L. S. Marshall, Runckel, Schmidt, Senft, Vanderwall, Hugh Wright, R. E. Wright, J. Marshall.

1940: Arens, Blatecky, Broberg, Damrow, DeGroot, Fredrickson, Garcia, Halberg, Johnson, Lagergren, Lamb, Pike, Rau, Slavik, Sorenson, Stieg, Yugo, Schlintz.



POLYGON

First Row: Friess, Voss, Hunzicker, Andre, Sargent. **Second Row:** Wright, Ferber, Sawyer, Sheerar.

MEMBERS

Civil Engineers: Edwin J. Voss, '37; Lewis L. Sheerar, '38.
Mechanical Engineers: Paul F. Andree, '37; Clifford Sawyer, '38.
Chemical Engineers: Earl E. Sargent, '37; Peter S. Sarocka, '38.
Electrical Engineers: Robert W. Friess, '37; August L. Ferber, '38.
Mining Engineers: Wayne T. Hunzicker, '37; William N. Wright, '38.

OFFICERS

Lewis L. Sheerar	President
Peter S. Sarocka	Treasurer
Clifford L. Sawyer	Secretary
August L. Ferber	Publicity Agent

THE MAIN purpose of Polygon is to co-ordinate the activities of the engineers in the University, and to act as a central committee in governing their activities. Each of the five branches of the Engineering College is represented by two men in Polygon. These men are elected by the engineering societies when they are sophomores, and they take office in their junior year.

Every engineering student is assessed a dollar each semester, for which Polygon gives him membership in his respective society, pays part of his dues to the national chapter, and gives two dances and two smokers during the year. Polygon also partly finances the Wisconsin Engineer magazine, and takes charge of the annual St. Pat's parade.

OUR REPORT

. . . *Polygon*

A year ago you voted overwhemingly that the Polygon activity fee should be collected only once during the school year—at the time of registration in September. You liked the idea because it saved you the trouble of paying in two installments; we liked the idea because it gave us an opportunity to plan the year's activities in advance—to budget the available money and know just how much to spend for each function. There is another advantage—which you probably don't realize, but is even more important to us. During the days when the activity fee was collected each semester, the first semester collections were always good, but for various reasons the second semester collections fell off alarmingly—sometimes to about half of those of the first part of the year. Mainly, this was due to the difficulty in contacting the students because of the method of registration used in the college. All of this resulted in a rather mediocre showing for a year that started off with flying colors. Consequently, the activities of the second semester were never as satisfactory as they should have been. Our new plan has resulted in keeping the quality of the activities up during both semesters.

Just what has been done? This year Polygon has contacted more men than ever before. There have been two all-engineering smokers, each well attended; there were two all-engineering dances which were exceedingly successful; the student chapters of the national professional societies have had more and better programs with excellent attendance; the St. Pat's parade this year was bigger and better than ever; the *Wisconsin Engineer* has come to you every month with more and better illustrations and articles and has endeavored to publish the things you were interested in.

In such a changing society as the engineering student body, it is hard to gain group solidarity. The seniors, who are the most enthusiastic over the Polygon Plan because of their longer assocation with it, are leaving us. The freshmen have only seen it in operation one year and have not yet experienced all of the advantages which the many contacts can provide. The new men coming in next year are totally ignorant of its benefits and must be enlightened as to the possibilities of entertainment and education it offers. It is then up to you men who have found benefit from and have experienced the Polygon Plan to fall into the ranks again next year and get solidly behind the Polygon Board in putting it across.

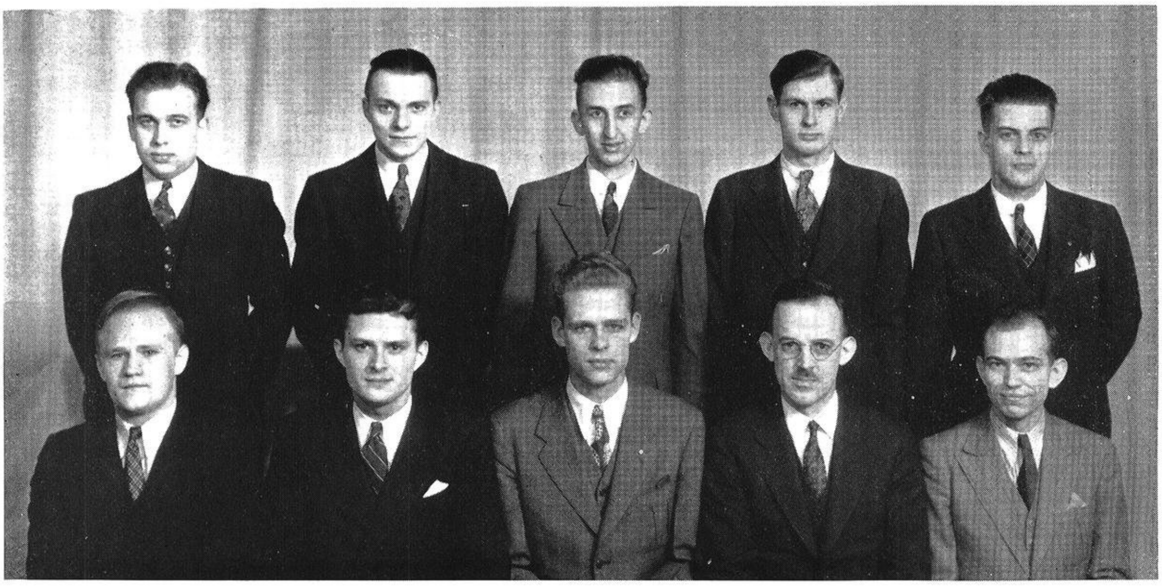
After they had petitioned several times, last year you voted to invite the agricultural engineers to join our group since their course was something like mechanical engineering. This was done, but due to complications in their own group, they were not able to join us this year. Should they be able to next year, it will be of help to us. If the present enthusiasm is maintained, the Polygon Plan should grow to be the biggest, closest knit activity group in engineering student history.

We know that everything we have done in the past year has not been as satisfactory as it might have been, but Polygon Board members serve for two years—half of the board continues on next fall and they will surely benefit by this year's experiences. So, we can promise you that if you will continue to help us grow we will provide bigger and better features.

FINANCIAL SATEMENT OF POLYGON
Year 1936-37
(As of April 29, 1937)

Bank Balance, September 1, 1936 (All Societies and Polygon Board)		$ 130.69
Income, 1936-37:		
Fees	$1,376.90	
Dances	110.50	
St. Pat Elections	128.70	
Miscellaneous	3.39	
Total Income		1,619.49
Total:		$1,750.18
Disbursements:		
Societies		
A.S.C.E.	$ 84.00	
A.S.M.E.	106.20	
A.I.E.E.	82.80	
A.I.Ch.E.	129.69	
Mining Club	26.10	
Research Fund	40.63	
Wisconsin Engineer	688.50	
Contingent Fund	144.61	
Expenses	344.64	
Total Disbursements:		1,647.17
Polygon Board Balance:		$ 103.01
Bank Balance (composed of Polygon Board balance plus contingent fund plus unexpended funds for various societies):		$ 400.61

Respectfully submitted,
EDWIN J. VOSS
Retiring Polygon Treasurer



AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS

OFFICERS

Marvin C. Riggert .... Chairman
Louis D. Berg .... Secretary, Treasurer

First Row: Boening, Berg, Riggert, Prof. Tracy, Wrensch. **Second Row:** Schille, Vater, Ahlswede, Schmiedlin, Ferber.

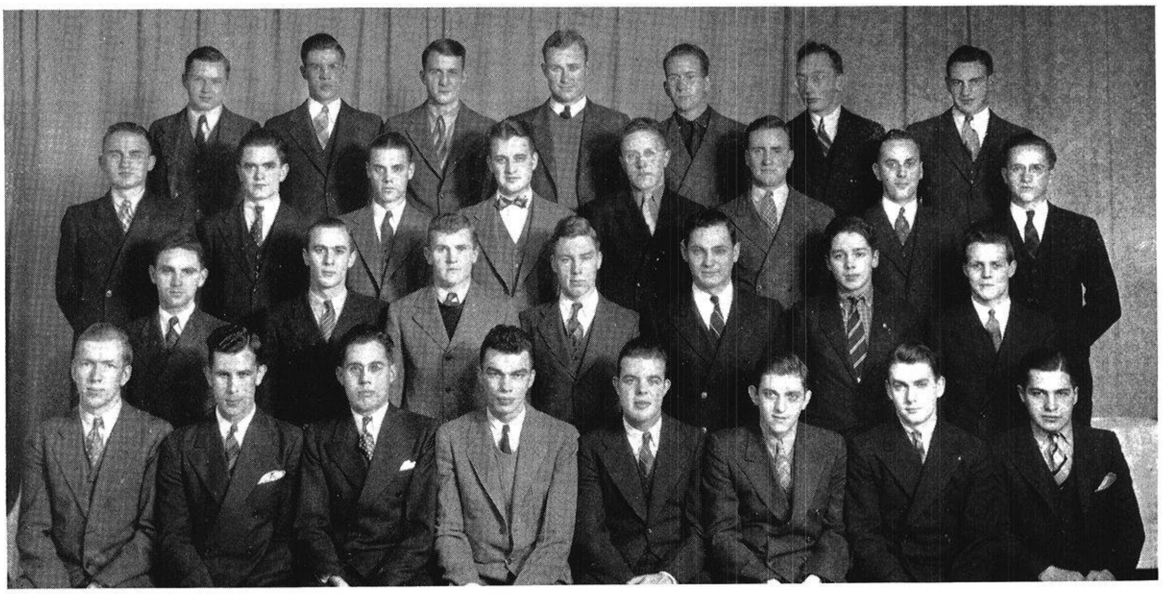
Graduate Member: W. F. Kraemer.

1937: Louis D. Berg, Elroy F. Boening, Rex. C. Dieterle, Edmond F. Heinrichsmeyer, Marvin C. Riggert, Carl A. Schille, J. W. Seifert; Harry G. Sellery, G. A. Vater, B. E. Wrensch, J. R. Hafstrom, N. E. Ahlswede.

1938: August L. Ferber, Ralph F. Schmiedlin, Carl E. Schultheiss, Roy R. Lee.

1939: Frederick C. Wolf, Agustus Lehrkind, Robert L. Oetting.

1940: Thomas G. Sell, John W. Soule, Thomas N. Teigen.



AMERICAN SOCIETY OF CIVIL ENGINEERS

First Row: Wendt, Liebmann, Polk, Hoffman, Voelker, Littleton, Maxfield, Bachmann. **Second Row:** Thompson, A. Voss, Kwasniewski, Baum, Dorff, Curry, Hunt. **Third Row:** Jankus, Sheerar, Jensen, Johnson, Schuette, Davy, E. Voss, Toole. **Fourth Row:** Krejchik, Eppler, Schmidt, Lehmann, Norris, Luecker, Zwettler.

OFFICERS

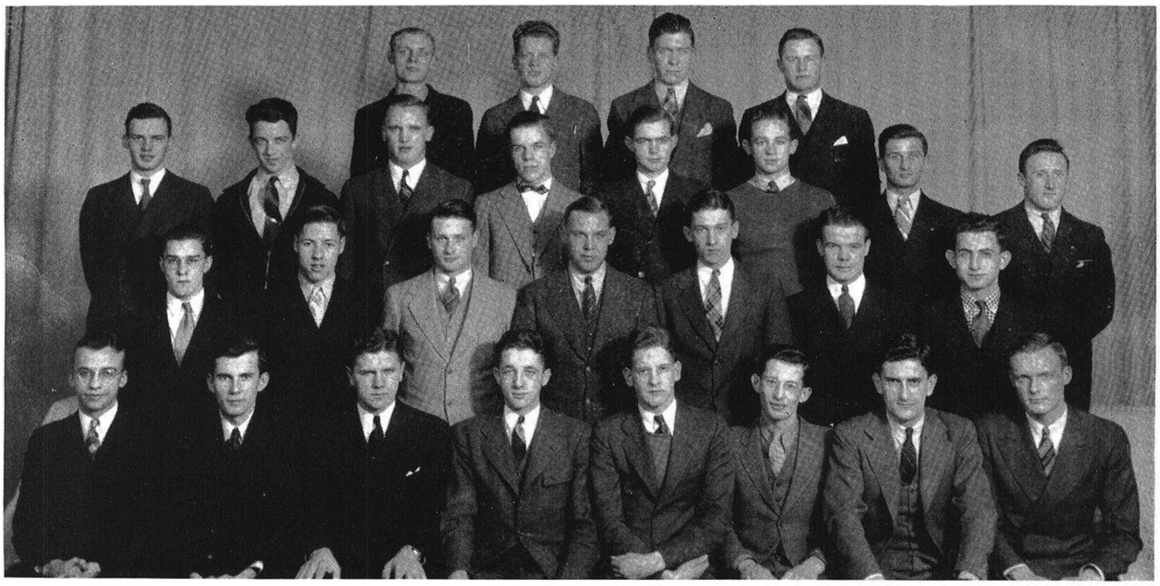
Theodore F. Hoffmann	President
Ray F. Voelker	Vice-President
William H. Polk	Secretary
William E. Littleton	Treasurer

1937: Carl Bachmann, John Baum, John Bessert, Frederick Brunner, Lawrence Carlson, Ralph Culbertson, Philip Davy, Leslie Deno, Sol Dorff, Edwin Duszynski, John Eppler, Karl Fuge, Lynn Gunderson, Theodore Hoffman, Lester Hoganson, Paul Hunt, Howard Jensen, Wayne Johnson, Oscar Kiendl, John Kuhta, Donald Kutchera, Russell Langteau, William Littleton, Arthur Luecker, Paul McKinnon, Spaulding Norris, William Polk, Russell Poynor, Kenneth Qualman, Albert Schluter, Cornelius Siettmann, Ray Voelker, Emerson Vorel, Edwin Voss, Eldon Wagner, Martin Wendt, Francis Wilson, Charles Miller.

1938: Fred Alexander, Henry Bergman, Vaso Bjelajac, Alvin Edelstein, Robert Gross, Herbert Johnson, Glenn Krejchik, Paul Klieger, Roman Kwasniewski, Jack Maxfield, James Michalos, Otto Olsen, Harry Panzer, William Pryor, Lee Savorias, Norman Scovill, Lewis Sheerar, William Toole, James Vaughan, Glenn Von Gunten, Harvey Wirth, Lyle Yerges.

1939: Elwood Bartz, Jesse Dietz, William Eulfeld, Woodrow Felts, Allan Jankus, Richard Krahn, Carlton Laird, Kenneth Lehmann, Hubert Leland, John Lewis, George Morgan, Stan Nestingen, Richard Olson, Glenn Thompson, Fred St. Germaine, Arnold Voss, Harvey Wendorf.

1940: Robert Ackermann, Clifford Bedore, George Blair, Clarence Bogenhagen, Clarence Boncyk, George Brem, Elmore Buckeihal, Gilbert Buske, Joe Cierack, Donald Curry, Walter Davy, Albert Draves, Frank Erl, Carl Eustice, William Faulkes, Robert Felhofer, John Findorff, Charles Fisk, Edward Fitch, Dalman Hatz, Harold Heldebrandt, Jack Gerlach, Gerald Gilbert, John Goldsmith, Robert Goodier, Robert Gregory, Richard Gustafson, Bill Hancock, William Harlow, Carlos Hessler, Clyde Kasper, Frank King, Leonard Kohl, Donald Leaman, George Leffler, Hugh Lewis, Kenneth Lemke, Paul Mangold, Carl Matthies, Charles Metcalf, John Mielke, Ervin Miller, Paul Mitchell, Ben Mohns, Arnold Mortenson, Jamieson Newell, Lyle Olson, Robert Puestow, William Ryan, Evan Schuette, James Shaney, Newell Smith, Verne Soderstrom, William Stanton, Knute Takle, Arthur Tuttle, Robert Walker, Arthur Widmann, Anthony Wojciechowski



AMERICAN INSTITUTE OF CHEMICAL ENGINEERS

OFFICERS

Ralph Goetz..President
Neal Olson..Vice-President
Edward Anderson..Treasurer
Jack Heuser..Secretary

1937: Stanley R. Adams, Edward D. Anderson, Edward J. Dahlke, Gerald J. Fleming, Joseph F. Kescher, G. Edward Kornreich, William M. Mayer, John B. Merriam, Herman Miller, Neal Olson, Arthur Raeuber, Fred Raynor, John Roebuck, Chester Rudolf, Earl Sargent, Leland Sargent, Fred Schwanberg, Stanley Sivertson, Charles Staadt, J. J. Worner.

1938: John J. Antlfinger, Kenneth M. Beals, Kenneth M. Brown, Clarence G. Cichocki, Clarence W. Eckmann, Howard W. Fiedelman, Ralph W. Goetz, Ted B. Haufe, Leo A. Herning, William W. Humphrey, Joseph M. Keating, Max L. Lindoo, John W. Mann, John W. Marston, Kenwyn Merrifield, Robert Olson, Ray Pacausky, Theron Place, Myron Roshar, Peter Sarocka, Walter Whiteis, Philip Winter.

1939: Edmond H. Albrecht, William B. Avery, Walter R. Blair, Edmond R. Boehck, Willis Browne, Thomas K. Christianson, George V. Dawley, Herbert W. Eickner, Clark A. Fisher, Karl E. Forsgren, Leo J. Fuchs, James H. Hare, Karl T. Hartwig, Howard E. Herchinburg, John E. Heuser, Edward J. Huber, Wilbur P. Isberner, Kenneth P. Johannes, M. L. Jungwirth, Raymond G. Knudsen, John W. Koehler, Marshall Neipert, Alfred Nelson, Walter Otto, John Rezba, Herbert Sanford, Philip Schneider, Jack Seelow, Lawrence Smith, Carl Velguth.

1940: D. V. Ackerman, James R. Bishop, Erroll V. Black, Walter A. Blair, Robert N. Braun, J. J. Brower, R. J. Bryan, Victor S. Burstein, Melvin W. Butenhoff, Anthony L. Casciaro, George H. Crowell, Robert S. Cunningham, Albert H. Dorsch, Albertus G. Draeger, John F. Elliot, John M. Erickson, Eugene D. Ermenc, Thomas R. Favell, Aubrey A. Fierick, Charles J. Finn, E. Chester Foster, Leo H. Francis, Jules Gilbert, Dan B. Greenwood, Charless Hahn, Alvin C. Hanson, Kenneth E. Higley, Richard P. Kepler, Erwin C. Koeber, Ralph E. Koester, Norman E. Krause, Francis L. Kurek, Louis T. Lanz, Neils C. Larsen, Francis W. Lauck, Bertrand Jesse Mayland, Donald H. Merry, James W. Millin, Thomas Morrissey, Carl J. Muckler, Roland Nelson, George Nichols, Wallis Peters, Charles Piene, Thomas Polchinsky, Lew Porter, Donald Rindt, Robert Schindler, Louis Schueler, John Scott, Robert Seidl, George Smithwick, Frederick Steinmann, Edwin Stellmacker, Charles Sutter, Alex Temmer, Walter Tick, Milton Trecek, Charles Vaughn, Richard Westerman, Robert Weyke, Richard Willette, John Woerfel.

"STATIC"

by

ENGIN EARS

• Sprig has cub, with the delightful rustle of leaves on tree and in blue-book, the balmy South wind bringing us the whine of turbine and the drowsy babble of condenser exhaust water on the M. E. floor, the murmur of wild life in the woods, mingled with the anguished swearing of Civils lost with their stations in the underbrush. It's great to be alive, provided one is not taking Rails 105 or E.E. 112. It sort of does something to one. Like Dean Millar breaking in a new suit, or Lingard counting the buds on trees for a Cardinal feature spread; Ketchum breaks down and buys a new slip-stick, Fred Cape shifts to the next lighter of his graded-for-the-season undie assortment, P. J. Brewer dons his Nat. Honor Society pin again while Bates (of the mechanical Bates) takes his off. It hits both faculty and stoogents. "Smilin' Jimmy" Watson disturbs his students' slumbers with little gems such as, "—different in being separately related to something in common." Students too numerous to list fall in love all over again, Pryor and Heuser (of the Ex-Kings' Club) run about promoting things, Instructor Rose begins to tinker with the kicker on his Naval Reserve Scow, and Glenn Krejchik takes his first shave (3/25/37). So goes the Engineering merry-go-round. So what? Ho, hum, we're too tired to care.

» » « «

• If you want to see a guy's ears really get red, ask "Carsty" Slack, e'39, about his love life.

» » « «

• The sterling silver necktie for candor is awarded this month to an elongated prof. of D. C. Machinery who held up the course text and casually remarked, "I'd like to have you familiar enough with these books to know where they are."

• Comes the close of another year. We're disgruntled, in fact, disgusted. Ol' Engin Ears has been performing the incredible feat of simultaneously keeping his shoulder to the wheel, his nose to the grindstone, and his ear to the ground—for which his gentle readers, if any, have rewarded him by turning in practically no contributions at all. Phooey on you . . . and we hope all your bridges fall down, your substations blow up, your powdered coal units melt, your girls run off with shysters, and that you may be haunted forever by memories of Mechanics 3.

• The season is once more on us when the following short story becomes appropriate:

"Oh, George, let's not park here."
"Oh, George, let's not park."
"Oh, George, let's not."
"Oh, George, let's."
"Oh, George—"
"Oh—"

» » « «

• While in Milwaukee, the gang took our boy Lingard to his first "inspection trip" of the "Gayety." As we'd have suspected, he brought out the old slide rule and carried on some involved calculating during the entire show. They even had a job getting him out of the joint.

They had the same trouble with Von Gunten in Chicago's "Rialto," but not because of any lack of interest in the proceedings on his part. He insisted that the front row wasn't close enough.

» » « «

• From the testing labs of Washington State comes this chemical analysis of women:

Symbol: Wo. Thought to be a member of the human family.

Atomic Weight: Accepted as 120, though known isotypes vary from 100 to 180.

Occurrence: Found both free and combined, usually with man.

Physical Properties: Seldom found in the pure state. All colors. Surface usually protected by a film of paint or oxide. Boils at nothing and freezes without reason. An unpolished specimen tends to turn green in the presence of a highly polished one. All varieties melt with proper treatment. Density not as great as generally supposed.

Chemical Properties: Highly explosive and dangerous in inexperienced hands. Possesses great affinity for gold, silver, platinum, and all precious stones. Has the ability to absorb unlimited quantities of expensive foods. May explode spontaneously when left alone by man. Fresh variety has great magnetic attraction. Ages rapidly.

Uses: Chiefly ornamental. Efficient cleaning agent. Acts as a positive or negative catalyst in production of fevers. Probably the most powerful (bank account) reducing agent known.

SOIL EROSION

Caused by Highway Construction

by **SOL E. DORFF, c'37**

SOIL erosion has, in recent years, occupied a prominent position in the public mind. The problem has become so grave, that it seems imperative to take immediate action in order to prevent utter destruction.

The serious state of soil erosion along the highways is directly attributable to the policies pursued in the early days of highway construction. The need for extending the highway system was so urgent that proper drainage, well-designed soil-saving structures, and other phases of erosion control methods leading to economical maintenance were entirely disregarded. In recent years, however, the road builders have been more mindful of the future and, as a result, a marked improvement in these practices is discernible.

Nineteen states, according to the April, 1937, issue of "Roads and Streets," have established roadside erosion control relationships with the Soil Conservation Service. Actual operation to protect highway cuts and fills, highway ditches, and drainage structures have been started in some of these states. Plans worked out between their highway departments, the Bureau of Public Roads, and the Soil Conservation Service call for vegetable control measures wherever possible and for construction work where gullies are menacing adjacent farm lands. Such cooperation between the federal and state governments is a step in the right direction and should be encouraged to its utmost.

In this problem, as in any other, it is necessary first to determine and investigate the phenomena which have led to the prevailing examples of soil erosion along the highway, and then to formulate suitable solutions for each case. It has been found that the four chief causes of erosion along the highway are:

(1) Untreated approaches to cattle passes;
(2) Unprotected steep back-slopes and fills;
(3) Improperly constructed culverts; and
(4) Lack of drainage structures at points of concentration of large drainage areas.

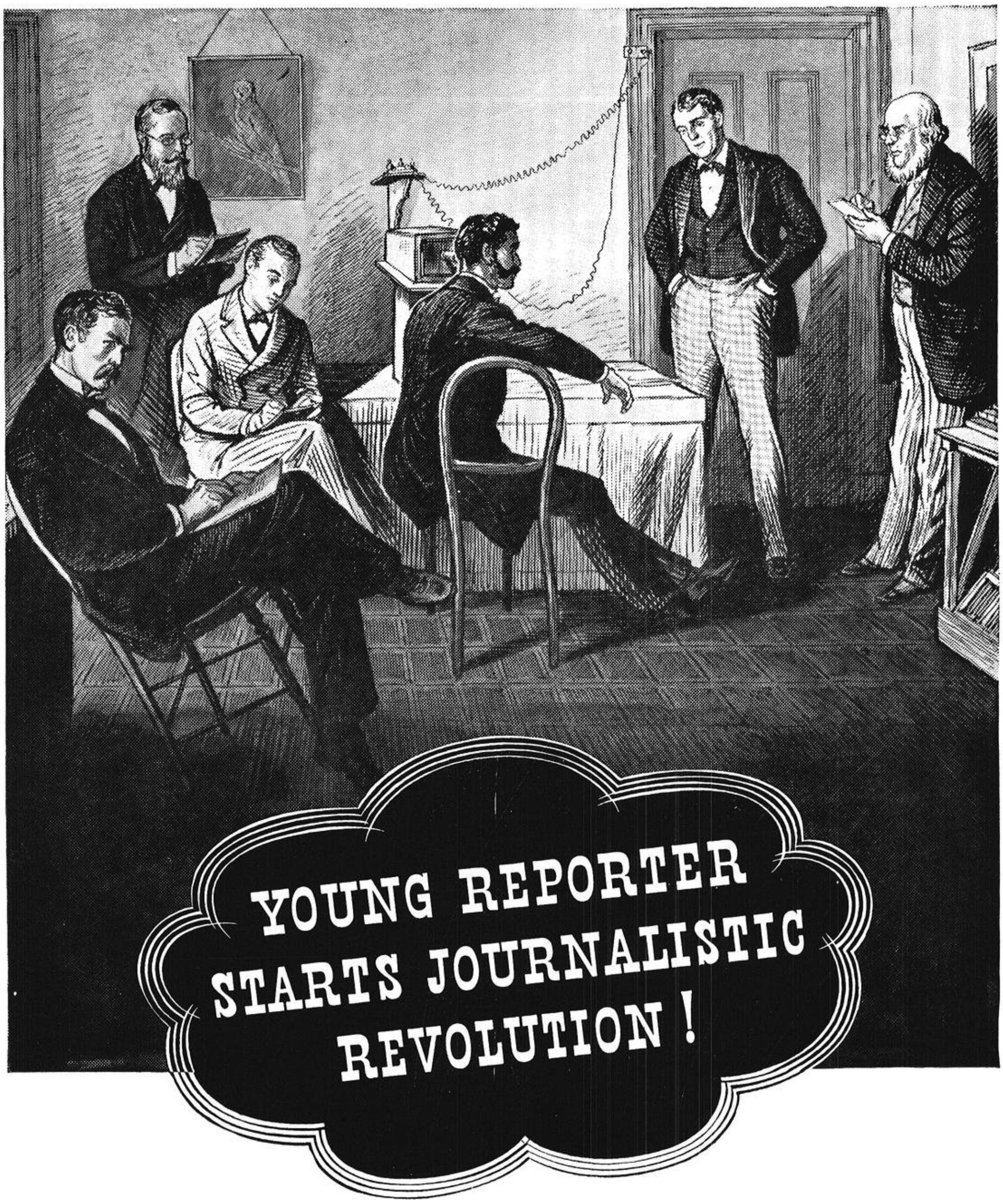
Cattle Passes

The use of the cattle pass has often created a serious problem and has resulted in many an "eye-sore" along the landscape. Too often, no precaution has been taken to preserve the stability of the soil in the immediate surroundings of the cattle passes with the result that they often present a sight which is much to be regretted. A study of some cattle passes will reveal a stagnant pond of water, mud, and frequently the inception of a gully. The muddy condition of the ground is largely due to allowing the cattle the use of the pass immediately after it is finished instead of continuing to drive them over the road until the approach to the pass has been well sodded or covered with flagstone. In the construction of the cattle pass, the elevation of the bottom may be depressed to a lower elevation than that of the natural ground. This tends to create a depression which the engineer usually fails to consider. As the cattle walk over this depression, they tend to loosen the soil and thus initiate the process of erosion which will then continue to spread with great rapidity to a large area of the natural soil. The soil directly in front of the pass is subject to the most concentrated wear and, consequently, will be eroded much faster than the surrounding area. Since these passes are always built in fills, the water from the surrounding area converges at this point and forms a pond. The saturated soil is then more easily eroded, carried through the pass by the water which, due to confinement, has increased in velocity. As this form of erosion continues, more and more land is washed away until, in time, rather large gullies may be formed. These gullies, once started, will not cease until they have reached a divide in the land, frequently resulting in great damage.

Treatment of culvert to stop gully from advancing.

Steep Back-Slopes and Fills

In order to practice economy in the earlier years of highway construction, the slopes of the cuts and fills were



It happened in Salem, Mass., on February 12, 1877. The young reporter attended a demonstration of inventor Bell's new telephone—then "talked" his story to his paper in Boston *by telephone!*

Though he didn't realize it, he was inaugurating a new era in journalism. For today's newspapers could hardly exist without the telephone.

Gathering and spreading news with lightning speed is just one of the telephone's countless contributions to modern life. And 300,000 Bell System people strive constantly to make the service still better, still more useful.

BELL TELEPHONE SYSTEM

Why not telephone home oftener? Rates to most points are lowest after 7 P. M. and all day Sunday.

frequently made steep. This leads to an unstable condition of the soil unless the banks were seeded immediately. Since this was seldom done, the flow of water over these steep slopes formed shoe-string gullies, and frequently caves of considerable size. An accompanying illustration shows the immense proportions of some of these caves. It will be observed that these caves, in every instance, occur on steep, almost vertical slopes that have been left bare. As long as the season is comparatively dry, or the precipitation is of such quantity that the soil can readily absorb it, no damage will be done and the banks will remain stable. However, as soon as the ground becomes saturated or at the first intense rainfall during which the ground cannot absorb the moisture as quickly as it falls, the water will flow down the bank and begin to undermine it at its base. This is especially true when the water is concentrated at any particular point at the top of the embankment and comes down in heavy streams. The inception of a cave-in may not be noticeable after the first storm or two, but when a cave-in occurs, it occurs suddenly. The first storm may form only a small pocket at the base and small gullies leading to this pocket. After the soil has had a chance to dry, cracks will form in the bank above and around the pocket and these cracks will serve as channels for the water of the next storm. When the next intense storm occurs, the water will flow down the gullies and into these cracks, causing the breaking away of large masses of soil. The repetition of this process will continue until almost the entire bank will be eroded.

Caves in steep slope.

Where steep back-slopes are not subject to high concentration of water, sheet erosion will take place. This form of erosion tends to wear away the surface evenly until it presents a raw appearance. Although this form of erosion is not as serious as cave or gully formations, nevertheless, it is detrimental to the appearance of the highway.

Many methods may be devised to prevent the formation of such gullies. The most highly recommended procedure is to plant blue grass on the slopes immediately after grading. Rye should be mixed with the grass seed in order to hasten its beneficial results. The rye will grow faster than the grass and thereby hold the soil while the grass takes root. Whenever possible, seeding should be avoided on steep slopes. On steep slopes or on soil which is not conducive to seeding, sodding should be used. Seeding and sodding of the banks will not only conserve the soil, but also make the highway more attractive.

Intercepting ditches on top of cuts have been tried and proved successful as long as they are kept open. However, due to lack of maintenance these ditches have been allowed to fill up and have become useless.

Culverts

A culvert, poorly designed or improperly located, may be the cause of the inception of erosion. If a culvert inlet is not placed directly in line with the stream, the water must change its course and, in doing so, gives up energy. As the water impinges upon the bank near the culvert, it will tend to scour away the soil. Another precaution to be observed is to place the culvert at the elevation of the natural ground so that there will be no chance for the water to drop and thereby cause gully heads.

Another illustration in this article shows the treatment given a culvert in order to stop a gully from advancing above the culvert. In this case a gully which had its origin near the inlet to the culvert had worked back for quite a distance. A three-sided wall was attached to the culvert to prevent further erosion. This wall acted as a weir and ponded the water, thus giving the soil in suspension a chance to precipitate. It proved a rather cheap, but effective means of curbing a developing menace.

Drainage Structures

At the juncture of some cuts and fills, the care of the water course is frequently neglected. Water is allowed to flow down the embankment without any provision for its transportation, whatsoever. The soil, obviously, cannot be expected to withstand such abrasion, and consequently is carried along with the water. A deep ravine will be formed which will work its way along the newly graded soil of the ditch in the cut, and thus form a serious hazard along the road. Where a large discharge at the mouth of a cut causes such a condition, it is recommended to pave the water course with rip-rap.

When a road is built on ground where little grading is necessary, the ditch along the road has to serve as a channel to drain not only the road, but also the adjacent land area. If this area is unusually large and the watershed great, the point of concentration of the area will be subject to undue wear caused by the large quantities of water that must pass over it. Gullies will form and will proceed to work up the main drainage channels. The construction of a notched spillway at this point of concentration will arrest any tendency of gully formation. The water is directed to this structure where it is allowed to fall in stages, thus preventing damage. The notched spillway is usually made of local stone and can be built at a reasonable cost.

In the foregoing paragraphs an attempt has been made to illustrate that soil erosion caused by highway construction can and should be controlled.

The advantages to be gained from a well-planned program of soil conservation are three-fold. First, it would keep the cost of maintenance to a minimum. Second, it would prevent damage to property adjoining the road. And third, it would enhance the esthetic value of the highway panorama.

Map Needs of Wisconsin

by **FRANK CNARE, c'10**

Design Engineer, Wisconsin Highway Commission

THIS is a very interesting subject to me, because it so happens that for many years my work has been of such nature that I have been in constant contact with maps, and I have often been impressed by the lack of them, rather than by their availability. It is seldom that you can find a person who is not interested in this subject. Exhibit a map in a public place and note how each person examines the locality from whence he came, and how quickly he informs the world if an error on the map exists.

Just how could the map needs of Wisconsin be defined, by whom are maps used and to what extent? A study of this question will indicate that the map needs of no two agencies will ever be quite the same. Your selling or promotional agencies of a stock business would not be interested in drainage, but would probably be interested to know the distribution of population and wealth. Your real estate association might not care anything about the distribution of forest areas, but on the other hand would want to know all about the location and descriptions of farms. Our own Highway Commission is primarily interested in the location of highways and all of the federal relief agencies are wanting maps which show everything, regardless of classification.

At this time we might attempt to mention a few of the maps which are at present available for various uses. First, and probably most valuable because of the care in their preparation, are the so-called topographical maps. Unfortunately, the area mapped covers only about one-third of the state and at the present rate of progress, it will be many years before topographical maps are available for the entire state. Furthermore, some of these maps are quite old, and, of course, changes in highways and the location of buildings, bridges, etc., have occurred in the past years. We have the so-called geological base map drawn to a scale of about eight miles to the inch. This is a satisfactory map from which to prepare other base maps, but does not show much detailed information. We have the so-called postal maps drawn to a scale of one mile to the inch, which are very satisfactory. At present there are still 19 counties which have not been completed. These maps are based on the topographical maps and of the rural postal roads, but have not been kept entirely up to date. We have the so-called Hotchkiss map drawn to a scale of six miles to the inch which attempted to show all of the local roads. As far as I know, no corrections have been made to this base for years. Then we have numerous maps produced by private agencies for the individual counties, no two of which are alike, drawn to various scales and showing various types of information. We have one set of township plats produced by the Hickson Company of Rockford, Illinois. For many years these maps constituted the most important source of information to the Highway Commission, but at the present time, many of these maps are out of date. Back about 1915 the Railroad Commission drew a set of county maps to the scale of one-half inch to the mile, but these maps have deteriorated quite seriously and are not satisfactory for present day usage. In general, it can be safely said, that practically all the maps mentioned above are more or less out of date or have not been drawn on accurate bases.

About 1924 the idea was suggested that the commission draw a complete set of county maps. Nothing was done, however, until about 1930 when the design department of the Highway Commission was authorized to produce such a set. At the present time, this has been done and there exists a set of county maps to a uniform scale drawn on a durable drafting paper mounted on aluminum, making a permanent and exact record. Every available source of information was used in their preparation. The United States geological map was used as the base. The boundaries between states were checked and corrected from supreme court decisions. Rivers were charted from river surveys made by various power companies, the location of all railroads was checked by section, town and range by the Railroad Commission. Village and city clerks were circularized and the corporate limits checked against their report, and in general, where available, the topographical maps were used to check the drainage. Tracings may be produced from these original bases by a photographic process. This method eliminates the wear and tear which occurs on tracings and which is necessarily a characteristic of any blue printing method of reproduction. These maps have been published in two sizes, one size to a varying scale, but to a standard letter size of 8½x11, the other to a uniform scale of one-half inch to the mile. These bases lend themselves readily to enlargement up to one inch to the mile and we have furnished many counties with maps of this size. These maps are so accurately matched at their boundaries that a state map can be prepared by photographing them all to the same scale and joining them together. The spot map now on exhibition in the rotunda of the Capitol showing the automobile fatalities in 1936 was made in this manner and represents only two or three days' work for one man. On it is shown all of the information which was included in the old Hotchkiss base map and which took many days for its preparation.

It was not until 1933, however, that the real worth of these county base maps became evident. About that time the various federal relief agencies began to function and one of their first needs was for maps. Every day the offices of the commission were constantly besieged with requests for maps, everyone requiring something different, but in most cases we were able to photograph these maps to the various requirements and to satisfy the demand.

I have gone to some detail in describing existing maps in order to lead up to what I think really amounts to the map needs of the state. Personally, I am of the opinion that the real map needs of the state are not so much maps themselves as the necessary information which at present is not available, which would enable us to correct our present bases. The State-Wide Highway Planning Survey has been trying to assemble and correlate such information and it has a great advantage over the forces of the commission because it has funds at its disposal such that it can actually measure by speedometer and inspect in the field all of the rural highways of the state, but even such information is hardly adequate to prepare an accurate set of map bases. It still must depend upon our old projections. It must be realized that the original surveying of the state, by which the township boundaries were established, was done by surveyors working under contract, that the equipment and methods used were crude, and that undoubtedly the primary purpose of many of these men was to collect their wages with the least possible amount of work. We know that there are many sections in the northern part of the state which are far from being regular in outline, yet from our bases, we would conclude that these lines were all laid out accurately. The work of the State-Wide Highway Planning Survey is a more or less accurate check up of the roads as they exist, but it is not able to locate these roads accurately on the ground, especially in the northern cut over lands and lake regions of the state. Many of the section corners have been lost or are inaccessible, and there is no way, with the means at the disposal of this survey, actually to determine the relative positions of section corners and highways. Neither is there enough time actually to meander all of the lakes and rivers. The result has been that the State-Wide Highway Planning Survey will be forced to take the old bases at present available and to add the information which it obtains from automobile surveys. With this in mind, we must realize that the real purpose of this discussion should be the taking of such steps as will influence the legislature to authorize the necessary funds for an accurate survey of the state by modern methods, probably by an aerial survey, an idea which has been advocated for years by our state geologist, Mr. Bean. There are hundreds of miles of traveled and local roads leading to lakes of which we have no record, but which would be of interest to the tourist visitor and which should be shown on our maps. An aerial survey would give us the actual location and contour of all lakes. It would be no small job as it would involve more than the mere aerial photographing of the area in question. It would have to be tied in to the proper section corners, which would necessitate the location of visible monuments that would show up in the photographs. A complete, accurate aerial survey would expedite the completion of our topographical maps, for instruments are now available which locate contours quite accurately from such photographs. After the correct information has been taken and the base maps prepared, it will be an easy matter for any agency conversant with ordinary map technique to record it in the manner which would be of most advantage to its special purpose.

Summing up, and in conclusion, I am of the opinion that our most important map needs are as follows:

First. Funds should be provided for a complete survey of the state, probably by aerial methods, whereby an accurate base map can be prepared showing the location of all natural features, highways, railroads, municipalities, etc., all to be tied in to their proper monuments, and then drawn to such a scale and in such a manner that duplicates to various scales could be prepared for the use of any agency requiring them. This survey should include sufficient additional photographs of municipalities to permit the preparation of accurate city and village plats.

Secondly. An agency should be created, probably constituted of representatives of the State Highway Commission, the Geological Survey, and the League of Municipalities, and any other interested bodies, which would be responsible for the continuous operation of checking up changes in the records and of keeping this base map absolutely up to date. This agency must be provided with the necessary funds and with some vested authority to circularize and compel governmental agencies to furnish these corrected records such that the accuracy of this base map can be maintained.

EDITORIALS

Therefore all things whatsoever ye would that men should do to you, do ye even so to them: for this is the law and the prophets.
—MATTHEW 7:12

DYKSTRA TAKES THE PILOT'S SEAT Clarence A. Dykstra assumed his duties as president of the university early in May. His welcome has been a friendly one, but one in which enthusiasm has been kept firmly in control. First impressions have been all in his favor, but judgment, obviously, is being reserved.

A successful president of the University of Wisconsin will possess three qualities: he must be a good administrator, a real leader, and have sound judgment. As administrator, he must keep the university running smoothly and economically and must maintain order among both faculty and students. As a leader, he must be liked by the students, the faculty, and the people of the state. There must be general confidence in his ideas and acts. Finally, as a leader, he must have the judgment necessary to lead in the right direction; he must have an open mind, but not a wild eye.

In the present unsettled state of public opinion regarding social organizations, every person in a position of authority and public responsibility is in a precarious situation; it is impossible to satisfy all shades of opinion. Our new president goes into office with at least one, and perhaps two strikes called upon him before he starts. There are many people on the campus who hope sincerely that he will rise above the handicap and lift one over the fence for a home run.

REUNITE THE ENGINEERS During the past few days, the newspapers have carried notices of the favorable action of the board of regents on the proposed third wing for the Memorial Union. It is expected that it will be started in the next year. We do not dispute for a moment that the Union's third wing is a vital necessity for this campus and it should be constructed as soon as possible to relieve overcrowded and unsafe conditions in the university theater and various offices; but there is a situation in the college of engineering which is even more urgent.

The electrical engineering laboratories are congested and laboratory sections work under difficult conditions; the drawing department could use more space for classrooms and offices; the chemical engineering building is old and not adequate for the number of students enrolled—to mention a few of the overcrowded conditions which should be remedied. The mechanical engineering building is the only one which comes near to filling the requirements of one of the departments.

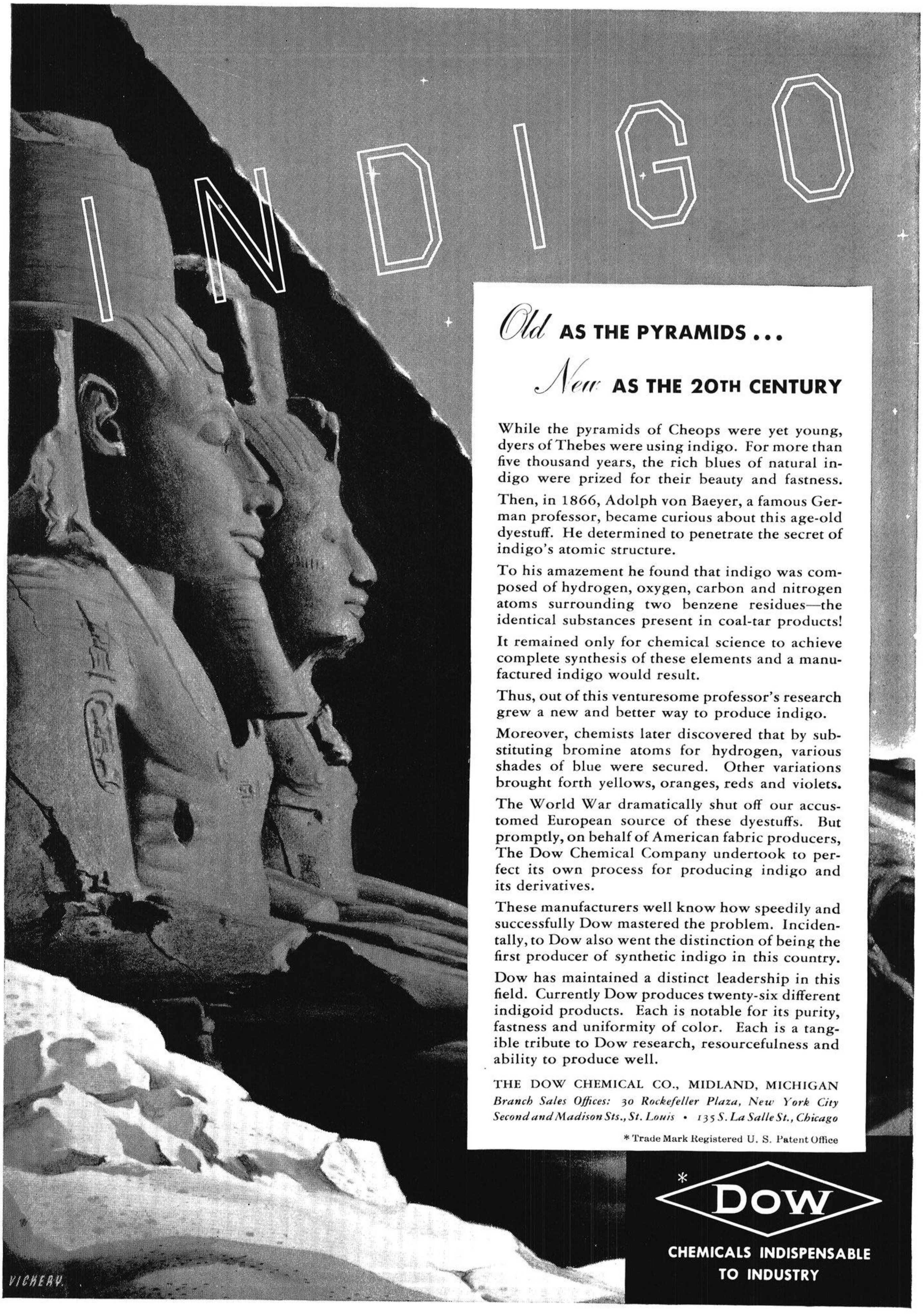
Even more important than these deficiencies, the college is divided—the mechanicals and miners way out on University Avenue are better than a half mile from the rest of the school. It is practically impossible to walk from the main engineering building to the mechanical engineering building in the 10 minutes allowed between classes. This tends to separate the engineering school into two groups—those who have a majority of their classes out on University Avenue and those who have them on the hill. Faculty members, who used to see each other daily, never meet for months at a time. Students we knew in freshman math and chemistry classes barely nod when we pass them on the street. This separation into two important groups is harmful to the college—it prevents the solid and united student body there used to be years ago, and it cuts down the efficiency of the teaching staff and consequently the development of the school.

Eventually, a building at a time, it is planned to move the entire engineering college over to the vicinity of the athletic fields—near the mechanical engineering building. Now is the time to recommence the schedule of construction of new engineering buildings which was halted by the depression. When the college is reunited in one compact group, it will begin to advance at a rapid rate again.

COOPERATION During the time that we are in school, many of us work together on experiments in the laboratory or on class problems; but how many of us get all we can out of these partnerships? Do we get together to keep from exerting a little effort or so that we can accomplish the greatest amount with the least expenditure of time and energy? Many of us know, to our sorrow, that the partner he draws is no co-worker but rather a credit splitter. It's all right in school to hang back and rely on your partner to put forth all the effort; but do we ever think of the opportunities for learning to effectively cooperate with people which we are wasting in so doing?

When we graduate we will start out with one, two, or a group of people, and we will be paid to accomplish as much as possible in the shortest time. To many people, it is axiomatic that if two persons do a job together it takes just half the time for one to finish; but it is seldom that such an ideal can be lived up to without close cooperation and wide-awake participation between the partners. To keep from overlapping endeavor and holding each other up, there must be a strict scrutiny of each division of labor and an adherence to whatever schedule is decided upon.

Last winter in an interview with a prospective young engineer, Dr. Benger, the assistant head of DuPont's research lab in Wilmington, stated, "Our men are not employed unless they have good recommendations from their graduating schools; but once they are in our organization, they do not stay unless they turn out a good day's work every day in the week. And the only men who are advanced are the ones who can cooperate efficiently and harmoniously with the rest of the men in the department."



Old AS THE PYRAMIDS . . .

New AS THE 20TH CENTURY

While the pyramids of Cheops were yet young, dyers of Thebes were using indigo. For more than five thousand years, the rich blues of natural indigo were prized for their beauty and fastness.

Then, in 1866, Adolph von Baeyer, a famous German professor, became curious about this age-old dyestuff. He determined to penetrate the secret of indigo's atomic structure.

To his amazement he found that indigo was composed of hydrogen, oxygen, carbon and nitrogen atoms surrounding two benzene residues—the identical substances present in coal-tar products!

It remained only for chemical science to achieve complete synthesis of these elements and a manufactured indigo would result.

Thus, out of this venturesome professor's research grew a new and better way to produce indigo.

Moreover, chemists later discovered that by substituting bromine atoms for hydrogen, various shades of blue were secured. Other variations brought forth yellows, oranges, reds and violets.

The World War dramatically shut off our accustomed European source of these dyestuffs. But promptly, on behalf of American fabric producers, The Dow Chemical Company undertook to perfect its own process for producing indigo and its derivatives.

These manufacturers well know how speedily and successfully Dow mastered the problem. Incidentally, to Dow also went the distinction of being the first producer of synthetic indigo in this country.

Dow has maintained a distinct leadership in this field. Currently Dow produces twenty-six different indigoid products. Each is notable for its purity, fastness and uniformity of color. Each is a tangible tribute to Dow research, resourcefulness and ability to produce well.

THE DOW CHEMICAL CO., MIDLAND, MICHIGAN
Branch Sales Offices: 30 Rockefeller Plaza, New York City
Second and Madison Sts., St. Louis • 135 S. La Salle St., Chicago

* Trade Mark Registered U. S. Patent Office

*DOW

CHEMICALS INDISPENSABLE TO INDUSTRY

G-E *Campus* News

FOR OUTSTANDING ACHIEVEMENT

February 26 was a big day in the lives of thirty-three G-E employees. These thirty-three were selected from the 60,000 persons in the Company's employ to receive the Charles A. Coffin Awards. There were fifteen factory men, twelve engineers, two commercial men, and four administrative and clerical employees. Twelve of the group are college graduates:

Roy T. Adolphson, University of Washington, '34; Eugene W. Boehne, Texas A & M, '26, and M. I. T., '28; Claude P. Hamilton, University of Nevada, '14; George H. Jump, Syracuse U., '10; Jack R. Meador, Texas A & M, '27 and '28; Harry E. Scarbrough, Georgia Tech., '19; Edward J. Schaefer, Johns Hopkins, '23; Alfred A. Thompson, University of California, '05; Carl Thumin, College of City of New York, '17, and M. I. T., '20; Harold E. Trekell, Kansas State, '31; Elmer J. Wade, University of Maine, '19; and Leo F. Worden, West Virginia University, '25.

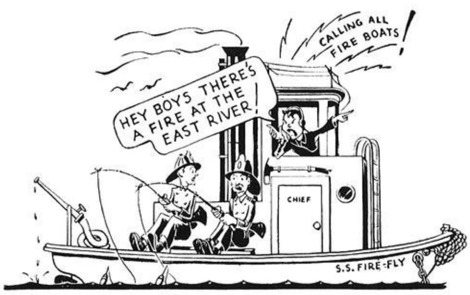
Each year General Electric makes these awards to employees who have done outstanding work, as provided in the Charles A. Coffin Foundation established in 1922. Charles A. Coffin was organizer and first president of General Electric.

"EXPERIMENTALLY—NOT ON PAPER"

Sixteen years or so ago, Dr. Willis R. Whitney, now Vice President in charge of General Electric research, sent a note to a research worker, suggesting experiments with a motor-generator set sealed gastight and filled with hydrogen to see if the machine ran cooler, and more efficiently. The results of those experiments promoted the use of hydrogen in synchronous condensers and established the present trend toward the use of hydrogen in turbine-generators.

Windage loss in a rotating machine is reduced about 90 per cent and noise is greatly decreased because of the low density of hydrogen. Heat is carried away much more rapidly through the higher thermal conductivity of hydrogen. Resistance to damage due to corona within the machine is increased. These characteristics increase the electrical output for a given core size and reduce inspection and maintenance expense.

The construction of several hydrogen-cooled turbine-generating units is now going on in the Schenectady turbine shop—perhaps all because of that note written by Dr. Whitney so many years ago.



CALLING ALL FIREBOATS

Fireboats are often away from their docks for several days at a time—not on a fishing trip, but fighting severe marine fires. The communication problem has been solved, however, for the fire-fighting sailors on the nine New York fireboats. General Electric engineers have installed a two-way radio system which will be in operation when the boats are out of telephonic contact with shore. This system will be an invaluable aid in expediting the handling of injured persons or those suffering from exposure.

In size, this system will be second only to the police-car system used in Boston. Two-way conversation will be possible, with no switching operations necessary to change from talking to listening. The equipment will include a remote-control, 500-watt, medium-frequency central transmitter for direct radio communication to all fireboats. The return part of the conversation from the boats will be transmitted by ultra-high-frequency radio to pickup receivers located at strategic points on the shore.

96-376DH

GENERAL ELECTRIC