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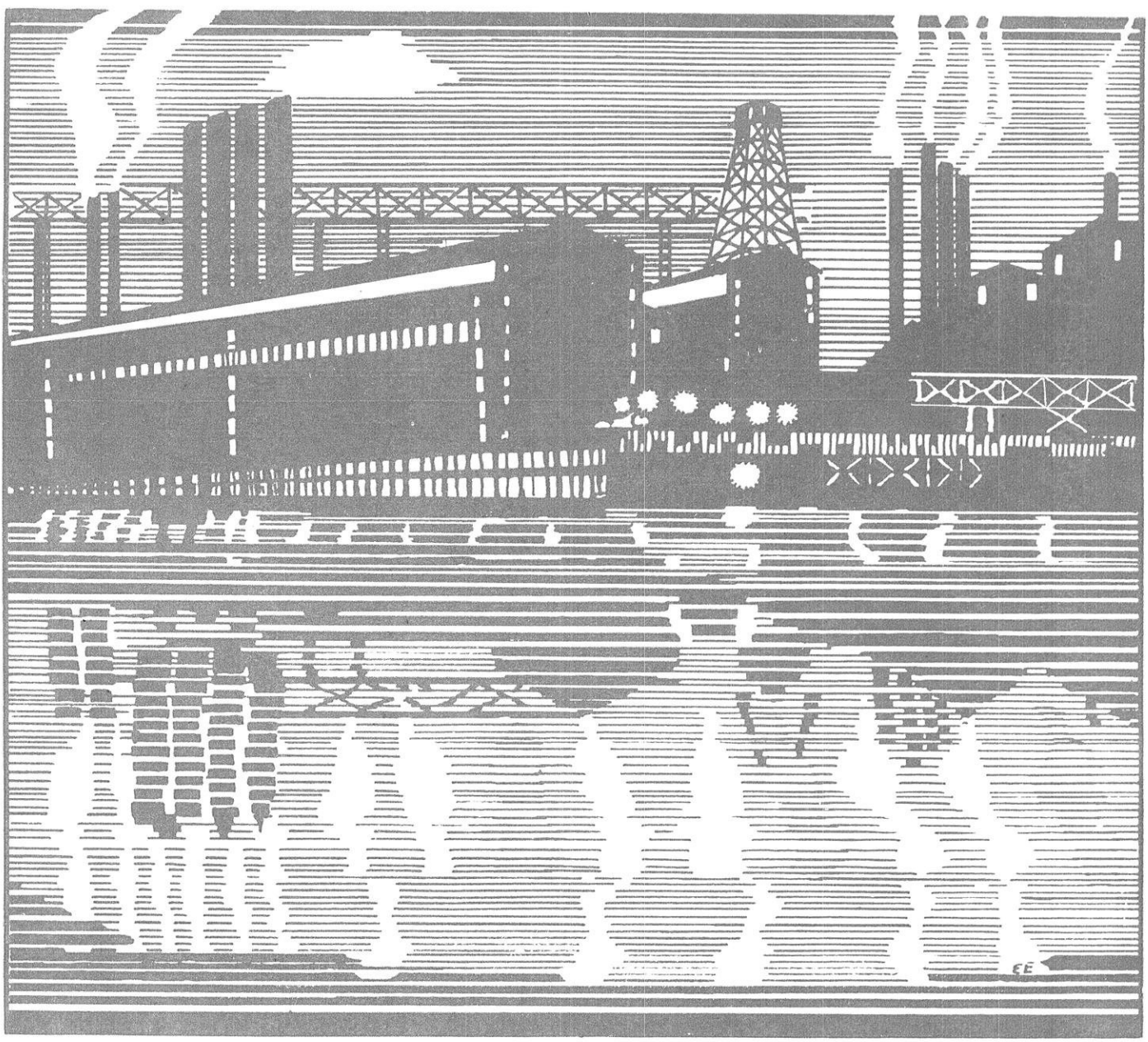
# THE WISCONSIN ENGINEER



*ENGINEERING SOCIETY of WISCONSIN . . . CONVENTION ISSUE*

MARCH 1935

MEMBER, ENGINEERING COLLEGE MAGAZINES, ASSOCIATED

# *Wisconsin Engineer*
# MECHANICAL DRAWING CONTEST

**TO ENGINEERING FRESHMEN — In keeping with the policy inaugurated a year ago, the "Wisconsin Engineer" will conduct a drawing contest in order to give you an opportunity to participate in an activity whereby your conscientious efforts may be appropriately rewarded. We urge you to enter the competition.**

## CONTEST RULES:

1. All students who are freshmen in the college of engineering of the University of Wisconsin excepting members of the staff of the *Wisconsin Engineer* are eligible for competition.

2. A pencil mechanical drawing to be assigned by the instructional staff of the drawing department as a part of the regular work in Drawing 2 will serve as the entry to be judged in the contest.

3. Entries will be received up to and including April 25, 1935.

4. The three best drawings shall be awarded first, second, and third places, respectively, by the judges. The three winners will receive material prizes as announced in the April issue of the *Wisconsin Engineer.*

5. The entries will be judged under the general headings given below, which are listed in the order of their weighted values, the first receiving the greatest weight:

1. Technique and theory
2. Accuracy
3. Lettering
4. Neatness

6. The winning entries will be exhibited to the public after the close of the contest.

7. One or more of the winning entries will be reproduced in the pages of the *Wisconsin Engineer.*

8. The judges will be announced in the March issue of the *Wisconsin Engineer.* Their decisions will be final.

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# *The* WISCONSIN ENGINEER

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**With the Contributors —**

● Mr. L. Crandall, c'35, presents a discourse which he delivered at the 1935 meeting of the Wisconsin Engineering Society.

● Mr. R. S. Hartenburg, m'28, has powerful confidence in aviation development. He might be heard saying, "The progress of aviation has had a few reverses during the past year, but recent scientific indications will make air transportation more infallible mechanically. Then all that remains is to develop a confidence in human control of the plane."

● Mr. E. Bennett's article is an excellent example of an engineer utilizing engineering insight in the determination of social and economic problems. He expresses a possible method of rapid recovery.

*The April Issue —*

● Mr. E. Bennett concludes his discourse, with a presentation of the plan he proposes.

● Mr. Bogen, ch'35, predicts the adaptibility of Diesels to pleasure cars.

● Mr. Nestor Gutierrez, m'37, of Columbia, South America, says that opportunities for the young engineer in that country are infinitely great.

VOLUME 39 MARCH, 1935 NUMBER 6

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*This issue is presented by the Engineering Society of Wisconsin to all of its members.*

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The WISCONSIN ENGINEER

VOLUME 39, NO. 6 MARCH, 1935

# United States Land Survey of Wisconsin*

By Lee W. Crandall, c'35

GOVERNMENT surveyors entered Wisconsin in 1832 as soon as the Indian cessions were made. The Black Hawk War of 1832 gave the United States government title to practically all of the lands comprising southern Wisconsin as defined by the Illinois boundary, Lake Michigan, and the Green Bay, Fox-Wisconsin River line.

Beginning at the Illinois boundary, which was selected as the base line, Lucius Lyon and his party ran the Fourth Principal Meridian due north to the Wisconsin River, between the present Grant county on the west, Lafayette and Iowa counties on the east. Then ranges of townships were laid off on both sides of the meridian, always terminating, for the time being, at the Wisconsin-Fox River boundary line. The early survey continued eastward as far as the Rock River. In 1834, Mullett and Brink surveyed the township lines in all of the territory north of the first correction line at Township 10 and east of the Fox River. By the end of 1835 a diagonal band of townships was completed, stretching from the Mississippi River to Lake Michigan including all that territory south of the Green Bay, Fox-Wisconsin River line except the southeast portion of the state, which was surveyed in 1836.

The surveyors who ran the lines in this territory were closely followed by intending settlers anxious to locate claims. The work of the government surveyors meant much more to the settlers than the mere locating of township and section lines. The surveyors made the first detailed examination of the land. They recorded in their field books the quality and character of the soil — whether first rate, second rate, or third rate — described the surface of the country as level, rolling, broken, or hilly. Some of the most important data recorded, as far as the State Land Office is concerned, are the descriptions and distances for the beginning and ending of swamp areas. By the Swamp Act of 1850 the State was given title to all of the land in a 40-acre tract if over 50 per cent of land in the 40 was swamp. Over 3,250,000 acres became State land under this act. The land was located on the plats made from the field notes of the government surveyors. The surveyors indicated in their field books the several kinds of timber and undergrowth, the quality and extent of all minerals and ores, the location and kind of stone in stone quarries and rock ledges. They located all rivers, streams, and lakes, as well as towns, villages, and improvements. In short, they worked under instructions to furnish a "complete topographical description of the country surveyed, as it regards everything which may afford useful information, or gratify public curiosity."

At slight expense this information could be procured from the government land office by land seekers. Armed with copies of the surveyors' plats and notes, the land hunter was well informed as to the best farm and timber land and the speculator was enabled by this means to choose likely town sites, mill sites, or lands that might soon be in demand for agricultural or lumbering purposes.

In 1834, the government established two land offices for the Western Michigan Territory — one at Green Bay and the other at Mineral Point. A "land office business" in the sale of lands to speculators began at once. Expecting large profits, speculators entered everything that seemed to them promising. They bought town sites, mill sites, and steamer landings along the larger rivers, as well as large tracts of the most valuable or best located timber and farm land. Lands bordering on streams and timbered land adjoining a prairie district were favorites.

In their expectations of profit from holding lands, speculators were often disappointed. In many cases where the holding period was long, it was difficult to sell at a profit in competition with land office sales of Congress land. Then too, many American settlers avoided paying the high prices for land which its speculative ownership implied, by going farther afield.

*This paper was presented at the convention of the Engineering Society of Wisconsin on February 21, 1935, and will appear in the bulletin of that society.

American settlers, having traditions about selecting farms in new regions, were generally shrewd judges of land. Tracts which remained long in the hands of the government were almost invariably poor land, as the topographical survey or the soil survey proves. Foreigners were less expert in land selections. Another reason for the failure of foreigners to choose lands wisely was that selections were sometimes made by one or two persons for an entire company. Among Americans, save in infrequent cases of the land companies, land selection was an individual matter. Every newcomer to a township passed a fresh, original judgment on its farm land, and perhaps compared it favorably or unfavorably with what he had examined elsewhere.

The State of Wisconsin was given title to millions of acres of land appropriated by Congress for various purposes. The origin of what is commonly called "School Section" was known as early as 1803. Congress passed an Act in 1825, giving each state coming into the Union, the Sixteenth Section of each township in the state for the use of schools. Upon adopting the Constitution on May 20, 1848, Wisconsin secured title to 966,732 acres in these "School Sections." The University was given, at this early time, a grant of approximately 300,000 acres.

Two contemplated enterprises which were given generous land grants, but never built, were the Sturgeon Bay Canal and the Rock River Canal projects. By an Act of Congress, April 10, 1866, 200,000 acres were granted "to construct a breakwater, harbor, and ship canal at the head of Sturgeon Bay in Door county to connect the waters of Green Bay with the waters of Lake Michigan." Conveyances were made by the Commissioners of Public Lands to the Sturgeon Bay Canal Company, but when the patents were withheld from the Company on account of their being in conflict with the swamp land selections of August 13, 1881, the project was abandoned.

In 1836, public attention was directed to the importance of connecting the waters of Lake Michigan with the waters of the Rock River by means of a canal. In 1837, a preliminary survey was made of the line along which the canal was to be constructed. The Milwaukee and Rock River Canal Company was organized in 1838 and incorporated by an Act of the Territorial Legislature. By an Act of Congress approved June 18, 1838, there was granted to the Territory of Wisconsin a quantity of lands for the purpose of aiding in the construction of this canal, and all land that had not been disposed of in those sections which were numbered with odd numbers on the plats of survey within a width of five full sections taken on each side of the line of the proposed canal. At the session of the Territorial Legislature in 1839 an Act was passed providing for the disposal of the lands granted and making other provisions relative to the matter of constructing the canal. Partial grants of land were given to the Canal Company from time to time and it was understood that construction should continue with funds derived from the sale of the adjacent lands which brought the high price of $2.50 per acre. There was considerable legislation on the subject, but little was done in the way of building the canal. Upon an examination of the adjoining land ownership in 1848 it was found that of the above named number of acres granted, there had been sold 110,984 acres. The enterprise, which turned out to be more of a real estate venture than a construction project, was finally settled by John Herbert Tweedy. No doubt some refunds were given the purchasers of land along the proposed right-of-way.

Appearing on the plats of Wisconsin lands are the names of many distinguished Americans. Among them are Daniel Webster, Edward Everett, Caleb Cushing, and Ralph Waldo Emerson. In March, 1837, Daniel Webster entered three tracts, totaling 952 acres in Dane and Rock counties. Five and one-half years later, he sold his land for $1,572 or at the rate of $1.65 per acre. At this time government lands were selling at from $1.25 to $1.50 per acre, but considering the prevailing rate of interest, the transaction undoubtedly netted Webster a considerable loss.

Speculative activity collapsed during the Panic of 1837 which, by the way, was partly caused by land and canal speculation. Later operations were much more cautious and conservative. Speculators reduced the risk by giving themselves a long time credit. Some state lands could be held 30 years before the principal had to be paid. Thus after transferring the purchase contract, the speculator's responsibility was limited to paying the taxes and an annual interest at the rate of 7 per cent on the purchase price. The speculator land which was purchased unwisely, remained a burden to the purchasers and ultimately had to be disposed of at a loss.

In view of the experience and first hand knowledge possessed by the surveyors, it is not surprising that their advice was much sought after by land hunters. The surveyors who ran the section lines looked into every square mile of land surveyed. They knew where the best town and water power sites were located, where the finest timber land was. In the surveyors' personal memoranda books can be found such notes as: "On both sides of the St. Croix River discovered several mines of virgin copper," or "Henry King says that on the Ontonagon and in its vicinity he found an abundance of virgin copper ten miles from the mouth of that river." The surveyors were so well informed that it is little wonder that some of them should have been tempted to use their special knowledge for the purpose of advancing the interest of themselves or their thrifty friends. While it was charged in congressional debate that the surveyors "note every valuable lot and sell the information thus acquired to speculators," there is no evidence to prove that the government surveyors were engaged in profiteering.

The surveyors were usually men of fairly good scientific training. "Some of them like Lucius Lyon, afterwards United States senator from Michigan, attained distinction in political life." A surveying party usually consisted of the surveyor, an ax-man, and two chainmen. On the average it took the party about 12 days to lay out the township lines for a single township. The surveyors' field books containing notes, sketches, and information, were returned to the surveyor general's office where the plats were prepared for the land offices. The original note books and the plats are now on file in the State Land Office in the State Capitol Building.

# Engineering Society of Wisconsin Holds Twenty-Seventh Convention

SOIL erosion control and shore protection were the leading topics at the twenty-seventh annual convention of the Engineering Society of Wisconsin, which was held in the main Engineering building and the Mechanical Engineering building at Madison on February 21 and 22. Sydney M. Wood of Lake Bluff, Illinois, presented some recent ideas in regard to the construction of groins to protect beaches. Prof. W. H. Twenhofel of the department of geology at the University of Wisconsin, outlined the erosion problem from the point of view of the geologist at the luncheon meeting on Friday noon.

* * * *

Harold F. Janda, professor of highway engineering and city planning at the University of Wisconsin, was elected president for the ensuing year.

* * * *

Robert M. Connelly of Appleton was elected vice-president. Bob has been faithful in his attendance and generous in his services to the society. His attendance at this convention was prevented by the serious illness of his wife.

* * * *

Henry Traxler, city manager of Janesville, and C. A. Wiepking, testing engineer for the City of Milwaukee, were elected trustees.

* * * *

Attendance was good; 95 members registered, and there were many students and other unregistered listeners at the sessions.

* * * *

Registration was handled as usual by the student members of Chi Epsilon. Those at the desk included Henry, Rhodes, Price, West, Gollnick, Crandall, Neroda, Ree, Bidwell, Brinkman, Ackermann, Leopold, Kutchera, Matthias.

* * * *

The luncheon on Friday was served in the laboratory of the Mechanical Engineering building by members of the faculty assisted by a staff of students. The food was prepared on the spot.

* * * *

As Friday was Washington's Birthday, the decorations at luncheon included an alleged cherry tree, which Secretary Owen was required to cut down with a dull hatchet that was really dull. Failing to make an impression on the tree, Prof. Owen attacked the cast iron base that supported the tree. The ringing blows of metal on metal stirred Dean Turneaure to remark, *sotto voice,* "Sounds to me like Valley Forge."

* * * *

Secretary Owen reported 343 members as compared with 331 a year ago. There were 23 members gained and 11 lost, making a net gain of 12. However, 33 members were reported in arrears with dues.

The society operated at a loss of $40 for the year. The book surplus is reported as $2700.

* * * *

Corrosion is just as bad an actor as erosion, Prof. Oliver P. Watts of the chemical engineering department of the University of Wisconsin told the convention.

* * * *

The revised platting law, over which the society has been working for several years, was presented by Vernon Hamel, who reported that the law has been introduced in the present legislature by Assemblyman Novotny.

* * * *

As usual, the surveyors dominated the convention for the first half day. Harry C. Hall of Rhinelander made a plea for the permanent marking of the remaining government corners by the state and counties. Within twenty-five years, he declared, the corners will be irretrievably lost.

* * * *

Four members were lost by death during the past year: John T. Hurd, city engineer of La Crosse; F. M. Balsley; D. B. Danielson, contractor of Milwaukee, and George Langley, Jr., county highway engineer at Sheboygan.

* * * *

L. F. Warrick, state sanitary engineer, reported that a test case will soon be tried to test the legality of the practice of charging the householder for sewer service.

* * * *

There were only two changes in the program as printed: Capt. Dalton was unable to be present because of illness, and State Highway Engineer E. E. Parker did not appear, his paper being read by Mr. J. Stransky.

* * * *

Announcement was made that an attempt will be made at this session of the legislature to amend the present registration law to cover all professional engineers.

* * * *

One student, Lee W. Crandall of Milwaukee, was on the program with a paper on the United States Land Survey in Wisconsin. In this year of depression, he told the convention, it is of some interest to know that just one hundred years ago, from 1832 to 1836, Wisconsin was in the midst of a land boom of feverish activity.

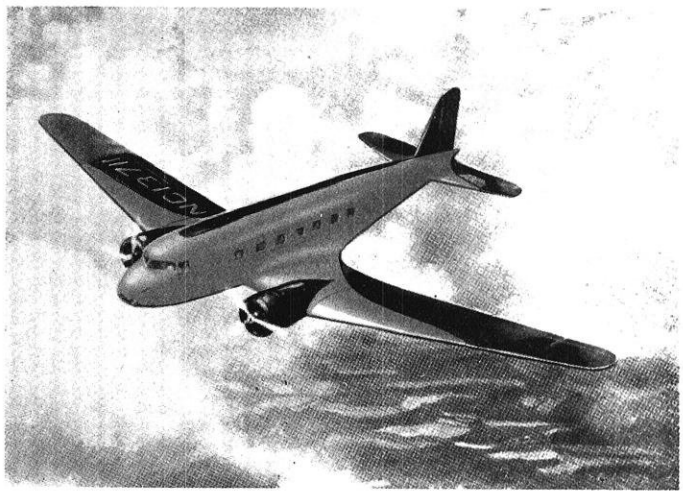
* * * *

James L. Ferebee, chief engineer of the Milwaukee Sewerage Commission and member of the Wisconsin Board of Examiners for Architects and Engineers, told of his experiences as chief engineer for PWA in Wisconsin. Efforts of Wisconsin authorities to put men to work in a hurry, he stated, were blocked by conditions at Washington. "The more the government got ready," he declared, "the harder it was to get a project through." He recited the painful efforts of a particular village in Wisconsin to build a sewerage and water system under PWA. Sixteen months elapsed from the first steps until the work commenced.

(Continued on page 101)

# Safety in Efficiency

By R. S. HARTENBERG, M. E. B. S.'28, M. S.'33



*New York to 'Frisco in 18 Hours.*

THE demands of aircraft during the past decade have caused a tremendous aeronautic development; the call for higher speed, greater safety, improved reliability and increased economy of operation has been answered with significant advances in the design of the structure, engine, propeller, and accessory equipment.

The most interesting problems are those that concern themselves with the speed range — that is, the question of high flight speed and low landing speed. A necessary preamble to the discussion of some of these problems will be the establishment of a few fundamental concepts. Considering the case of the airplane in horizontal flight at constant speed, there are the forces acting in a vertical direction, the weight, and an equal and opposite force due to the reaction of the air on the wings, called the lift L (the small vertical air force acting on the horizontal foil-surfaces may be disregarded for the purposes of this discussion); in the horizontal direction the forward force or thrust of the propeller must overcome the air resistance or drag D of the wings, engine, fuselage, landing gear and tail-surfaces. A measure of the aerodynamic effectiveness is given by the ratio of lift to drag, written $\frac{L}{D}$; a large $\frac{L}{D}$ means that the lift is associated with a small drag.

*Aviation is always in "The Public Eye." Nevertheless, there are many people still hesitant when it comes to "Taking to the Air" themselves. The developments arising from research by companies and individuals all over the country are rapidly forcing this means of transportation upon us, and we, in turn, are learning more and more every day, to accept it.*

For high speed flight to be achieved as cheaply as possible — with a minimum of horsepower — extreme refinements are necessary The most obvious refinement is the reduction of drag by streamlining of all non-lifting surfaces such as struts, wires, and landing gear. Even the simple cowling, or "pants," over the wheels, reduces the drag of the landing gear by about twenty per cent. Here a further step has been taken. The present-day landing gear can be retracted into the wings or fuselage while in flight, giving about a twenty per cent reduction in total drag. The engine is skillfully hidden under a cowling that not only reduces the air resistance but also provides adequate cooling. Government tests show that for speeds in excess of 200 miles per hour, the air-cooled radial engine has a drag, even with the best of cowling, that may absorb half of the engine output. It can be imagined what the drag of an uncowled radial engine would be!

A factor of great importance is the interference drag. The fuselage and wings, taken separately, have drags which, when added numerically, are different from the drag of a combination of the wing and fuselage. The difference is called the interference drag, and is termed favorable when the drag of the combination is less than the sum of the wing and fuselage drags. With changes in flight attitude, the interference drag may pass from favorable to unfavorable, or vice versa. Favorable interference drag is accomplished by the use of suitable fillets between the wings and fuselage, or between the engine nacelle and wings. Not only do properly designed fillets reduce the drag, but they also give greater flight stability and thus insure safety. Flutter (a vibration of the control surfaces due to aerodynamic disturbances) not only makes flying uncomfortable, but may lead to destruction of the surfaces. Proper filleting will prevent this.

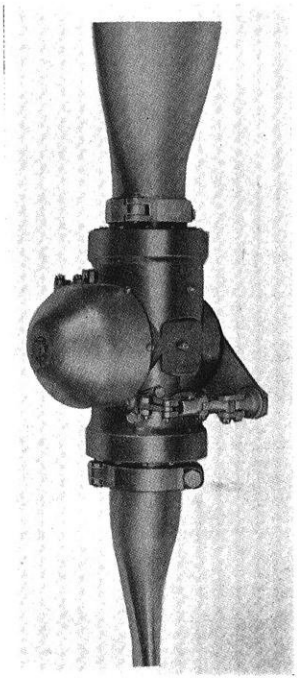
The wing cross-section is most important in design. Formerly, fairly thick wing sections with a considerable curve on the top side were used. The present trend is to thin, more nearly symmetrical sections. The thin section has an inherently smaller drag, as well as a smaller lift. Now, for high speed flight the loss in lift can be tolerated within certain limits. It is at low speeds — as the landing-speed, for example — that the lift must be maintained. How this is accomplished will be seen later.

The best results for all flight conditions cannot be obtained from one propeller of fixed size and shape. If the propeller has been designed for maximum speed at sea level, the full engine power and highest efficiency will not be available for takeoff, climb, or high altitude flight with a supercharged engine. Propellers with variable area and variable diameter have been abysmal failures. It has remained for the controllable pitch propeller (one in which the blades can be rotated in their sockets) to be the practical solution of the propeller problem. The controllable pitch propeller has been brought to a high degree of perfection in the last two years. Its use permits constant engine speed

within a wide range of airplane speeds — as from take-off to the maximum — an important feature since the engine has maximum efficiency and performance at a particular crankshaft speed. Also, the engine revolutions may be kept constant with increase in altitude. The fixed blade propeller, designed for sea-level conditions, would cause racing at altitude when mounted on a supercharged engine. Furthermore, the fuel economy that may be obtained will permit the flying range to be increased, for as the fuel load is consumed, the power may be reduced without decreasing the speed. These propellers may be controlled by the engine speed, or they may be manually controlled by the pilot.

For obvious reasons, landing should be accomplished with as low a speed as possible. Low speed is essentially dependent on high maximum lift. High speed demands low drag, and this necessitates a thin wing. Since the thin wing does not have a large maximum lift, it is necessary to alter its characteristics for the low-speed flight condition. This may be accomplished in a number of ways.

Perhaps the greatest advance was made with the invention of the Handley-Page slot. This may be described as a small movable airfoil mounted by a linkage along the forward edge of the main wing. In the high-speed flight condition, the attitude of the airplane is such that there is a smooth flow of air over the top surface of the wing; with a decrease in speed the attitude changes until there is an interruption of this smooth flow over the top surface causing a decrease in lift. In high-speed flight the air pressure keeps the auxiliary section pressed firmly to the main wing. At low speeds the change in attitude of the airplane causes the air pressure to blow the small section away from the wing, creating a slot giving a smooth air-flow over the top surface of the main wing, thus maintaining the necessary condition for continued lifting effect. The slot may extend along the whole span of the wing, or it may cover only that portion in front of the ailerons. The slotted wing presents no great structural difficulties and does not effect the high-speed. However, American designers are indifferent to the advantages that might be derived from its application.



*Variable-Pitch Propeller Hub*

It has already been indicated that a wing which has a pronounced curvature, has a higher lift than a flatter wing. This effect is approximated with the flap, a hinged panel on the under side of the wing that may be lowered at the will of the pilot. The panel has a width of about one-third that of the main wing, the hinge-line being two-thirds of the way back from the front of the wing. The flaps are depressed in anticipation of the landing. Not only do they increase the lift, permitting a reduction in speed, but they also serve to reduce the speed by reason of the increased drag. For high-speed flight the flaps are folded against the underside of the wing, and consequently cause no interference.

The flaps may be so arranged that they not only swing downward, but they also may move backward. Here, then, is an increase in wing area, permitting a decrease in flight speed while maintaining normal lift. The flap-gear that moves back presents more structural difficulties than the simpler, hinged type.

Slots and flaps are used together quite successfully. There exist an almost infinite number of combinations; furthermore, each type alone is susceptible to variations in form and application. It is particularly fortunate that the thin wings of the present day are benefited more by these measures than are the thicker wings.

Increased safety has been approached from many sides. Advances in aerodynamic knowledge, based not only on theoretical considerations but also on actual tests under real flight conditions, have pointed the way to trimmer designs, incorporating not only speed but safety as well. Metallurgical discoveries have made possible the use of metals lighter than steel, and possessing, in some directions, more desirable properties than steel. An increasing knowledge in the mechanics of materials has given the designer a more accurate concept of the materials and the stresses they can safely withstand.

Safety while in the air has been advanced through the development of precision instruments that indicate position and attitude. Of particular significance is the Government work in the development of radio beacon and radio blind landing systems. The radio beacon serves to guide the pilot from point to point across country when the visibility is low or lacking, and he cannot determine his position by familiar landmarks. Under similar weather conditions, the radio blind landing system, by means of a radio beam, guides the pilot to the airport runway. These devices, then, permit not only safe navigation but safe landing under all weather conditions.

## STATION W9CD TO THE RESCUE

A raging blizzard signifies suffering, inconvenience, and loss to most people but to Robert Mallory, e'35, it recently meant the opportunity to apply his particular knowledge and experience in the performance of a noteworthy and commendable public service.

Mallory is a licensed amateur short-wave radio station operator and owner, and has become skilled in the use of the Morse Code, the international language of the radio and telegraph. When a northwest storm isolated cities in Minnesota from Wisconsin by tearing down all telephone and telegraph wires, the Wisconsin Telephone Company requested Mallory to use his station W9CD to re-establish communication. With his two assistants, Simms, '37, and Mead, '38, Mallory remained at the station and aided in the coordinating of efforts to re-establish telephone lines into Duluth and Minneapolis.

# Speeding Economic Recovery by a Corrective Credit Award

By Edward Bennett

**1. The Mismanagement of Credit: the Immediate Cause of the Business Breakdown.**

The letters of Paul written during the early years of the New Dispensation declare that "the love of money is the root of all evil." The present years are being hailed as the early years of a New Deal. If this New Deal is to endure through the ages, the letters of these formative years will, in like manner, contain clarifying pronouncements having a direct application to existing conditions. Among these judgments will be the following:

Not so much to the love of money, but rather to the *mismanagement of credit-money* will be attributed the existing breakdown in the system of production and distribution — a breakdown which has brought the number of the nation's unemployed to the astounding peak of 14 million and has held it at an average of 9 million for the last 38 months of the Old and the first 22 months of the New Deal, or for 5 long years.

**Suppose you and every other person in this nation were given $100 in cold cash to-morrow — to spend as you desired. Would the expenditure of the money lead us to rapid recovery? Mr. Bennett has written two provocative articles for the "Engineer" in which he analyzes and discusses such a proposal. The second article will follow in the April issue.**

The money of the nation consists not alone of the coin and of the paper money, or the *currency,* which constitutes the *legal-tender money* issued under the control of the government, but also of the *bank-credit money* (check money) provided and awarded by the bankers. The relation between the volume of these two forms of money, and also the startling rise and fall of the bank-credit money before and after the crash of 1929, are shown by the curves of Fig. 1.

These curves show that over the decade from 1922 to January 1932 the volume of the currency in circulation remained substantially constant at 4.9 billion dollars, whereas the bank-credit money varied greatly, reaching a peak of 55 billion dollars in 1929.

What is the nature of this bank-credit money which constitutes the medium of payment in the transaction of 90 per cent of the business of the country, and whose volume in the interval of a few years varied from 7 to 11 times the volume of the governmentally supported currency in circulation? How is it created? What governmental control is exercised over its creation and its volume? How has its volume varied, and how has the volume of the bank-credit money affected prices?

By the simple process of taking the note of an individual or a corporation, and of making a debit entry in the bank's "notes receivable" account and a credit entry in the note giver's bank account, any banker manufactures money; that is, he expands bank deposits or increases the volume of bank-credit money, as his own judgment or interests may dictate. In many cases the security back of the note and of the money created by banker fiat is not positive or creative, namely, the note giver's capacity to produce: it is negative or destructive, namely, the note giver's power to exact or extract. Largely by this process, the bankers of the 30,000 banks of the country in the seven years from 1922 to 1929 increased the volume of the bank-credit money from 39 billion dollars in December of 1922 to 55.3 billions in December of 1929, an increase of 16.3 billion dollars or 42 per cent.

Following the bursting of the speculative bubble, bank loans have been contracted from 42 billion dollars in 1929 to 22 billion in 1933, a decrease of 20 billions. In the five years since the crash, the bank deposits have been contracted from the 55.3 billion dollars of 1929 to 38 billions in 1933, a contraction of 17 billion dollars in the bank-credit money.

The years of the "New Era" which immediately preceded the stock market crash of October 1929 were years of administratively supported inflation, in which the money of the United States was diluted with billions of dollars of bank-credit money.

The 42 per cent increase in bank-credit money was, in part, sound, being the necessary accompaniment of an increase of 21 per cent in the production of goods and services. That part of the increase was treacherously unsound which was based upon counterfeit securities; that is, upon securities which were counterfeit in the sense that they capitalized either legal and business ingenuity in circumventing the regulatory and the blue sky laws of the states or fancifully estimated future profits.

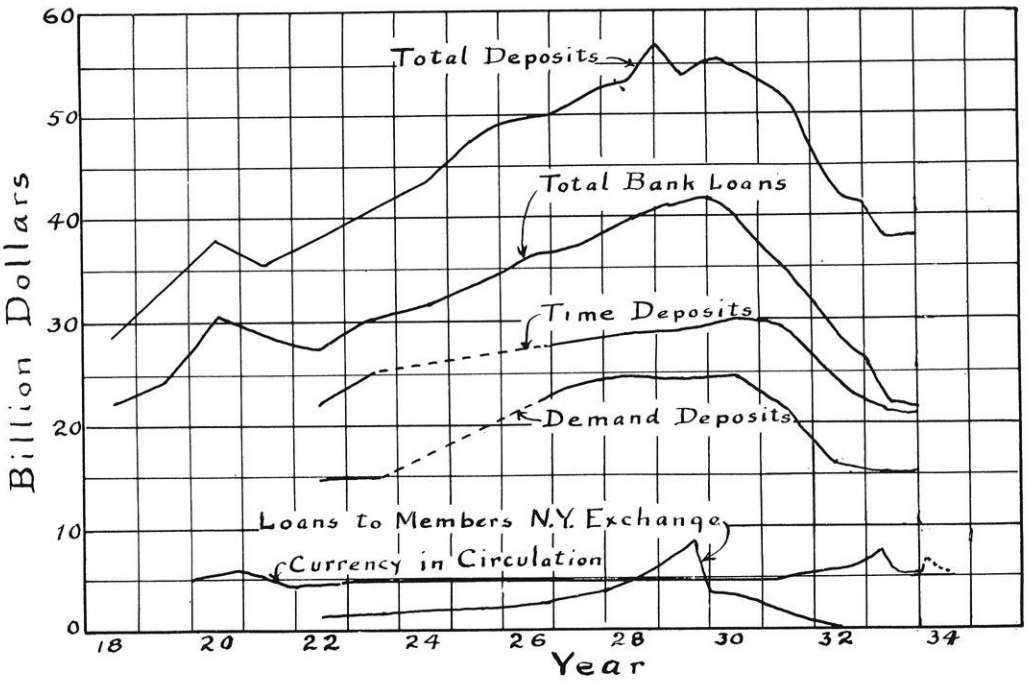
This unsound fiat bank-credit money was used in the gamble in the common stocks of the nation's industries and holding companies, which culminated in 1929 with the loans of members of the New York stock exchange exceeding a total of 8 billion dollars (see Fig. 1), and with the average price of the common stocks skyrocketed to 400 per cent of their 1922 level.

The market crash, the resulting deluge of bank and business failures, and the continued unemployment of an average of 9 million workers for the 5 years of the depression have wiped out, not alone the fictitious value, but also the life-time hard-won savings of millions of citizens.

Other movements and practices have made their contributions to the breakdown in the national system of production and distribution, such as,

a. Price dislocations growing out of changes in supply or in wants and interests, and the resulting losses in purchasing power and employment.
b. Mal-distributions of wealth and of the national stream of income.
c. The losses and dislocations growing out of unwise business ventures and of the displacement of old agencies by more efficient agencies, processes, and machines.

It seems reasonably clear, however, that the *immediate cause* of the crash of 1929 and of the ensuing destruction of confidence in the integrity of men and institutions was the *mismanagement of credit-money:* the destructive misuse of bank-credit money to finance speculation for private profit has brought production to low ebb.



*Currency and Bank Credit.*

## 2. The Continued Mismanagement of Credit: the Bar to Recovery.

The *destructive misuse of credit* is only the first half of the history of mismanagement of credit. The second half is that the productive activity of the nation has remained at low ebb for 5 years primarily because of the *failure to agree upon and to use a workable plan for making a constructive use of bank-credit money* to put men to work.

*The fatal defect in the uses that have been made of government credit to restore employment is the petty or trivial scale of the credit operations;* the scale corresponding to the use of a medicine dropper to prime a dry kitchen pump.

TABLE I. National Income: Paid Out and Produced by Business: In Billions of Dollars per Annum

| *Calendar Year* | 1929 | 1930 | 1931 | 1932 |
|---|---|---|---|---|
| 1. Income paid out | 81.1 | 75 4 | 63.2 | 48.9 |
| 2. Income produced | 83 | 70.3 | 54.6 | 39.4 |
| 3. Excess of purchasing power awarded to consumers over the price of the product (1) — (2) | 1.9 | 5.1 | 8.6 | 9.5 |
| 4. Cost-of-living index | 100 | 97.4 | 88.9 | 80.4 |
| 5. Wholesale price index | 100 | 90.7 | 76.6 | 68. |

This table is taken from Senate Document 124 containing the Report on the National Income made in 1934 by the U. S. Bureau of Foreign and Domestic Commerce with the cooperation of the National Bureau of Economic Research.

To obtain an adequate idea of the scale on which credit must be used to rapidly return men to work, Table I should be examined. Line 1 of this table shows, for each of the years 1929 to 1932, the total money paid out by the country's productive enterprises to the workers and the proprietors of the nation. This is the amount per annum paid in the form of wages, salaries, fees, benefits, rents, entrepreneurial withdrawals of goods, interest, and dividends.

This table shows that in the last year of employment for (almost) all, nomely the year 1929, the ultimate consumers of the country received 81.1 billion dollars with which to place the purchase orders which mean jobs for themselves in their capacity as producers. In the year 1932 the consumers had increased in number by 4.5 per cent (5.5 million) but they received only 48.9 billion dollars with which to place purchase orders. However, the cost of living in 1932 had fallen to 80.4 per cent of the cost of living in 1929. This means that the income needed in 1932 to order the same volume of goods and services as in 1929 need be only 80.4 per cent of 81.1 billions, or 65.2 billion dollars. This exceeds the actual income of the consumers in 1932 by 16.3 billion dollars.

In other words, the purchase orders for finished goods and services in 1932 fell about 16 billion dollars below the level necessary to employ the same number of workers as in 1929. Corresponding figures for the national income during the years 1933 and 1934 are not available, but since 1932 the increase in annual production or in employment has not been striking, except for employment in the Civilian Conservation Camps and in the projects of the Civil Works Administration, the Federal Emergency Relief Administration, and the Public Works Administration.

*The continued mismanagement of credit during the last three years of the depression lies in the failure to use bank-credit money at the rate necessary to restore the volume of*

(Continued on page 103)

# THE CRITICAL ANGLE---

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

**SHALL REGISTERED ENGINEERS BE CLASSIFIED?**

After four years of operation, the Wisconsin law providing for the registration of architects and civil engineers faces amendment for the purpose of making it cover all engineers in the state. The proposal has the general support of the engineers so far as principle is concerned, but engineers are divided in opinion upon the point of a mandatory classification of engineers into civils, chemicals, mechanicals, electricals, and miners. The registered civil engineers of Milwaukee voted 33 to 6 at a recent meeting for such mandatory classification. Members of the present examining board oppose such classification.

The argument for the classification seems to rest upon two things: first is a strong attachment that civil engineers have for the term "civil;" second is a fear that unless engineers are classified they will undertake work in fields for which they are not fully qualified.

The argument against classification rests upon a number of points. First is a desire to build up in the minds of the general public a consciousness of professional status of engineers. It is argued that the public should not be required to recognize more than one kind of engineer. The fear that engineers would tend to undertake work for which they are unqualified if believed unfounded. It is pointed out that trouble on this score comes from untrained men who do not appreciate fully the scientific basis that underlies engineering design. Such untrained men are prevented from practising under a registration law. Furthermore, the formal training of all classes of engineers is identical for about three-quarters of the total training. Experience shows that the graduates of engineering schools frequently go into fields other than the ones for which they specialized in school and are successful in such changes.

Perhaps the strongest argument against classification is that it would be an unnecessary restriction upon the registrants. It would sort engineers into pigeon holes and prevent their professional growth regardless of their native ability. Such restrictions, as well as the restrictions to free movement imposed by state lines, are felt to be undesirable results of registration which should be minimized so far as possible.

This difference of opinion will have to be reconciled before the proposed amendment can hope for passage. It would be unfortunate for engineers to be divided upon so important a matter at the time that the amendment comes up for hearing.

**A STATE ENGINEERING SOCIETY IS NEEDED**

If and when the law providing for registration of all engineers in Wisconsin is passed, there will be need for a state society that will include all registered engineers. Lawyers, medicoes, and architects have already blazed the trail in Wisconsin, and in other states the engineers have fallen in line and organized as professional engineers. A national society that will include all registered professional engineers in the country has been organized and already has several thousand members.

The Engineering Society of Wisconsin seems to have here a chance to expand and become in reality what it has always hoped to be: the organization of all Wisconsin engineers. Such an expansion could readily be made. All registered engineers would become automatically members of the state society. There are probably three thousand engineers in Wisconsin. The present society has a membership of 343; only about one-tenth of what it might have. Such a consolidation of the profession would probably do much to improve the profession and give it the higher rating to which it aspires.

The new officers of the society have before them an unusual opportunity for effective accomplishment.

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**FOR YOUR INSPECTION**

Endeavoring to enhance the students' technical training by encouraging and facilitating the reading of recent literature concerning the social and economic significance of engineering, the Engineering Library Committee has made available bibliographies of books and articles dealing with this subject. A brief list of articles that have appeared during the past three years in engineering journals will be distributed to seniors and other students who may be interested.

Another important feature of this project is the preparation of a map on which will be indicated the location of dams, bridges, flood and erosion control projects, and other activities on which work is under way or soon to be commenced. The purpose of the map is to furnish a guide to students who may desire to witness the interesting and practical ramifications of engineering training in the field. Brief descriptions and appropriate references will accompany this map and it will be posted in a prominent location in the hall of the engineering building. Students are urged to consult this unusual guide, both to acquaint themselves with the projects described and to ascertain the possibility of their visiting one or more of them during the spring or summer vacation periods.

The short list of books on engineering and related subjects, prepared several years ago, may be had on request from the library and the more extensive bibliographies may also be consulted there. The Committee also proposes to post in the library the titles of new books recommended for general reading.

# « ALUMNI NOTES »

### MINERS AND METALLURGISTS

**ROSENTHAL, PHILLIP,** '35, a February graduate and recent Alumni Editor of the "Wisconsin Engineer," has found employment with the Battelle Memorial Institute at Colombus, Ohio. At present Rosenthal's work is that of a research assistant and is being done under the direction of two former graduates of the University of Wisconsin, **LORIG, C. H.,** Min.'24, Ph. D.'28, and **KRAUSE, D. E.,** Min.'29.

**SMYTHE, N. O.,** '35, began work with the Sivyer Steel Casting Company, Milwaukee, Wisconsin, directly after graduating at mid-year.

**MATTEK, LAWRENCE J.,** '35, is with the Wisconsin Steel Company of South Chicago, serving in the capacity of open hearth metallurgist.

**SCHEUERIN, LENHER,** Ph. D.'28, who is with the Victory Fluorspar Company of Elizabethtown, Illinois, has the position of assistant manager.

### ELECTRICALS

**SWEET, ALVA L.,** '29, has been in the employ of the General Electric Company at Schenectady, New York, since 1929. He is working in the industrial control engineering department. He further states that they have a rather inactive alumni association there, but occasionally get together for luncheon meetings, there being about fifty alumni in the city.

**MILLER, BURTON F.,** '26, former chief engineer for the University of Wisconsin Radio Station WHA, is with the Warner Brothers, First National Studios, Burbank, California, as a transmission and development engineer.

**HOLMQUIST, ARTHUR S.,** '25, has a position with the Ohio Public Service Company, Elyria, Ohio, in the Service Department.

### MECHANICALS

**WARREN, GLENN B.,** '19, M. E.'24, is head of the Turbine Design Department of the General Electric Company which recently completed the design of one of the largest turbines in the country with a 208,000 kw rating.

**GRAHAM, G. C.,** M. E.'25, is president of the Eddy Stoker Corporation of Chicago, which entered an exhibit in the recent solid fuel conference under the auspices of the Mechanical Engineering Department.

**CLARK, HENRY L.,** '26, was married to Zita Brewer of Madison, ex'34, on October 24 at Richland Center. Mr. Clark is associated with the Braden Copper Company. At home in Rancagua, Chile, South America.

**POSZ, HOWARD M.,** '21, has a position with the Southern California Edison Company as a power specialist.

**BLEYER, CHARLES F.,** '07, died on January 15th at Lorain, Ohio. Following Mr. Bleyer's graduation he became erecting engineer for the Allis-Chalmers Company of Milwaukee. Some years later he became superintendent of power for the United States Steel Corporation's plant at Lorain, Ohio. His wife and a daughter, Constance, '37, survive him.

**DANIELS, GEORGE C.,** '08, who is a mechanical engineer with the Commonwealth and Southern Corporation at Jackson, Michigan, has charge of design and construction of power plants.

**FITCH, W. K.,** '13, was recently elected president of the Dravo-Doyle Company located at Pittsburgh.

### CIVILS

**MELVILLE, JAMES,** '75, C. E. (Hon.)'77, who is in his eighty-seventh year, is spending the winter in Florida. Mr. James is of Madison.

**WOO, WILLIAM H. F.,** '29, Ph. D.'31, writes from Nanking under date of November 29th, as follows: "I resigned my position as chief engineer of Yenching University six months ago and in August was appointed district supervisory engineer for the Bureau of Public Roads, which is a bureau of the central government. The work is responsible and interesting, and there are promotions which I can look forward to. The political situation is improving right along. I'm single yet but will be married in June."

**RENNER, E. ROSS,** '32, is a draftsman on the Rural Electrification Survey for W. E. R. A., located at Madison.

**LAPHAM, CHARLES,** '81, assistant chief engineer of the Milwaukee Road, died of a heart attack in Chicago on January 3.

Mr. Lapham had been an employee of the railroad for fifty-six years and had seen it grow from a mere 1200 miles of track to more than 12,000. He engineered the road's first bridge across the Mississippi, at Savannah, Ill. He also surveyed the "second" line to Chicago, relocated the channel of the Menominee River in Milwaukee to allow industrial development of the valley, and drove the stakes for the Milwaukee Union Station. During his life Mr. Lapham had been offered easier positions numerous times, but he declined, preferring rather to stay in the railroad business. Mr. Lapham is survived by his daughter, Mrs. Guy C. Lindow, and a brother.

### CHEMICALS

**BRANDEHOFER, ALFRED,** '34, is working for the Carbide and Carbon Chemicals Corporation of Whiting, Indiana.

**METZ, HUGH J.,** '34, is employed by the Metric Metal Works of Erie, Pennsylvania.

**ERICKSON, KENNETH W.,** '14, represents the Chicago section of the Titanium Pigment Company, Inc., with offices at 219 E. Illinois Street. He and Mrs. Erickson and their two children are living at 258 Forest Avenue, Winnetka.

**ROSS, GEOIGE H.,** '26, has been transferred from Old Hickory, Tennessee, to Richmond, Virginia, by the Du Pont Cellophane Company. He and the family are living at 303 Roanoke Street.

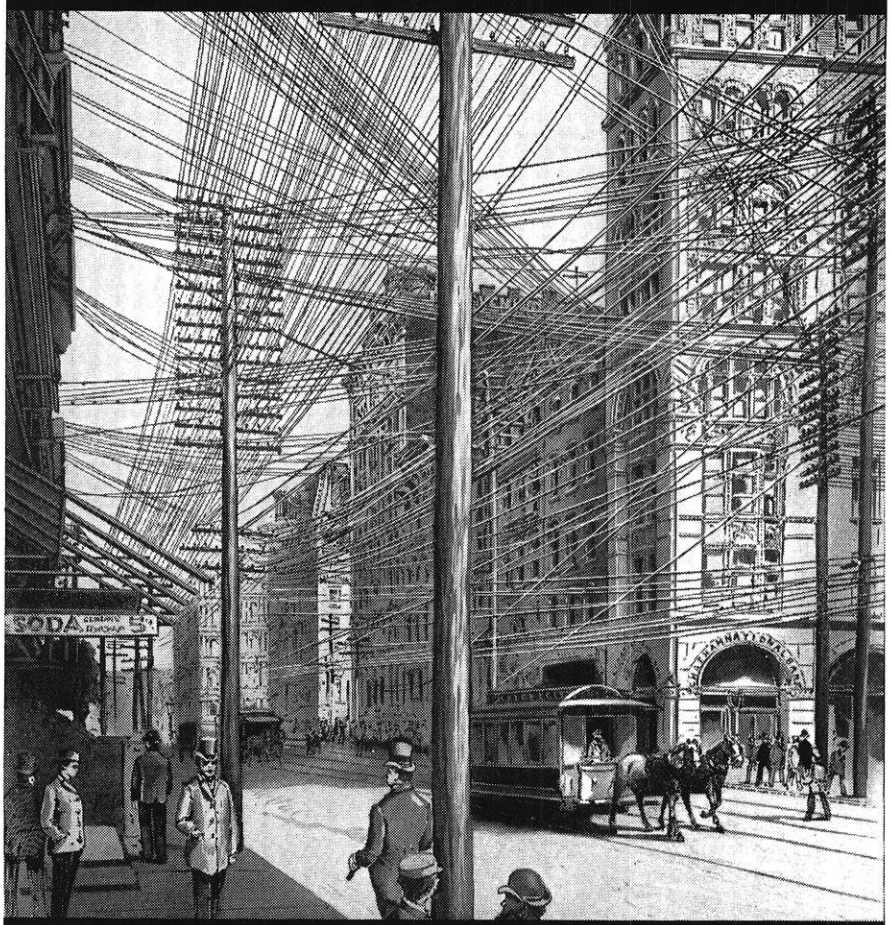
**HARVEY, LYLE C.,** '21, is vice-president in charge of sales for the Bryant Heater Company in Cleveland, Ohio.

**BLOXDORF, WALTER R.,** '28, who is employed by the MacWhyte Company of Kenosha, Wisconsin, as metallurgist, informs us that he is very much interested in fatigue testing at the present time, especially since his company recently bought a new type of fatigue testing machine which represents a distinct step forward.

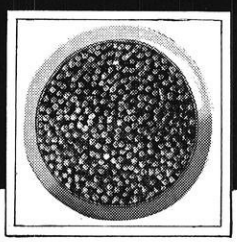
### GENERAL

**KEATOR, E. N.,** '10, is president and treasurer of the Southwest Drilling Company, San Antonio, Texas. After Mr. Keator's graduation, he was an engineer for Hugh L. Cooper for three years; then from 1914 to 1929 he was in the employ of Stone and Webster, Inc., working for that firm at Keokuk, Iowa, Indianapolis, Indiana, and Columbus, Georgia. Since 1929, however, he has been in business for himself, specializing in oil drilling and producing. He is married and has three children, the oldest now a sophomore at the University.

# 300 telephone wires in 1890




# 300 telephone wires in 1935



Above: *From an old photo of lower Broadway at John St., New York about 1890.* Right: *Actual size of 150 pair cable.*

Bell System engineers long ago began to work out a way to clear city streets of overhead wires. The first telephone cables were crude affairs—a few wires drawn through a pipe. Continuous research brought forth improved designs, better manufacturing methods, cables of smaller size yet far greater capacity. The cable with the greatest number of wires today—3636—is 2⅝″ in diameter.

Why not drop in at home tonight — by telephone? For a lot of pleasure at bargain rates, call by number after 8:30 P. M.

More than 94% of the Bell System's wire mileage is now in storm resisting cable—one of many developments to improve service.

**BELL TELEPHONE SYSTEM**

# ON THE CAMPUS

### ENGINEERS OF THE DANCE

With the spring social season at the university in full swing, several engineers have achieved prominence through their activities on dance committees. Tom Gilbert, c'35, and Bob Kaska, e'35, were among the Greeks selected to direct the Interfraternity ball, held on the th of March. Gilbert was chairman of the decorations and entertainment committee, and Kaska was an assistant on that group.

With the Military ball scheduled for April 5, Ronald O. Ostrander, ch'35, is busy making preparations for that affair. He has been appointed assistant general chairman of the finance committee.

One of the R. O. T. C. members, now engaged in planning for the Military ball dinner, is Victor A. Kneevers, c'35, a member of the committee in charge.

### CRANDALL ADDRESSES ENGINEERING SOCIETY OF WISCONSIN

Several hundred Wisconsin and midwest engineers gathered at the engineering building on February 21 and 22 for the annual convention of the Engineering Society of Wisconsin. The opening of the convention witnessed the focusing of the spotlight on Lee Crandall, c'35, who presented a paper on "U. S. Land Surveys in Wisconsin." Crandall is one of few engineering students who have had the opportunity to address a similar professional convention.

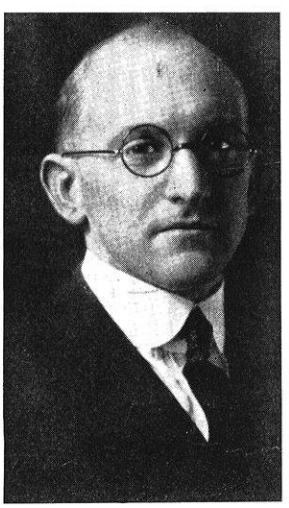
### STAFF MEMBERS RECEIVE AWARDS

In recognition of their commendable service on the editorial and business staffs of the Wisconsin Engineer during the past year, five men were recommended by the Board of Directors to receive Engineer keys. Presentation of these awards was made by the retiring editor, Leslie G. Janett, ch'35, and business manager, Wilfred H. Tock, ch'35, to the following: G. H. Cook, ch'35, incoming editor; P. C. Rosenthal, min'35, R. C. Price, c'35, S. J. Robish, ch'35, and L. A. Poast, c'35.

### JANDA MADE NEW PRESIDENT OF STATE ENGINEERS

Harold F. Janda, professor of highway engineering and city planning at the University of Wisconsin, was elected president of the Engineering Society of Wisconsin for the ensuing year.

Professor Janda is a native of Portage, Wisconsin, where he was born and educated. His father was Anthony Janda, printer. Prof. Janda received his degree of Civil Engineer from the



HAROLD F. JANDA

University of Wisconsin in 1916. He taught at the University of Cincinnati from 1916 to 1921, and at the University of North Carolina from 1921 to 1928. He was appointed to his present position in 1928. From 1924 to 1926, while on leave of absence from his teaching duties, he served as assistant director of the Highway Research Board of the National Research Council at Washington. He is a member of Sigma Phi Sigma, Sigma Xi, Chi Epsilon, and is an associate member of the American Society of Civil Engineers.

During recent years, Prof. Janda has directed research work into the cause and prevention of frost boils and frost heaves for the Wisconsin Highway Commission. Largely through his efforts appreciable progress has been made in conquering this troublesome condition that has long been a serious nuisance.

### ENGINEERS IN ATHLETICS STAR

That the college was well represented in athletics during the past season was concluded after glancing over the sports roster. In the recent all-university boxing matches, William Hodgins, m'35, Cornell champ, supplied one of the surprises of the tourney when he out-fought Bill Pfeffer in the semi-finals of the 175 pound class and then put up a stiff battle against the defending champ, only to lose by the narrowest of margins. Hodgins displayed A-1 calber and a fighting heart, which won him the support of many in his try for the crown.

When Wisconsin's basketball season drew to a close with the Badger quintet still on the top of the heap, Ray Hamann, e'35, was one of the three seniors to finish outstanding careers. Ray saw action this year as a dependable reserve man, one who played hard, fast, alert ball every minute he was on the floor.

One of Wisconsin's minor sports — wrestling, recently closed a fair season of competition with Dave Mesiroff, m'37, as one of the up and coming candidates on the team. Dave is noted as the sincerest follower of strict training rules and with more experience and confidence should go far in the future conference meets.

### WE'RE ON OUR WAY

The Engineering College of the University of Michigan proudly reports that twenty students have received a perfect grade of "A" in all their studies during the past semester. Perhaps Wisconsin's College of Engineering can't duplicate this enviable record, but from all indications, "it won't be long now." Wayne T. Mitchell headed the freshman high honor list with a perfect rating, with H. K. Voigt, M. T. Roshar, P. M. Setchum, C. P. Walter and F. J. Gunther following in close order. The honor list is composed of 36 students and 28 others have acquired a 2.00 average or better. Even Asst. Dean Millar broke down and admitted that this year's frosh were one of the best ever to enter the University. But don't let that bother you, he's wont to get enthusiastic about every new group "of his boys."

## ENGINEERING SOCIETY OF WISCONSIN HOLDS TWENTY-SEVENTH CONVENTION

(Continued from page 92)

Jim said that after trying for a year to find out what the PWA authorities at Washington were driving at, he could sympathize with Hans Hanson who didn't realize why Ole's wife was cold until it was too late to do anything about it.

* * * *

Erosion that has occurred since the country was first settled, Professor Twenhofel told the convention, has taken from the United States an area of arable land equal to that contained in seven states the size of Wisconsin, and practically nothing has been done about it. If a foreign nation had taken that much territory from us, he ventured, there would have been plenty of action.

* * * *

President Arthur L. Boley, city engineer of Sheboygan, showed those members who attended the Thursday luncheon at the University Club how he keeps sewer records. The cost of the records, he stated, is more than offset by the savings which they make possible.

* * * *

C. A. Wiepking, C. A. Willson, and F. A. Torkelson constituted the resolutions committee.

* * * *

The nominating committee included W. A. Peirce, G. L. Larson, and H. C. Webster.

* * * *

W. S. Cottingham and W. H. Tacke made the audit of the secretary's books.

# « CAMPUS ORGANIZATIONS »

### POLYGON

Gay songs, clouds of smoke, barley spirits, two hundred engineers, pretzels, to say nothing of a shyster or two — all mixed up with Pat Smith and his accordian (the inimitable Pat "Can he tickle those ivories" Smith) that was the state of affairs at the Polygon Smoker held March 27 in Tripp Commons, and the Great Hall of the Union.

Starting in the Great Hall, Pat Smith led the program with scintillating jazzistories. He was followed by James McDonald, a local practising barrister, who told the truth about Paul Bunyan. While still holding their sides, the Lawyer and the Engineers sojourned to Tripp where aching sides soon turned to aching heads.

Responding to the first flare up, St. Pat interest shown at this smoker, Polygon has laid plans for a magnanimous parade. "And when Polygon says it will be magnanimous, it will be magnanimous, yow sah!!" The date is set for Saturday, March 30, to follow the evening of Spring Ball (Git your gal immejiatly). The Ball will be the scene of the official presentation of Ye Royale Engineer, St. Patrick.

Committee chairmen have been selected as follows: General chairman, Gilbert Nieman, parade, Carl Matthias, prizes, Ernest R. Ziehlsdorff, publicity, Bert Gallistel, and finance, Oscar Welker. The various committee heads will select men from the ranks of the several schools of the engineering college.

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### MINING CLUB

The first meeting of the second semester was held on Wednesday, February 20. The Mining Club adopted a revised constitution and voted to renew its affiliation with the American Institute of Mining and Metallurgical Engineers as a student affiliate chapter. The general nature of the current semester's program was decided upon. Refreshments were served after the meeting.

The officers of the club are William Horton, president, Lloyd Severson, vice-president, Hershel Kaufman, secretary, Graydon Beechel, treasurer, Bert Gallistel, program secretary, and Robert Schultz and George Kemmer, muckers.



### PI TAU SIGMA

On January 24 the Wisconsin Alpha Chapter of Pi Tau Sigma began activities for the second semester by electing the following officers:

*President* _____ C. Bradford Kniskern
*Vice-President* _____ Roger K. Smith
*Corresponding Secretary* _____ E. W. Gross
*Recording Secretary* _____ H. W. Alyea
*Treasurer* _____ A. W. Cole

The new officers assumed their duties at once, and committees were appointed by President Kniskern to take care of special functions.

With the aim of helping senior mechanical engineers find employment, Pi Tau Sigma is taking the initiative in an attempt to publish a booklet containing the pictures and qualifications of all members of the senior class, and which is to be distributed among prospective employers throughout the country. It is hoped that enough interest can be aroused to make the proposed publication financially possible, since the plan has been adopted by one other school and found to be of great value.

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### CHI EPSILON

Officers who will be at the helm of Chi Epsilon, honorary civil engineering fraternity, during this semester were installed at the chapter meeting held February 19 at Acacia House. Men who took office are:

*President* _____ William Ree, c'4
*Vice-President* _____ Lee Crandall, c'4
*Secretary* _____ Luna Leopold, c'4
*Treasurer* _____ William Ackerman, c'4
*Ass't Editor of Transit* ____ Carl Matthias, c'3

Action was taken by the group to urge the support of the Polygon Unification Plan in every possible way. This plan of unification of student engineers' activities fosters the participation of all in school activities rather than limitation of participation to a few. Budgets of all student engineer groups can be helped by this plan to allow each society to know early in the semester the sum of its available cash.

Plans for this semester include luncheon meetings the first Tuesday of every month at which student engineers are to be given the opportunity to become more closely acquainted with various men on the engineering school faculty. Besides this, an inspection trip of water power plants at Kilbourn and Prairie du Sac is to be made during the semester. If sufficient transportation can be arranged, men outside the chapter will be invited to accompany the group.

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Only as we increase the capacity of each of us to produce the goods and services we require can we hope to raise the general standard of living. There is no other way.

## SPEEDING ECONOMIC RECOVERY

(Continued from page 96)

*purchase orders for finished goods (durable and consumption) and services to the 1929 volume, namely at the rate of 16 billion dollars per year.* This rate of use of bank-credit money to order men back to production needs to be kept up, not for a year, but only until the number of unemployed is reduced from 10.5 million to, say, 2.5 million.

Let us compare that use of bank-credit at the rate of 16 billion dollars per annum, which is the essential condition of rapid re-employment with the actual rate at which the federal government has used its credit to swell purchase orders. In the 1932 presidential campaign, much importance was attached to the action of the federal administration in boosting the federal public works expenditures by a trivial half billion dollars for each of the first three years of the depression. During the fiscal year ending June 30, 1934, the federal expenditures for recovery and relief were 4.3 billion dollars. Of this amount 1.56 billion dollars was in the form of loans and subscriptions to capital stock, not all of which went to boost purchase orders. Accordingly during the fiscal year 1934 the federal rate of expenditure to boost purchase orders was between 2.74 and 4.3 billion, or, say, 3.5 billion dollars per annum. The federal budgets for the fiscal years 1935 and 1936 contain for recovery and relief expenditures items totaling 5.3 and 4.9 billion dollars respectively. These rates of expenditures are entirely too small to call the unemployed back to work in large numbers.

# A SLICE OF "PI"

## *Call B. 3.1416*

By SAINT PAT

**The Cop**

● Numerous stories and rumors are around about the cop who "dropped in" to play "hearts" with two couples at the Phi Kappa Sigma house. It is our pleasure to announce that two of the "Sweethearts" playing "hearts" were Gene Sickert, ME 3, and Gene Skinner of Green Gables and ex-EE 7.

**Again**

● We must mention Knake again. We have it, upon good authority, that the Phi Mu's value brains above brawn and beauty, so they nominated Bob Knake as their choice for the "most eligible bachelor."

**Parade**

● Last year only fourteen engineers were jailed after and during the parade. Why not conquest the "goose how" this year? The Miners and Chemicals could get in some practical work expounding with the bars — etching, cutting, polishing, etc. Would a file work better than alundum in polishing? Learn by experience!

The Electricals would probably get a "shock" out of the whole proceedings and create some "static." The Mechanicals could blow off steam and make indicator cards and the Civils could be uncivil and sight their way out.

**The Cold**

● Bert Gallistel refuses to enter the St. Pat's Parade if it's cold this year. He froze himself last year upon those stilts and refuses to undergo the hazard again this year.

**Cigars**

● "Sunshine" Shory, "League of Nations" Gilbert, Tad Shealy, Bob Haslanger, and "Robin Hood" Kraemer, are a few of the engineers who have done well in extra-curricular activities. You can't find a "pin" on them.

**Play!**

● Tom Ockerhauser, "playboy" of the Mining School has no liking for "gold diggers" although they are a part of his academic field.

**Ritchie Again.**

● Personal Dramatics—Bob Ritchie, friend and her family.

Place — Madison on Johnson Street.

Scene I — Bob enters house and greets friend. They occupy a davenport and begin whispering.

Scene II — Whispering ceases.

Scene III, IV, V, and VI — Censored.

Scene VII — Time #:30 A. M. Mother appears on scene and Bob leaves for home immediately if not sooner.

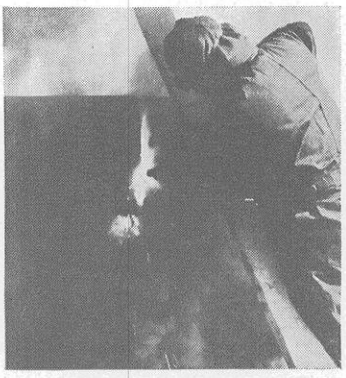
Scene VIII — Bob returns the next morning to get his overshoes which he had forgotten earlier that morning.

Scene IX — When he gets hold of me.

# Knives of Flame

## Oxy-Acetylene Machine Cutting and Flame Machining Lower the Cost of Fabrication.

*By* H. ULLMER*



LIKE CUTTING CHEESE—the oxy-acetylene cutting blowpipe demolishes a 52-ton cast iron rock crusher bowl.

Machines for guiding and moving the oxy-acetylene cutting blowpipe automatically are the most important of the recent developments in man's harnessing of flame for productive purposes. Like ribbons of fire, multiple flames of oxygen mixed with acetylene surround a jet of pure oxygen to cut steel, cast iron and other ferrous metals into intricate patterns —quickly and easily—with remarkable savings in costs over old methods.

### New Methods of Production

Since 1905, oxy-acetylene cutting by hand has been widely used in demolition and maintenance work. During the last several years, the effectiveness of oxy-acetylene cutting as a means of production has been proved and tremendously multiplied by the development of machines for various repetitive cutting requirements. The operating fields of these machines range from the simple beveling of steel plates to the cutting of intricate patterns. Most of the machines can cut vertically and horizontally. Some can be adjusted to cut circles without the use of patterns. Others cut bevels, gouge grooves, and shape complicated designs.

### Shape Thousands of Identical Parts

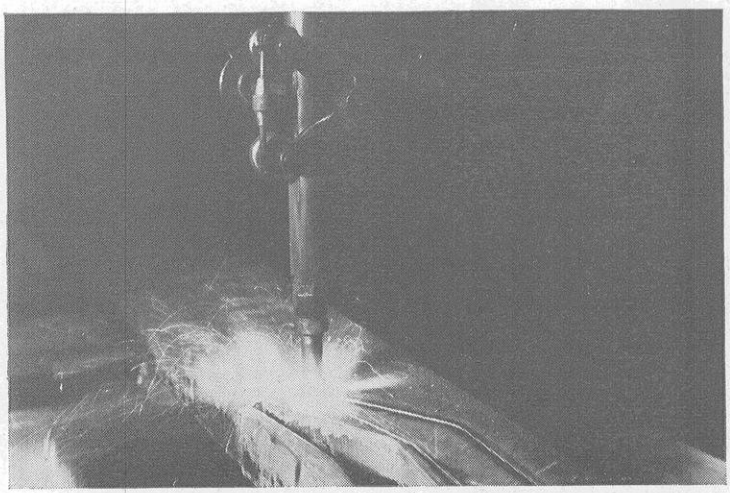
The economical continuous or intermittent production of identical regular or irregular shapes from rolled or forged steel is an outstanding accomplishment of present day oxy-acetylene cutting machines. With remarkable ease they follow templets of the desired form for the pieces to be cut. So accurate are the results that for many purposes the cut pieces can be used without machining or further finishing. Only by looking close at the smooth sides of the cut can an experienced eye tell the difference from a mechanical cut.

### In a Wide Variety of Pieces

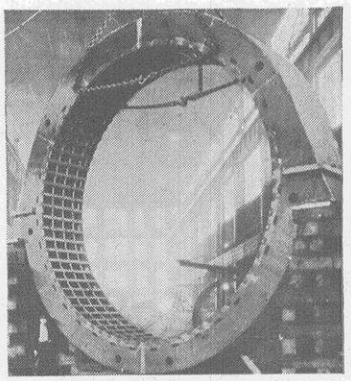
Some of the different pieces of equipment fabricated from oxy-acetylene shape-cut steel include: press frames of rolled steel requiring high strength and resistance to shock, gear blanks, cams in all types of intricate designs, forming dies which need little finishing before use, and flywheels often over a foot thick. In every case the shape-cut parts retain the great inherent strength and toughness of the rolled or forged steel from which they are made.

### Costs Cut With Oxy-Acetylene Cutting

No great investment in machinery is needed for oxy-acetylene cutting.



ONE OR A MILLION—flame cut parts can be produced easily and cheaply by oxy-acetylene machine cutting. These dipper tooth blanks are alike as two peas in a pod. No expensive patterns or dies are required.



FLAME-CUT PARTS—are welded into assemblies like this yoke for a 25,000 KVA Water Wheel Generator.

Pattern cost is reduced to a minimum and the making and storage of expensive and intricate patterns is avoided. In most cases the machine cut shapes can be beveled easily by oxy-acetylene cutting and quickly made ready for assembly by welding, thus further reducing the cost of the finished equipment and making a more salable and a more serviceable product.

### Machines Now Available

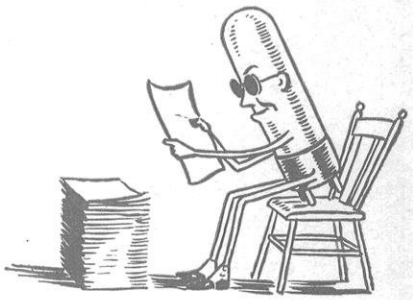
Machines of all sorts for various types of oxy-acetylene cutting and flame machining have been developed by The Linde Air Products Company, a Unit of Union Carbide and Carbon Corporation. Assistance and information as to how oxy-acetylene cutting can be economically fitted into your production operations can be obtained without obligation through Linde Sales Offices at Atlanta, Baltimore, Birmingham, Boston, Buffalo, Butte, Chicago, Cleveland, Dallas, Denver, Detroit, El Paso, Houston, Indianapolis, Kansas City, Los Angeles, Memphis, Milwaukee, Minneapolis, New Orleans, New York, Philadelphia, Phoenix, Pittsburgh, Portland, Ore., St. Louis, Salt Lake City, San Francisco, Seattle, Spokane, and Tulsa. Everything for oxy-acetylene welding and cutting—including Linde Oxygen, Prest-O-Lite Acetylene, Union Carbide and Oxweld Apparatus and Supplies—is available from Linde through producing plants and warehouse stocks in all industrial centers.

### With Engineering Cooperation

Users of oxy-acetylene welding and cutting, and other products and processes developed by Units of Union Carbide and Carbon Corporation benefit from a most unique coordination of scientific research with manufacturing, sales and service facilities. These combined resources of a vast organization assure a full measure of satisfactory performance.

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

# G-E *Campus News*



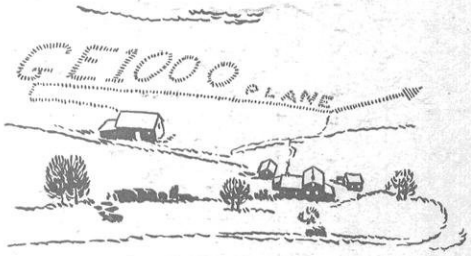
### GLASSES FOR ELECTRIC EYES

Electric eyes are wearing colored glasses and doing a new job. As a result of strict NRA code requirements, the paper industry had to find a rigid means of classifying different qualities of paper. The Institute of Paper Chemistry found that as far as white book papers were concerned, the percentage of light they reflected was an indication of their quality.

The General Electric general engineering laboratory built the necessary device—an instrument which relies on the scrutiny of two phototubes in series to measure the coefficient of reflection. This is an exceedingly delicate task, as the matter of a small percentage of reflectivity determines the price and quality of a paper.

Here's where the glasses come in. To do certain jobs right, the electric eyes had to don different colored glass screens in the form of a filter and lens arrangement. It wasn't that they were getting old; they just needed a little assistance.

J. L. Michaelson, Northwest Missouri State Teachers College, '28, is G-E engineer in charge of building these instruments.




### "GE-1000"

When, after a two-day search, a rescue plane finally located the lost transport plane which "mushed down" on a lonely Adirondack peak a couple of months ago, General Electric radio engineers rushed an emergency portable short-wave radio station into the mountain country to help in co-ordinating land and air rescue operations. The disabled ship was in the center of a wilderness, miles from the nearest means of communication. The radio expedition, however, managed to set up its equipment in a cabin at the end of a one-track automobile trail, only four miles from the scene of the mishap. There, designated as station "GE-1000" at the request of the airline operators, the equipment was used as an emergency unit in the airline's radio system. The General Electric engineers co-operated in communicating with the planes that guided the rescue parties toward the stranded fliers. They also helped send back news of the rescue, directly to owners of short-wave receiving sets, and through a rebroadcast by WGY, the General Electric station at Schenectady, to other listeners.

W. J. Purcell, chief engineer of WGY; W. R. David, U. of Kentucky, '19; E. H. Fritschel, Iowa State, '26; G. W. Fyler, Yale, '29; R. H. Williamson, Iowa State, '28; R. W. Orth, Minnesota, '30; G. M. Brown, Washington State, '29; and R. A. Lash, Ohio Northern, '29, comprised the General Electric radio expedition.


### TURBINE BIOGRAPHY

A turbine can now write its own biography, with the aid of recording instruments recently developed in the General Electric general engineering laboratory.

These sensitive devices were developed for the supervision of large turbines from a point remote from the scene of operation. The instruments measure and record shaft eccentricity, bearing vibration, shell expansion, and interference of rubbing or rotating parts. They provide the operator with an indication and a permanent record, on paper, of mechanical performance throughout the starting period and subsequent running time.

C. D. Greentree, Alabama Poly, '28; A. V. Mershon, Pratt Institute, '13; and M. S. Mead, Case School of Applied Science, '23, of the General Electric general engineering laboratory, worked on the instruments.

96-130DH

**GENERAL ELECTRIC**