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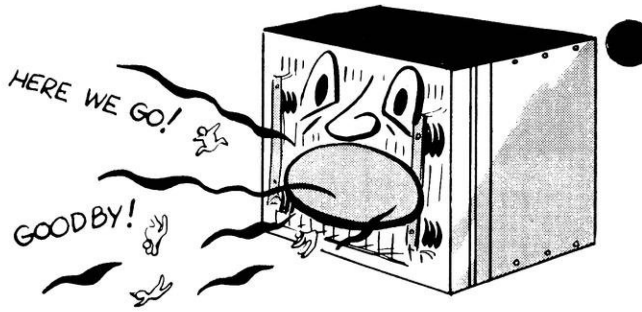
January, 1947

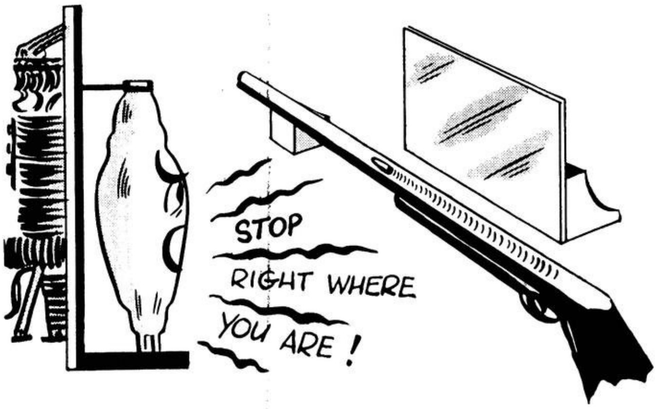
the WISCONSIN ENGINEER

What's your S.Q.*?

1.—THE "RADIUM HOUND," for tracking down lost radium, is so ultra-sensitive that it can detect the presence of (a) 4 quadrillionths, (b) 25 billionths, (c) 17 thousandths of an ounce of this precious metal?



2.—THE PRECIPITRON is a device for removing 95% of all solid matter from air. It does this by —(a) capillary action, (b) electrostatic attraction, (c) osmosis?



3.—A REVOLUTIONARY X-RAY can now "freeze" the image of a bullet while traveling through a high-powered rifle. This X-ray tube takes a picture in —(a) 3/10,000th, (b) 15/100,000th, (c) 1/1,000,000th of a second?

4.—IF YOU HAD a piece of string one astronomical unit long, would it stretch —(a) 115,562 miles, (b) 92,897,416 miles, (c) one light year?

ANSWERS

1.—(a) *This electronic device . . . developed by Westinghouse scientists . . . is also useful for determining the safe therapeutic dosage of radium, radon, and X-radiation.*

2.—(b) *The Westinghouse Precipitron removes dust, pollen, smoke and other particles as small as 1/250,000th of an inch, by ionizing the particles and attracting them to electrically charged plates.*

3.—(c) *Developed by Westinghouse research engineers, this millionth-of-a-second X-ray also aids U.S. Army ballistic experts in studying the action of armor-piercing bullets penetrating steel armor plate.*

4.—(b) *This is an easy one. The picture almost gave it away; the mean distance from the earth to the sun.*

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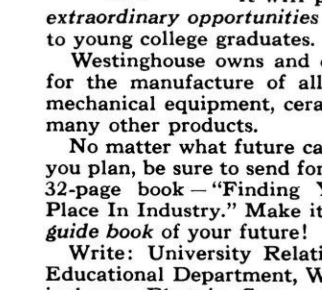

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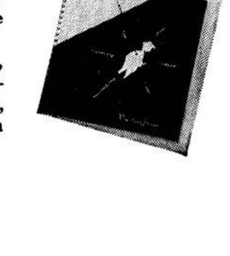


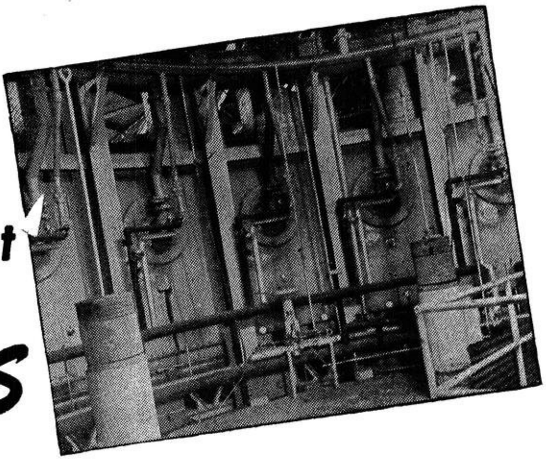
World's largest rotary furnace

AT

The Timken Roller Bearing Company plant

CANTON, OHIO

proves adaptability of GAS



An outstanding example of adaptability of Gas and Gas equipment in successfully solving any industrial heating problem is seen in the world's largest rotary furnace used to heat alloy steel billets for piercing into seamless steel tubing at the Canton, Ohio plant of The Timken Roller Bearing Company.

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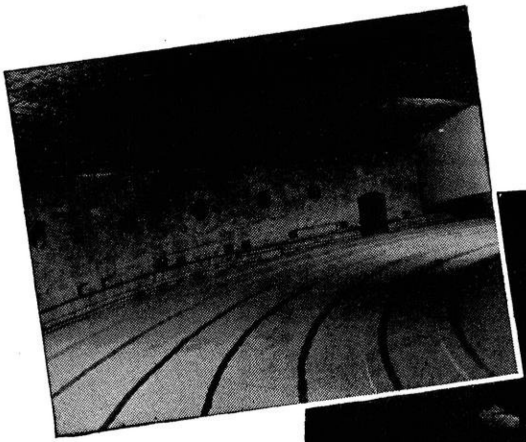

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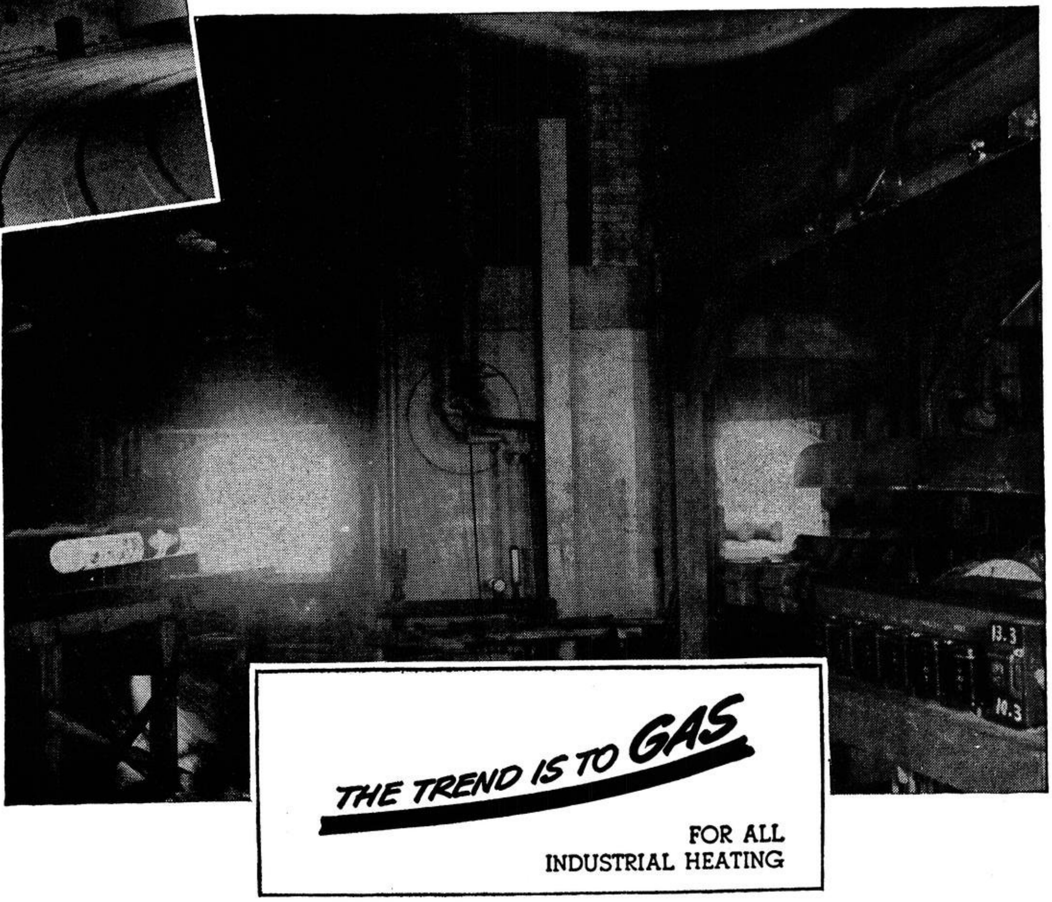

THE TREND IS TO GAS

FOR ALL
INDUSTRIAL HEATING

WISCONSIN ENGINEER

Founded 1896

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In This Issue . . .

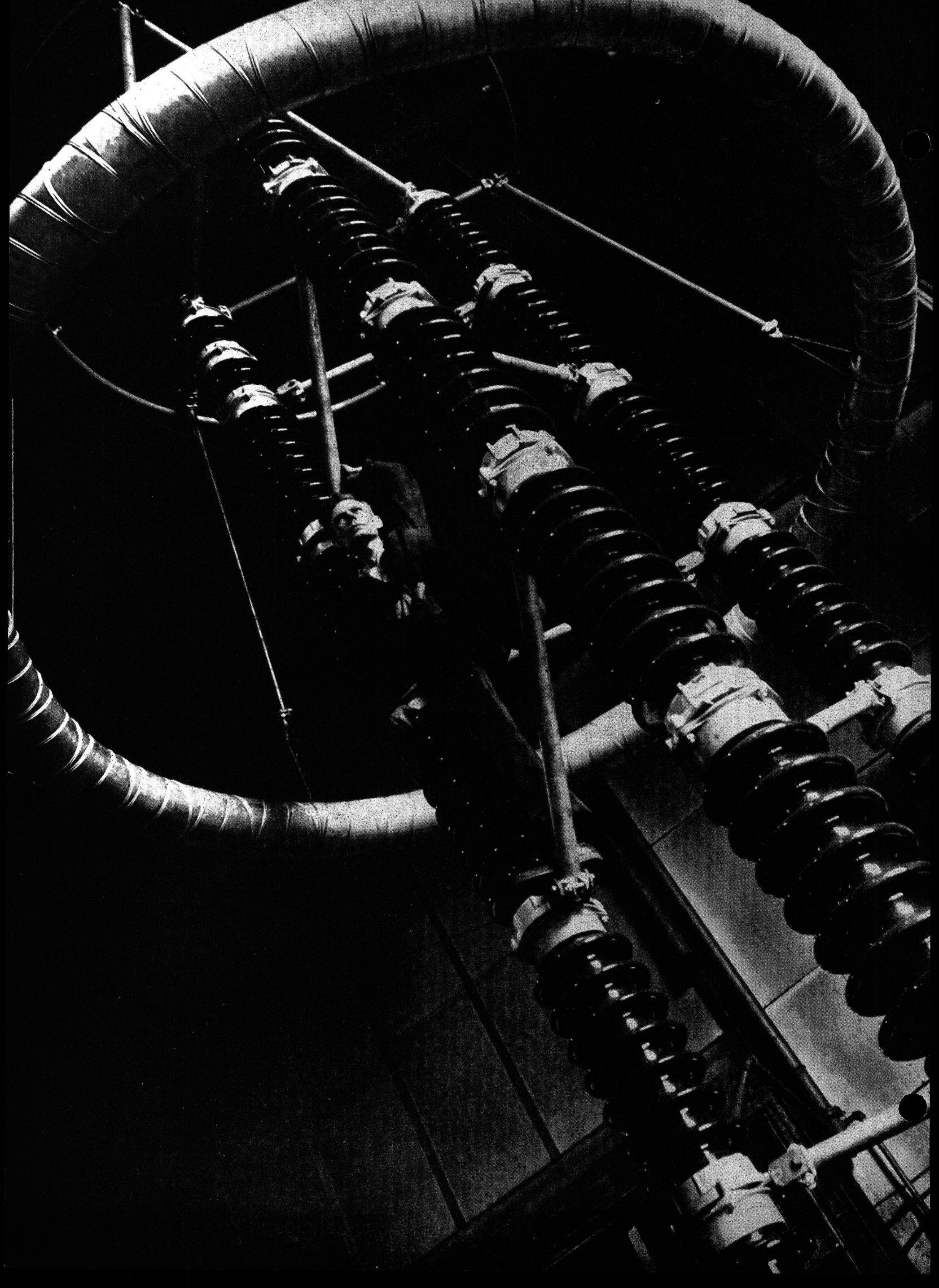
COVER:

Although almost invisible among the snow covered trees, the Badger Carillon is heard by all as they go to and from classes.

FRONTISPIECE:

The world's largest lightning arrester,—is to carry up to 500 kilo-volts in an experimental line near Brilliant, Ohio.

—*Courtesy Westinghouse*



A PLEA FOR HIGHER STANDARDS IN THE ENGINEERING PROFESSION

EDITOR'S NOTE: *Reprinted from Mechanical Engineering, Nov. 1946, this article contains the major portion of a talk by Mr. Frederick S. Blackall, Jr., President and Treasurer of the Taft-Pierce Manufacturing Co., Woonsockett, R. I., as presented to the autumn meeting of A.S.M.E., and contains information of interest to any future Engineer.*

I KNOW of no word in the English language which is more abused and misused than the term "engineer." It is a pity that real engineers cannot copyright the word in some such manner as the real-estate men coined and copyrighted the term "realtor" to prevent its prostitution by the incompetent and unworthy; but, alas, the abuse is of too long standing. In the course of my business activities I am called upon by a long list of "engineers," most of whom couldn't even read a slide rule. Yesterday a "profit and loss engineer" sent in his card. It developed that he was an accountant. And of course there aren't any peddlers any more; they have all become "sales engineers." To one who became an engineer the hard way and looks with justifiable pride upon his profession, this is just a little bit sickening. But we don't have to condone it and we shouldn't.

I have long felt indeed that the standards of engineering education should be raised, that the requirements for a mechanical-engineering degree should be made more stringent. In my judgment, engineering should be placed on a parity with medicine, law, and the other learned professions. Under such a procedure, he who would qualify as a technical graduate would first be required to complete perhaps either three or four years of pre-engineering-college work, with considerable emphasis on the pursuit of studies in the liberal arts and the humanities. During the pre-engineering course, the basic requirements in mathematics, and possibly in physics and chemistry, also could be dispatched. This would be followed by either two or three years of specialization in the chosen field of engineering. On completion of the first four years of college work, the student would receive the degree of Bachelor of Science, or its equivalent; on completion of his graduate work, he would receive a suitable engineering degree.

Beginning with the fall term this year, Cornell University is taking a step in this direction, with a five-year engineering course, in which liberal emphasis is placed on such subjects as English, economics, psychology, the history of modern civilization, etc. Some courses will be included as well in phases of management, industrial organization, and finance. By adding a year to the usual engineering curriculum, it is intended to avoid any dilution of the technical courses which are, of course, prerequisite to sound engineering training. In my opinion, this is a highly constructive step. It is not such a far cry, either, from the situation which exists today in many of our leading engineering institutions. I understand that immediately prior to the war 33 per cent of the matriculants at the Massachusetts Institute of Technology were either college graduates or college transfers. This ratio is being altered temporarily by the limitations placed upon applicants in order to provide for the veterans' postwar educational program. With a return to normal conditions, I believe that an increasing number of engineering students at the better technical schools will seek some pre-engineering training before completing their technical curriculum.

It may be argued that any such arbitrary raising of the educational standards of our profession would exclude from its ranks many who could not afford, in time or money, or both, to meet the requirements. Half a century ago the same objections were voiced when it was proposed to raise the standards of medical education, but who today will argue that the step was not a wise one?

To an increasing extent the engineer is called upon to exercise broader functions than those of pure research and design or the direction of technical processes. As he reaches the higher echelons, as our military friends love to put it, his duties increasingly embrace management, economics, labor and social problems, finance, and above all, the necessity for effective contact with all manner of people. Adequate preparation for such responsibilities requires breadth as well as depth.

Indeed, one of the minor tragedies of technical life is the presence in our ranks of too many hack engineers, men who somehow have wangled a technical degree, or may even have completed the formalities with apparent merit, but who simply never can and never will measure up to what you and I mean when we speak of a competent engineer. These poor souls go through life ever in a rut, frustrated and disappointed, feeling, perhaps with some justice, that they have been sold down the river because they have been through the diploma mill but simply cannot make the grade. A system which permits this to happen to an extensive degree does no good either to the profession or to the victims of the system.

Can anyone doubt that the engineer who has had an opportunity to acquire broad interests, more Catholic tastes, the ability to read and appreciate good literature, and above all the power of self-expression, orally and on paper, will be a better and more effective engineer? One of the shortcomings which many of our members, though fully competent in their professional fields, would be among the first to admit is a certain inarticulateness. Too many others are narrow in their outlook, because of overspecialization beginning at their most impressionable age. Is it surprising that such men should find it difficult to avoid getting in a groove? Yet there is no profession whose members seem to possess historically greater potentialities for enjoyment of the arts and the humanities as avocations than that of the engineer. It has been true from the days of Leonardo da Vince, who was no less capable a mechanical engineer than he was an artist and a sculptor. I remember with pleasure a display of canvasses at an Annual Meeting of the Society in New York a few years back, every one of which had been painted by a member of the A.S.M.E. There is no broader, more intelligent, or intellectually more delightful conversationalist than an all-round engineer; and per contra, perhaps never a worse bore than a hack.

I do not imply for a moment that the only way to secure an education is to go to college, or that the technical graduate who has had no more than four years of straight mechanical engineering may not develop into a broad-gaged, well-informed person of wisdom and breadth of vision. One need but point to this audience to give the lie to any such calumny. Neither do I imply that every hack engineer, who has ever been hatched out by a technical school, would have been a Daniel Come-to-Judgment had he had three or four years of education in the liberal arts first. You can't make a silk purse out of a sow's ear. But you can make good men into better men by proper training and development of their native aptitudes, and that is what I am pleading for.

Beyond this, I would urge every member of our Society to take an active part in community affairs. The discharge of one's duties to society partakes of some of the attributes of a liberal education in itself. The human contacts made, the opportunities for self-expression, the urge to original thought, which are an inevitable concomitant of broader intercourse with one's fellow men, constitute rich returns on the effort invested. As in most of the affairs in life, you get far more than you give, however great your contribution.

There is another sound reason for broadening the basis of an engineering education, however. The field of mechanical engineering has been tremendously expanded during the past two decades. The developments of the war period alone would probably justify the addition of two semesters of junior or senior work in engineering to the technical curriculum. It is no accident that those of us who received our engineering degrees 15 to 30 years ago find ourselves somewhat tongue-tied when confronted with the theory of atomic fission, with the broad array of new materials, with electronics, which latter is rapidly becoming the handmaiden of mechanical as well as electrical engineering, or of the new techniques of metallurgy and heat-treatment, with statistical methods of quality control, or of a host of other developments which were unknown a decade or two ago. If the mechanical engineer of the future is to be anything more than a narrow specialist, he is going to have to cram more material into his cranium than can possibly be done in the short space of a four-year college course. It is not my concept of the engineer's objective that he should go on knowing more and more about less and less, until finally he knows everything about nothing. Unless we are to have a completely functionalized society, the best engineer as a rule will be the broadest one.

We are on the threshold of an era of great scientific advancement, which, in the judgment of many, will generate a host of new industries and to such an extent transform our daily lives that one day the techniques of 1946 will seem as crude and outworn as those of the nineteenth century seem to us. If mechanical engineers are to meet the challenge of research and discovery, they will require the best of preparation. There never was a more timely moment in history to raise the standards of our profession or to take steps to hold them high. Professor Slichter of Harvard recently pointed out that physicists, chemists, engineers, and metallurgists are increasing in numbers from ten to fourteen times as fast as the gainfully employed, that expenditures on industrial research were nine times as large in 1939 as in 1920. Under these conditions, both the competence and the economic emphasis by this Society is on quality rather than quantity. And that, gentlemen , is what we should stand for.

Meet Your Department Head . . .
CHEMICAL ENGINEERING

EDITOR'S NOTE: *This is the first in a series, by Jack Strohm, introducing you to the department heads here at Wisconsin.*

OLAF ANDREAS HOUGEN, head of the University Chemical Engineering department, was born at Manitowoc, Wis., on October 4, 1893. He studied chemical engineering at the University of Washington, and in 1915 graduated with honors. He received his Ph.D. from the University of Wisconsin in 1925.

Dr. Hougen is a member of Alpha Chi Sigma, Sigma Xi, Delta Pi Epsilon, Phi Beta Kappa, Phi Lambda Upsilon, and Tau Beta Pi. Fraternities, as well as the following professional organizations: The American Institute of Chemical Engineers, The American Chemical Society, and the Society for the Promotion of Engineering Education, more recently known as the American Society of Engineering Education. Dr. Hougen has always taken an active interest in engineering relations. At the present time he is on the Projects Committee of the A.I.Ch. E., the Editorial Committee of John Wiley and Sons, the American Society of Engineering Education Research Committee, chairman of the Program Committee for the St. Louis A.I.Ch.E. convention, chairman of the University's Physical Science Division, and chairman of the College of Engineering Planning Committee.

In 1919 he married Miss Olga Berg at Madison, Wisconsin. The Hougens have one daughter, Ester.

From 1917 to 1918 he served as an instructor at the University of Wis., from 1920 to 1926 as an assistant professor, from 1926 to 1937 as an associate professor, at which time he was promoted to full professor. However, this period was broken once when Dr. Hougen took a leave of absence in 1936 and 1937 to act as professor of Chemical engineering at the Armour Institute of Technology. During his twenty-nine, (almost thirty), years at the University here, he has taught some 14 different courses.

Dr. Hougen has worked in industry on a large number of different problems and processes. More important of these include: ore analysis for the American Smelting and Refining Company, work in the leather industry, research on refractories and abrasives, on grain dust explosions, on nitrogen fixation, and textile research on degumming, soaking, knitting, and bleaching, and he has acted as a consultant on sulfonated oils for National Oil Products.

O. A. Hougen

Dr. Hougen has aided in special research and projects during two World Wars. During World War I most of his work was on nitrogen fixation, and during the more recent war he worked on the Thermal Production of Chlorine, and the Drying of Gases for the Navy and Air Craft Industries.

He is co-author of two textbooks, one being "Industrial Chemical Calculations", the other, "Chemical Process Principles", and he has written chapters in several other books. He has published more than sixty papers in many fields. Some of the more important fields include refractories, heat transfer, textiles, gas absorption, dyeing, and leather.

Dr. Hougen's hobbies are stamp collecting, photography, and golf.

Lumbering in the Mill

by R. J. Mitchell m'48

—Photographs courtesy U. S. Forest Products Ind.

A SAWMILL is a series of specialized cutting machines. In order to keep these machines operating, efficient conveyors and handling equipment are also necessary. The machines might be classified as to function, and further, as mass production or specialized production machines.

In order to understand the functions of sawmill equipment, let us see what is necessary in the conversion of logs into accurately dimensioned timber. A board must have length, thickness, and width. The trimmer determines the length by cutting from the board the barkey or unsound ends. The thickness is determined by the headsaw and carriage. Frequently, the resaw or gangsaw is used in this capacity. To give the board definite width, the edger is operated. This cuts the barky sides from the board, leaving the edges smooth and parallel. Consider each of these machines separately.

Saw-dulling grit is washed from logs by sprays such as this.

Carriage and Headsaw

The first principal machine that a log would encounter upon entering a mill would most likely be the carriage. This, basically, is a buggy on a miniature trolley track. It is motivated much as a crosshead on a stream engine—ie., by a direct connection between the carriage and a piston in a steam cylinder. The carriage is equipped with metal knees from which steel fingers can be extended. These grip the log firmly, and by means of a setworks, the knees are moved forward into the line of cut of the headsaw. This setworks may be either manually, electrically, or pneumatically powered.

Headsaws come classified as circular and band saws. The former is used to the greatest advantage in the high-speed cutting of small logs. Band saws are best used in the cutting of larger logs at a slower carriage speed. The smaller the log, the faster the cut must be in order to keep up production. If an attempt were made to run the log past a band saw at circular saw speeds, the band itself would probably be pushed from the pulleys, or warping of the saw would take place. On the other hand, if large logs were cut on a circular rig, one would find much of the log going into the slab-conveyor as waste. Such saws can be made large enough to reach through big timber, but increases in the thickness must also be made which means more power needed and more lumber going into sawdust. In choosing a saw rig, one must take into consideration the size of the timber to be cut.

The Resaw and Gangsaws

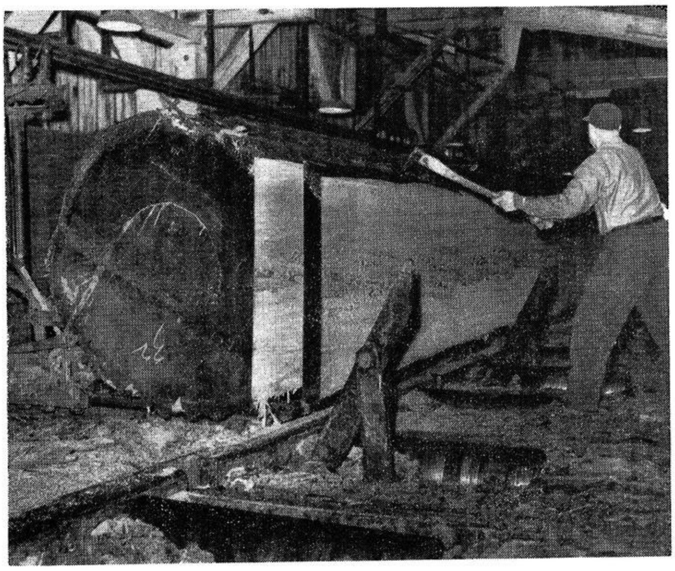
In mass producing lumber, the resaw and gangsaws are frequently used. The resaw might best be described as a saw located in the middle of a slot. A two-inch board, for example, will be fed through this slot by live-rolls and emerge as two one-inch boards. The gangsaw is the same thing on a much larger scale. A number of saws are placed on eccentrics on the main shaft and operate at high speed. A canted timber or, in some cases, a whole log is put through the gangsaw and emerges in a shower of lumber. The high production advantage is obvious, but the disadvantages are less obvious.

Our best lumber is tangentially sawed, or quartersawed. In using the gangsaw, much of the lumber will be cut radially. This gives a board with the annual rings perpendicular to the face and such boards will be much weaker than quarter-sawed lumber.

A second disadvantage is the fact that one unsound spot in the log will probably show up in over half the boards cut from it on the gangsaw. In cutting the same log on the carriage and headsaw, the spot could probably be entirely embodied in one board across its width. Much reduction of grade takes place in these two ways, but the production factor still makes the installation of gangsaws profitable in many cases.

The Edger and Trimmer

If one were to put two movable circular saws on a shaft, keyed so as to permit sliding, he would have a simple edger. Innumerable ways could be contrived to move



A big douglas fir log has received its first cut at the head rig of a saw mill.

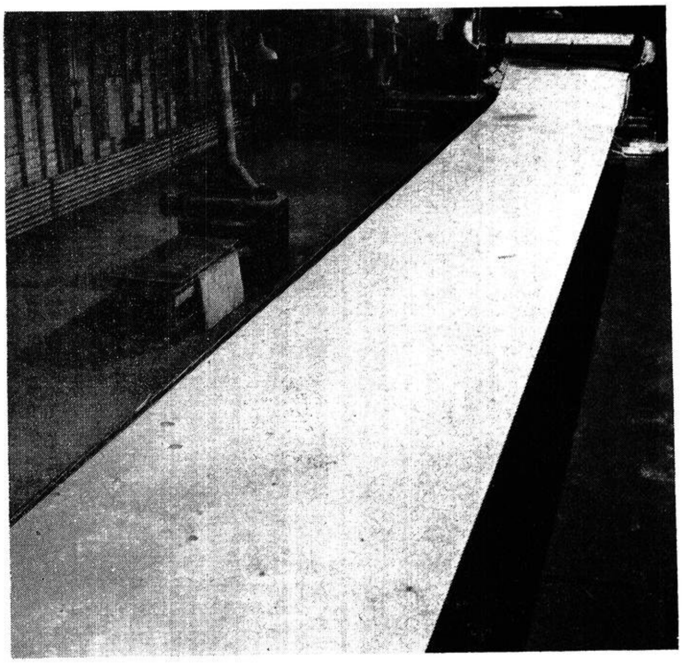
these saws, but the most popular are the crank-pinion-rack, and the lever arrangement methods. The latter involves the principle of similar triangles, and the former is merely a pinion fixed on long crank that operates a movable rack which embodies a sawguide. Either method is simply to change the spacing of saws so as to cut a different width from the rough edged plank as received from the headsaw. The plank is fed through the saws by a set of live, toothed, feedrolls. No matter what the capacity, all edgers embody these basic features, and they are all operated for the same purpose; to get the greatest amount of clear lumber from the board and to give it smooth parallel sides.

Similarly, if one were to place two movable saws on a keyed shaft of a greater length and feed the boards past these saws side-on, he would have a trimmer. The function of the trimmer is to remove barky ends and to cut out rotten spots. A more popular and efficient type is used in the large mills. A cross-feed table lies under a number of pair of these saws to intercept the board as it crosses beneath. The feed for such a machine is usually a sprocket driven link-chain type, with cleats to push the boards along.

The Power Plant

Until very recent years, very little or no attention was given the efficiency of the boiler units which are the source of power in nearly all sawmills. Fuel in the form of sawdust had to be used to avoid its excessive accumulation. More fuel in the form of slabs and edgings and trimmer blocks were available with little added effort. These were carried into a "hog" by conveyors, and from there to the fuel rooms by a similar conveyor. The hog embodies sturdy knives which hack the wood waste into small, easily handled, readily combustible bits of fuel. In the face of such excess, there is little wonder that time was not wasted in improving the efficiency of the power plant.

The Corliss and D-slide valve engines are quite common in the sawmills. The latter are popular due to the simple upkeep and the ruggedness of the unit. Corliss engines are to be found in many large mills where an engineer or mechanic is available constantly for tending the plant. The Corliss engines are much more efficient, but that has not been a prime factor in the selection of a sawmill engine.



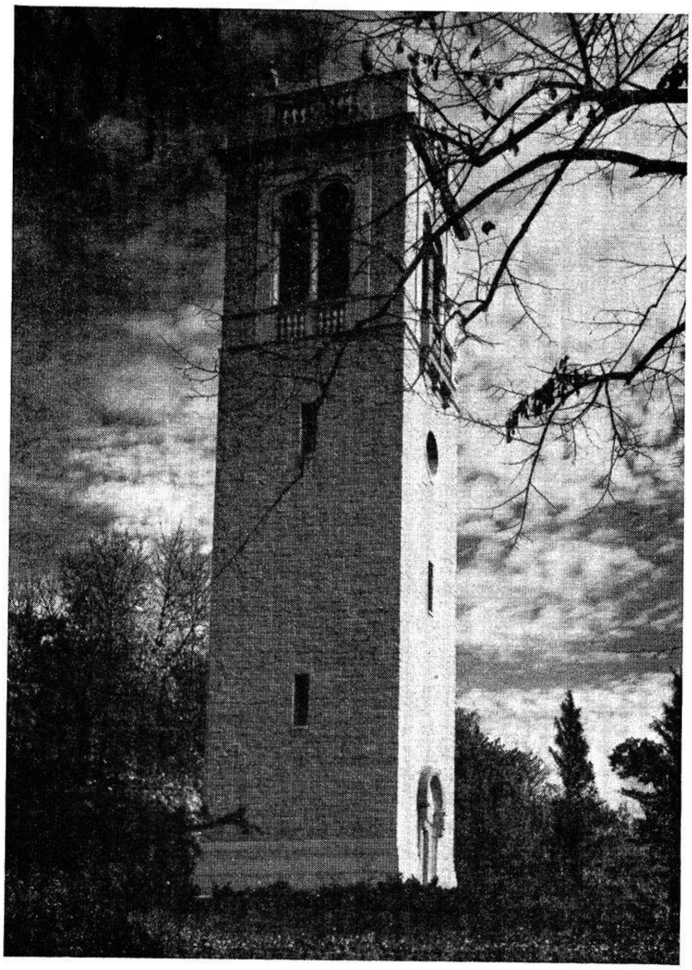
A long ribbon of veneer is being peeled from a log in a powerful veneer lathe.

Now that the operator has a source of added income through his waste, he is beginning to watch the consumption of that waste more carefully. The strips and edgings can be made into paper, and this practice is just gaining momentum. The sawdust can be made into industrial alcohol, as can other wastes. The government operates a plant in Springfield, Oregon, to produce alcohol from the wood wastes in that vicinity. Lignin is produced from such alcohol. This is a by-product of wood and has a

(continued on page 20)

Badger Carillon

by R. J. Meisekothen ch'47



—Courtesy Meuer Photoart

"That the harmony of its bells may symbolize in the future that deeper harmony of forces that underlies effective living alike for the individual and the state"— so spoke President Glenn Frank at the cornerstone laying ceremony of Wisconsin's Carillon tower on December 10, 1934.

AS you probably know, Wisconsin's carillon tower stands on a knoll in the area between the trees and the Blackhawk retreat marker just Northwest of Bascom Hall. Local history maintains that it was across this knoll about 100 years ago, that a small band of Sauk Indians, led by the fiery Chief Blackhawk, retreated before an army composed of state militia and federal soldiers during the state's famous Blackhawk War. (Note: the difference between a chimes and carillon is one of definition, mainly. To clarify the tariff laws of 1930, a chimes was stated as a set of tuned bells from 2 to 25 while a carillon is only a group above 25).

The idea of a chime for the University originated with the members of the class of 1917. The dome of Main Hall (now known as Bascom Hall) had recently burned and it was felt that in its reconstruction a chime could easily be installed. There were no carillons in this country at the time but many colleges and universities were installing chimes. Subsequent classes were invited to contribute to the fund. Today the carillon and tower stand as the gift of nine classes (1917-1926), whose contribution amounted to $30,000.

A change in the University's building program left Bascom Hall without a dome, and in 1932 plans were started for the purchase of a carillon and the construction of a tower to house it. Rapidly rising building costs would have prevented the completion of the project except for the grant of $11,600 by the Public Works Administration of the Federal Government. The cornerstone was laid by the late President Glenn Frank, in December 1934. The tower, designed by Arthur Peabody, State Architect, and built by Maas Bros. of Watertown, was completed in June 1935. The carillon was cast and installed by Gillett and Johnston of Croydan, England. The first 25 bells were installed before the dedication in June 1936, and five added in 1937. The frame and console were built to accommodate a total of 36 bells, of which the six largest remain to be added. It is hoped that future graduating classes will wish to contribute toward the completion of the carillon and installation of a mechanism for striking the hours and quarters.

Much Engineering and Physics Involved in Design

The tower itself is 85 feet high and 22 feet square at the base. It has a steel framework to support the masonry and the tremendous weight of the bells. (Note: since the steel framework absorbs about 75% of the vibrational energy imparted to the bells, it is believed that the sound range of the instrument could be increased tremendously by using a wooden frame to support the bells). The playing chamber is 50 ft. above the ground, one story above an empty chamber designed to house a future striking mechanism for hours and quarters. Large trapdoors in all floors permit raising and lowering of bells during installation. The masonry consists of Madison Sandstone to harmonize with Bascom Hall. The ballustrade on the roof has also been designed similar to the one on Bascom. The whole structure was done in a simple yet very appropriate style.

The bells, 30 in number, range 2½ octaves chromatically. There is room for six more large bells to fill out three octaves. The bells are of varied size, the smallest weighing 32 pounds with a diameter of 10½ inches and a height of 10 inches; the largest weighing 3109 pounds and measuring 52 inches by 48 inches. The range in pitch extends from a high Bb for the smallest bell to a low Eb for the largest. A great deal of effort and experience goes into the making of bells at the Croydan factory. It is a difficult process to cast a set of bells of the same tone quality, therefore the entire set is cast from the same molten bronze of the approximate ratio of 13 parts copper to 4 parts tin. Most exacting of all is the tuning. Bells as originally cast, even in the finest proportions, possess overtones which clash harmonically, particularly since the tone when struck rapidly dissolves into a discordant hum-tone which vibrates for a long time. The bell-tuner carefully harmonizes this clash by turning the bell in a lathe which pares the inside surface slightly. Each bell is tuned to five tones: There is the "hum-tone" an octave below the "fundamental" which sounds immediately after the bell is struck. The tone an octave above the fundamental is known as the "nominal", and sounds only briefly at the moment of striking. Between the fundamental and nominal are a minor third and fifth above the fundamental. It is this complexity which gives richness to the bell tone and must be regarded (along with the lingering sound) in arranging music for and in playing the carillon. A good bell can last five centuries and remain unchanged in tone.

In the carillon the bells do not swing but are hung rigid and fixed. They are connected with a keyboard by a series of tempered steel wires and levers, which release a clapper to strike the inside of the sound bow. The carillon can also be operated by a clockwork mechanism which releases clappers to strike the outside of the bells. The former is used for concerts and special occasions while the latter rings the hours, halves, and quarters.

Wide Variety of Music May Be Played

The keyboard or console from which the bells are played is a sturdy oak frame fitted with levers arranged somewhat as piano keys, but many times larger since they are struck with the whole hand. Pedals allow the use of the feet so that three to six tones may be included in one chord. You will be surprised at the range and variety of music that you hear on the carillon, anything from roundelays to opera. Since every carillon is designed individually and there is no uniformity in number or weight of bells, music written for one instrument may not be suitable for another. As a result every carillonneur adapts his own music to the instrument which he plays, keeping in mind its range and tone qualities. The carillonneurs Oxford is the Belgian national Carillon School at Malines, Belgium. Carillons appear to have originated in the Low Countries and nowhere else have they reached such a high state of development.

The instrument is best heard at distances from 300 to 1000 feet from the tower, depending on the wind conditions and the echo from buildings. Under ideal states of weather the sound of the bells is almost directionless, seemingly floating in the air without source. Wisconsin authorities have chosen one of the finest locations possible from the standpoint of the carrilon itself. Bells sound sweetest through the trees and over water. Situated as the carillon is near blue Mendota, it affords the ideal home for the University's splendid carillon.

Campus Highlights

by John Tanghe e'47

New Buildings

Windows on the west and east sides of the Mechanical Engineering Building have become perfect grandstands from which to watch the construction work now in progress adjacent to the M.E. Building. Here are the facts on the new buildings going up:

To the West . . . Four buildings are being erected immediately west of the M.E. Building. Two of these, a cafeteria and a food storage building, will occupy the lot nearest the corner of Breese Terrace and University Avenue. A third is being erected along Breese Terrace just south of the cafeteria building—it will house various electrical engineering laboratories and classrooms.

The fourth of these buildings is going up on the land immediately adjacent to the west side of the present M. E. Building, between it and the cafeteria being constructed on the corner. It will have 14 classrooms and one large drafting room.

All of these buildings are temporary one-story structures obtained from the federal government. They are made of Johns-Manville "Transite" material and are being moved here from nearby sites.

To the East . . . Additional construction is being done just east of the Mechanical Engineering Building. Two engineering laboratory buildings are being erected, one on either side of the Mining and Metallurgical Engineering Building. Behind the M.&M.E. building, the wooden structure formerly used as a sawmill for the old Forest Products Laboratory is being enlarged and will be the new location of the foundry laboratory.

Enrollment Figures

In the semester just completed there were 1510 engineers enrolled as freshmen and 408 as seniors. Barring possible slight irregularities due to postwar conditions, it appears that the beginning freshman of today stands only one chance in three of completing his course—hm.

Disaster!

Dan'l Cupid dealt a crushing blow deep in the heart of a strongly fortified bachelor Wisconsin Engineer staff when he snared Emil Kasum, assistant editor, and bound him over to Miss Shirley Hamann, B.S. 3. They were married at the Pilgrim Congregational Church, Milwaukee, on December 21. Best of luck to a swell editor and his recent bride!

Graduation ceremonies have likewise shown their mark amidst members of the Wisconsin Engineer staff. Raymond Meisekothen (ChE) and John Tanghe (E.E.), graduates of this month, are both members of the editorial staff. Ray leaves for Chicago in February to start work with Swift and Company. His article on the Carillon Tower appears in this issue. John plans to do graduate work for a semester or two. Harold May, editor of the Wisconsin Engineer, has extended his appreciation to both men for their work on the magazine.

Vacancies in Steel Industry

At a dinner meeting of the student branch of the American Institute of Mining Engineers held shortly before the Christmas vacation, William E. Brewster of International Harvester Company explained that there are many vacancies in the steel industry open to young metallurgical engineers. This, he explained, is because no men have been available for the past five years and consequently new men are badly needed.

Mr. Gordon Packard, in charge of personnel management for International Harvester, and William Wright of the board of directors of that company were also present at the meeting.

•

M. E. Honorary Society

One honorary and sixteen student mechanical engineers were initiated into Alpha Chapter of Pi Tau Sigma, national mechanical engineering honorary fraternity, on December 3. Those initiated were: Doctor Otto Uyehara, Erling Bligard, Daniel Canute, Claude Crosby, Eugene Dangle, Albert Ebi, Robert Fibikar, Walter Friedman, Walter Gray, Raymond Karabinus, Erwin Koppel, Roger Laughlin, Daniel MacDonald, William Mickelson, Marshall Nelson, Keith Rhodes, and Warren Whitney.

A steak dinner feting the new initiates was held at the Capital Hotel following the initiation ceremony. Mr. Rex. Vernon, Sales Promotion Manager of the Johnson Service Co. of Milwaukee, addressed the group on the subject of Sales Engineering.

(continued on page 27)

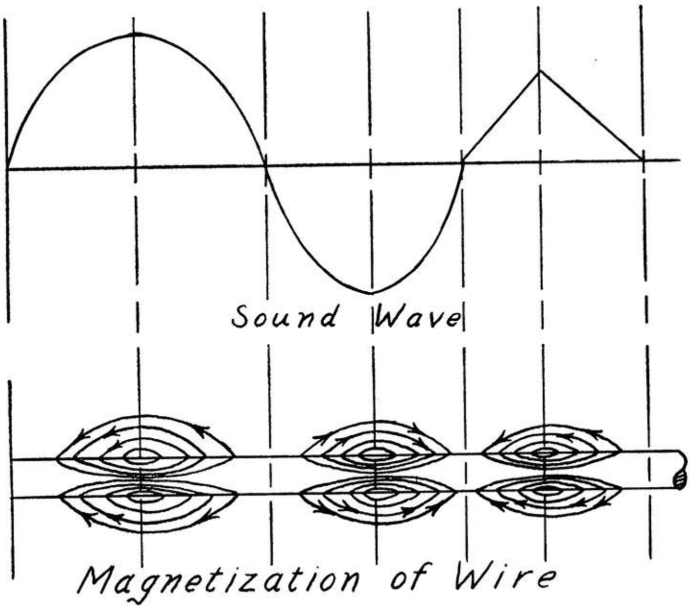
Wire Recording

by James L. Vasilion e'48

THE idea of recording sounds magnetically on a strip of moving tape or wire has been in the minds of men since 1898, when a Danish scientist, Poulsen, first produced a crude magnetic recording of sound. His equipment consisted of a heavy steel wire passing between the poles of two large electromagnets which were excited from a source of alternating voltage. As the strength of the electromagnets was varied, so would the strength of the magnetic pattern produced on the wire vary. To reproduce the magnetic sound waves, the process was merely reversed and the sounds could be heard from an earphone connected to the electromagnets. One of the difficulties encountered with this arrangement was, that as the wire advanced it would also tend to rotate about its own axis and cause large fluctuations in volume. The velocity of the wire required made it necessary to employ large quantities of wire, and the quality of reproduction was very distorted as a result of the magnetization curve of the steel wire.

Within the last ten years these problems have been nearly completely solved as a result of many careful tests. The problem of axial rotation of the wire was solved by the development of a special wire which could be magnetized longitudinally. This type of magnetization is illustrated in figure 2, hence the magnetic pattern through any diameter of a cross section is equal in magnitude. It was found that by making the diameter of the wire smaller, the response to high frequencies was improved. The recording head, which is also used to reproduce the recording, was redesigned to accommodate longitudinally polarized magnetization and was provided with an air gap of about one one-thousandth of an inch. This, of course, resulted in a highly concentrated magnetic field about the wire, hence the resolution for high frequency sounds and sensitivity of the head were greatly improved. The use of smaller wire and concentrated field made it possible to reduce the recording speed to 2½ feet per second, increasing the playing time realized from a given size spool of wire. To overcome the distortion introduced by the magnetization curve of the wire, a constant high frequency sine wave of about 30 kilocycles was superimposed with the sound wave to be recorded. The overall effect of doing this is to improve the linearity of magnetization.

Recordings made on modern wire records (Fig. 1) can literally be played back 100,000 times or more with little noticable difference in volume or quality. Units used during the war were entirely self contained with amplifier, speaker, recording, playback, and erase circuits, and had a frequency response of 100 to 5000 cycles per second.



The advantages of this system over any other means of recording are immunity to shock and vibration, also all or any part of the wire can be erased magnetically and used over again.

A still different approach to the problem of magnetic recording was tried in Germany. The Germans, during the war, developed a recorder making use of a plastic tape .05 mm. thick and 5 mm. wide coated with magnetic

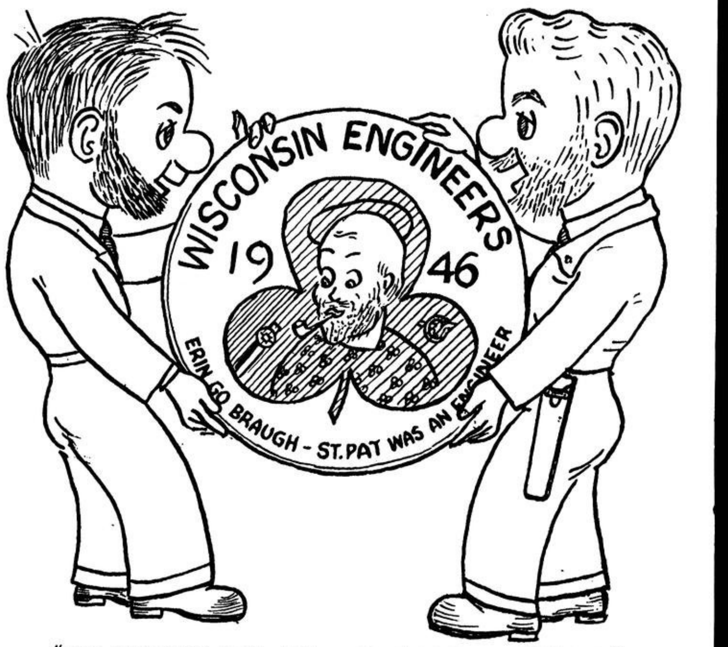
(continued on page 26)

LOOKIN

ON

"HEY JOE! DIDJA JUST GET BACK?"

The Veterans Return

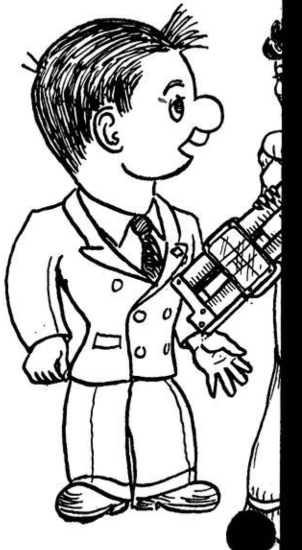


"THE HECK WITH YOUR GIRL - ST. PAT HAD A MUSTACHE!"

St. Pat's Day . . .

"WELL - WHAT D'YA KNOW?"

Dean Withey Takes Over



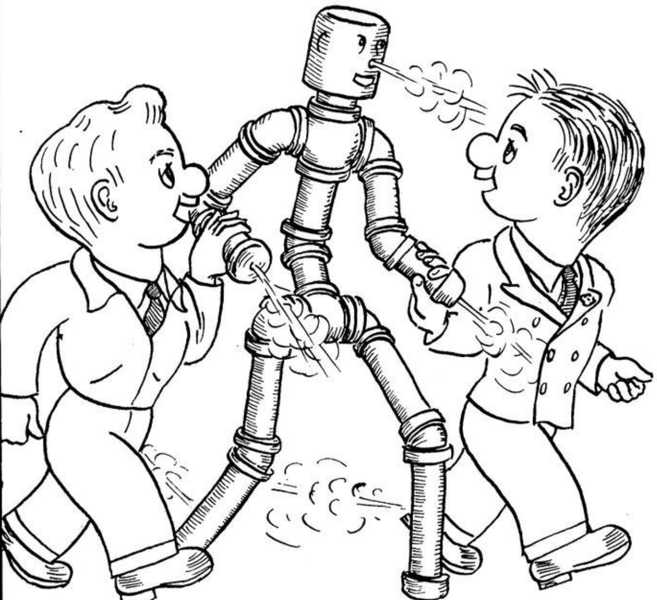
"HEY- GET DOWN AN

Engi

BACK
46

"WHAT MADE YOU THINK OF A TURBINE DRIVEN CANOE, PROF. ROSE?"

Commander Rose Is Back!

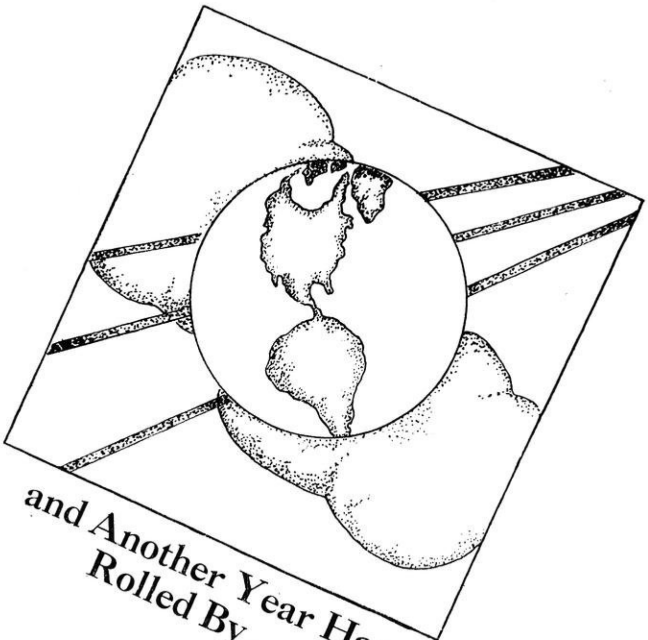


"HE'S CERTAINLY GLAD WE FOUND HIM AGAIN!"

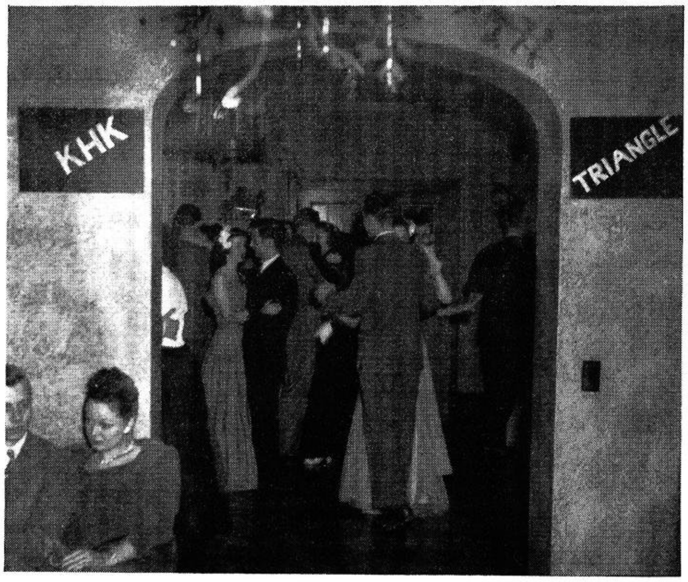
. . . and Oscar Returns

OU HOW!"

11



and Another Year Has Rolled By . . .



Triangle--Kappa Eta Kappa Semi-Formal

by John Tanghe e'47

Outside the snow was floating down—inside 60 Christmas-spirited couples were dancing and laughing in an atmosphere of holly and mistletoe . . . This was the scene at Nakoma Country Club on the evening of December 20 as the members of Kappa Eta Kappa and Triangle engineering fraternities ushered in the holiday season at their jointly-sponsored Christmas semi-formal dance.

The evening was officially opened with a banquet supper at the Country Club during which KHK President William A. "Mike" Larsen and Triangle President Raymond R. Holton introduced the guests of the evening and the fraternity officers. The chaperons were Prof. and Mrs. Kurt F. Wendt and Mr. and Mrs. Leonard H. Rall. Prof. Wendt is in the Mechanics Department of the College of Engineering and Mr. Rall is an instructor in the university Economics Department. Special guests included Prof. and Mrs. John C. Weber, Mr. and Mrs. G. L. Elmergreen, and Mr. and Mrs. William Faulkes.

Mid-way through the dance the orchestra suddenly stopped playing and Santa Claus John Ashenbrucker of Triangle appeared through a side window. Despite slipping pillows and scratching whiskers, Kris Kringle Ashenbrucker delighted the couples with his poems and jests as he presented gifts to the girls.

Another highlight of the evening came when all KHK members joined together in a skyrocket cheer to indicate their approval of Miss Shirley Hamann, B.S. 3, who attended the dance with Emil Kasum, E.E. 3, and was to become his bride the following day. This was in keeping with the fraternity custom whereby the members feel it is their duty to voice approval or disapproval of all brides-to-be.

Robert F. Miller of Triangle and Philip J. Wanzek of Kappa Eta Kappa, social chairmen of their respective fraternities, were in charge of all arrangements for the dance. Under their direction committees from both fraternities planned the decorations, finances, and entertainment.

Music for the dance was furnished by Will Harold and his orchestra. Although using "Will Harold" as his professional name, the orchestra leader's true name is Harold W. Luebs, M. 4, and he is a brother of KHK member Arthur H. Luebs, E.E. Grad.

This dance, given jointly by Triangle and Kappa Eta Kappa, is typical of the many social functions these two fraternities have held together in past years and which have now become tradition on the engineering campus. Both are national engineering fraternities, KHK being solely for electrical engineers, Triangle being composed of members from each branch of engineering.

NUMBER 5 OF A SERIES

Newsworthy Notes for Engineers

Why Condensers now live longer

Testing and setting standards for materials is a vital part of production at Western Electric.

Take, for example, the tissue paper —about 1/10 the thickness of a human hair—used as insulation between the turns of aluminum foil in millions of "paper" condensers for the Bell System.

Condenser life is generally in direct proportion to the quality of tissue used. In studying effects of differences in chemical composition, fibre structure, thickness, pinholes and other properties to set a standard of quality, engineers found intrinsic variables so great that a method of rating had to be developed.

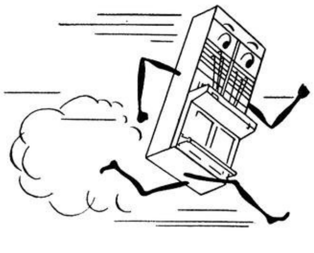
They solved this problem by making sample condensers using each type of paper and checking them at high temperatures and high voltages to determine life expectancy.

Correlating results of these accelerated life tests with manufacturing data led to improved paper making methods—paper manufacturing machines of new designs—increased production of the right kind of paper—longer-lived condensers.

It's hard to hurry a Switchboard

One of the major problems faced by Western Electric engineers in the rush to make telephone switchboards *fast* —to meet unprecedented demands—is the complexity of manufacture involved.

A recent study of what it takes to make a certain much-needed type of manual switchboard installation consisting of ten operator positions will give you some idea of the complexity. Here are the principal items of apparatus required: 5,680 relays; 19,500 jacks; 15,000 lamps of various kinds plus their lamp sockets and mounting; 17,000 lamp caps of various colors and designations; 450 mounting plates of relays, condensers and resistances; 580 resistances; 550 condensers; 360 fuses; 691 jack spaces and a total of 1,071,000 conductor feet of wire and cable!



In spite of this complexity, Western Electric is speeding switchboards on their way. Production in 1946 of manual switchboards is expected to break a record of 16 years' standing.

Problem for *Production* Engineers

Easy? Not when it means providing machine capacity for welding a billion precious metal contacts per year —*five times* the previous maximum production rate! This problem was one of the most critical faced by Western Electric engineers in meeting tremendously increased demands for telephone equipment.

A pair of these contacts is required at every point in telephone circuits where current is interrupted in switching. They minimize "noise" in your telephone receiver. They're made of bi-metal tape—the contact surface is paper-thin precious metal, usually palladium. The balance is less expensive metal such as nickel.

By providing recently developed electronic control equipment and making mechanical improvements in the precision welding machines — which must cut off small pieces of tape, accurately position them on telephone apparatus parts and weld them securely—the engineers pushed operating speeds to a new high.

Result: only about two-thirds as many hard-to-get new welding machines were needed — a half-million dollars were saved — and welds of higher quality are being produced at the rate of a billion a year!

Manufacturing telephone and radio apparatus for the Bell System is Western Electric's primary job. It calls for engineers of many kinds — electrical, mechanical, industrial, chemical, metallurgical — who devise and improve machines and processes for large scale production of highest quality communications equipment.

Western Electric

A UNIT OF THE BELL SYSTEM SINCE 1882

Lumbering in the Mill

(continued from page 11)

higher heating value than wood itself. Calcium sulfate, another by-product), renders a commercial fertilizer similar to gypsum. These are only a few of the uses to which the excess fuel is put, and greater refinement of mills in the future is seen as a result of such demand for these excesses.

Most transmission of power in sawmills is through the medium of belt and pulley. In some plants, however, the boiler station is removed from the mill some distance, (due to the fire hazard), and the transmission is through the use of turbo-generators and individual motors on the machines. Since this method, while rather efficient, is costly to install and maintain, you may safely expect to see the old reciprocating engines and the traceries of belts throughout the sawmills for a long time.

New Wood Industries

Since power sawmilling made its debut over sixteen centuries ago, such a thing as the plywood industry may well be considered "brand-new". The crude planks turned out in those days by wind-driven mills are noticeably different from the high-grade plywoods turned out by the power lathes and modern gluing processes of today. The lamination of these "plies" has given us not only a new wood product, but a new market for wood products, the aircraft industry. Superb performance was turned in by the Mosquitoe Bombers of Britain in this war. The construction was almost wholly of plywood.

Laminated timbers, formed to needs, have replaced the old trusses which were formerly made from massive trees at considerable labor and expense. They can be impregnated with plastics to improve durability. Wood engineering has become an active field in recent years, and such laminated members are significant of the products to expect in the future.

Furniture is coming in for its share of the benefits of this engineering. New compressed wood products, bonded with phenolic or urea resins, gives a wood that will not check, hardly warp, and swells but little from its basic dimensions.

It is a good idea to keep this progress of woods in mind. You might remember: WOOD—THE GREAT POTENTIAL.

Alumni Notes

by R. Zirbel m'47

Mining & Metallurgy

YARNE, JOHN L., met'38, recently accepted a position in the Metallurgical Research Laboratory of the Chain Belt Company in Milwaukee.

The following Wisconsin graduates are currently engaged in research work at the Battelle Memorial Institute, Columbus, Ohio:

DR. C. H. LONG, supervisor of Metal Process Metallurgy,

DR. L. W. EASTWOOD, met'29, Phd'31, now Assistant Supervisor of Process Metallurgy,

DANIEL E. KRAUSE, met'29, Ms'30, now Assistant Supervisor Process Metallurgy, and

CHARLES T. GREENRIDGE, ch'26, Supervisor of Equipment.

Electrical

BRUMBAUGH, JAMES W., EE'41, has been engaged by the Underwriters' Laboratory Inc. as an assistant electrical engineer, and is doing testing work on safety equipment. He had served three years as a radar officer, attached to the Air Corps.

JACK W. LOWER, EE'43, worked on a good variety of secret projects during the war. Working for Zenith Radio Corp. he had a hand in the development of the IFF equipment with which the Navy and AAF used to such good advantage during the struggle. Entering the Army in 1945 he worked on aircraft homing radar gear at Wright Field, and then on fire control developments at the ballistics research labs at the Aberdeen Proving Grounds. He is planning on getting into industrial electronic development with Sun-Kraft Corp.

BERNARD HANSEN, EE'42, has been working with the Sperry Gyroscope Co. as a servo Mechanism specialist.

Mechanical

NORDBERG, BRUNO V. E., died recently at the St. Joseph Hospital in Milwaukee after a lifetime of many great achievements. Born and raised in Milwaukee he attended South Division High School and later the university at Madison.

Mr. Nordberg's chief work was connected with diesel work at the Nordberg Manufacturing Company, but he is remembered by many for his active participation in civic affairs, and for his prominence as an inventor and engineer. He was a member of the Wisconsin Registration Board of Architects and Professional Engineers for many years. We regret his premature demise.

WACHTLE, WILLIAM, m'44, and **YOUNG, WARREN,** m'44, each have returned from several years' service with the Navy, and are at present engaged in graduate research work. More tubes and wires and gear we have rarely seen.

Civil

SMITH, LEATHAM D., c'09, was drowned on June 23, when his sail boat capsized in Green Bay, during a sudden squall. Three other persons lost their lives in the same disaster. His daughter, Patricia, was the sole survivor. He was a designer and builder of ships, and during the war turned out a number of vessels for the government at his yards in Sturgeon Bay.

SCUDDER, CHARLES M., c'11, died on July 12. He was an assistant engineer at the A. O. Smith Corp. in Milwaukee. He served in World War I as captain in the 107th engineers, 32nd division.

CONRAD, CUTHBERT P., c'15, who served as commodore in the Civil Engineer Corps of the USNR during the recent war, is president of the Iowa-Illinois Gas and Electric Company at Rock Island, Ill.

GRANT, EUGENE L., c'17, professor of economics of engineering at Stanford University, has just published a book on "Statistical Quality Control."

WILLSON, CLARENCE A., c'21, has been transferred from the War Production Board to the National Housing Agency. He is chief of the building codes division, in the Technical Research Branch of the agency.

WHEATON, HERBERT H., c'22, who served during the war as staff member of the radiation laboratory at MIT, has returned to Fresno State College, California, as professor of mathematics and engineering.

ULRICH, SPENCER E., c'27, civil engineer with the Chicago and North Western Railway at St. Paul, Minn., died in that city on May 7.

PELESKE, LEO W., c'30, joined the staff of Consoer, Townsend and Associates, of Chicago, on Jan. 1, 1946. He is engaged in promotion work.

BENGS, DONALD C., c'31, was appointed last summer as assistant city engineer for Waukesha, Wis.

DODGE, ELDON R., c'32, has been appointed head of the civil engineering department at Montana State College at Bozeman, Mont.

PLATZ, GEORGE A., c'32, is chief design engineer for the Solar Aircraft Corp. at Des Moines, Iowa.

McGUIRE, FRANCIS D., c'32, is with the Division of Waterways of the State of Illinois, in charge of engineering at the Chicago District office.

WERNISCH, GEORGE R., c'35, has been appointed assistant manager of the concrete engineering division of Ceco Steel Products Corp. He will be at the firm's manufacturing plant in Chicago.

HENRY, J. EVERETT, c'36, who served as major in the Corps of Engineers during the war, has returned to his position as director of public works at Wheeling, W. Va.

LEOPOLD, LUNA B., c'36, is in Honolulu with the Pineapple Research Institute of Hawaii, engaged in climatological and hydrological research.

RHODES, JAMES A., c'36, who is with the U.S. Engineers, was transferred last summer from Savannah to Norfolk, Va.

BRUNS, EDWARD G., c'37, who served as lieutenant in the Sea Bees, has been appointed assistant professor of agricultural engineering at Wisconsin. He will be located at Sheboygan and will give his attention chiefly to farm structures.

LUECKER, ARTHUR R., c'37, is with the Knappen Engineering Co., of New York City, as a structural designer.

WAGNER, ELDON C., c'37, assistant professor of civil engineering at Wisconsin, welcomed a new son, Thomas John, on July 23.

VAUGHAN, JAMES S., c'38, is assistant to the sales manager of the industrial controller division of the Square D Company, at Milwaukee.

JANE STOSINA, Civil '36, former columnist of the Engineer, has been employed with the Allis Chalmers Mfg. Co. in the Hydraulic Division.

S-t-a-t-i-c

by Jack Hinkley m'47
James Woodburn m'48

Two mosquitoes once lit on the features
Of two fair and peroxided creatures
When asked by what right
They replied we're not tight,
We're seeing the game from the bleachers.

•

He who laughs last is usually the dumbest.

•

M. E. Student: "Professor, is water-works spelled as all one word, or is there a hydrant in the middle?"

•

She was only a censor's daughter, but she knew when to cut it out.

•

She was only a gravedigger's daughter, but you ought to see her lower the beer.

•

All work and no jack makes play a dull joy.

•

Absent-minded Professor's Wife: "You haven't kissed me in three weeks."

Professor: "My word, I wonder whom I have been kissing."

•

The one who thinks our jokes are poor
Would straightway change his views
Could he compare the jokes we print
With those we cannot use.

•

Jack MacTavish had blown his lassie to a movie and hailed a cab to take her home. When he helped her in, she, knowing his natural bent where money was concerned remarked: "Oh, Jack, it makes me feel awful wicked ridin' aboot wi' you like this." At that Jack brightened perceptibly. "Then mebbe it'll be worth the money after all."

•

Engineering is a good deal like golf. The good drivers become managing executives. For those whose best shots are brassie, advertising offers a good field in case of a good lie. Those who approach well find salvation in salesmanship. Those who are good on the green become cashiers and investment brokers. But duffers remain engineers.

•

"I know a girl who swallows swords."
"Huh, I know a gal who inhales camels."

Life is just one fool thing after another. Love is just two fool things after each other.

•

"Beg pardon, but aren't you one of the college boys."

"Naw—I couldn't find my suspenders this morning, my razor blades were used up, and a bus just ran over my hat . . . "

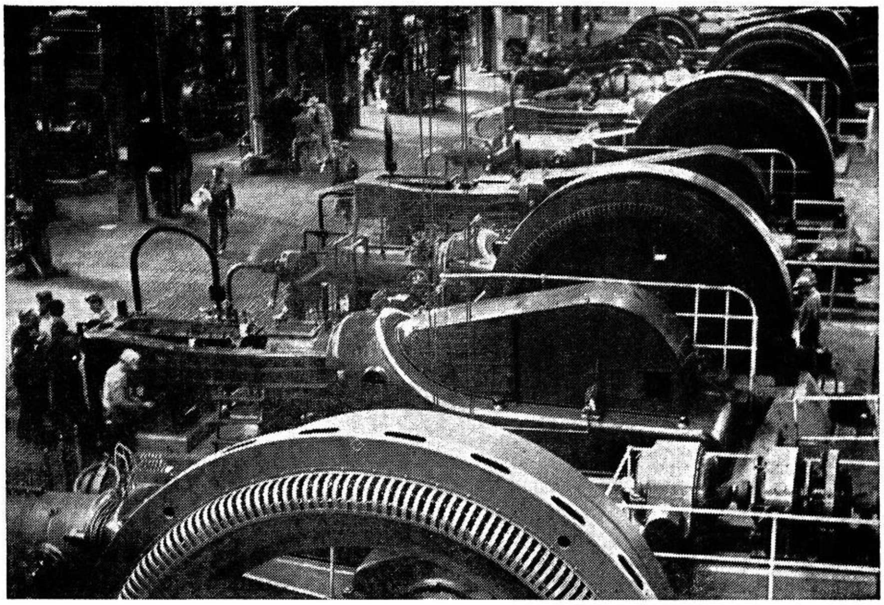
•

A Wisconsin student arrived at the pearly gates, where St. Peter asked him who he was. When he replied that he was an Art student, St. Pete said, "Go to the Devil." Some time later a law student arrived, and upon being asked who he was, replied that he was a law student; he was told to go to hell. The third Wisconsin man arrived at the pearly gates with his slide rule. When he was asked who he was, he replied, "I'm an engineer." "Come in, Mister. You've been through Hell already."

Du Pont *Digest*

Items of Interest to Students of Chemistry, Engineering, Physics, and Biology

High-Pressure Synthesis Opens New Chemical Fields



A Battery of Hyper Compressors Used to Bring Gases up to 700-900 Atmospheres Pressure in the Ammonia and Methanol Syntheses.

A Challenge to Research Men and Engineers

The use of techniques involving pressures up to and above 1,000 atmospheres (15,000 lbs. per sq. in.) has had a tremendous influence on chemical manufacture in the past twenty-five years.

The availability of unlimited quantities of nitrates via ammonia from nitrogen of the air by high pressure synthesis has greatly affected chemical economics as well as agriculture.

The plastics industry, too, has benefited greatly by the reduction in price of urea from about 80¢ lb. to less than 4¢, and methanol (to give formaldehyde) from $1.25 gal. to less than 25¢.

High pressure syntheses have also participated in a major way in the development of entirely new products such as nylon and polythene. In fact, starting from coal, air and water, Du Pont now makes over 120 widely used products.

In addition to improving the existing processes of manufacturing ammonia, methanol, higher alcohols, urea and other important chemicals, Du Pont organic and physical chemists, chemical, mechanical and metallurgical engineers have discovered and developed high pressure syntheses for the following: ethylene glycol; hexamethylene diamine; acetic, propionic and hydroxyacetic acids; methyl formate; C_8-, C_{10}- and C_{12}- alcohols; and numerous others.

Advantages and Problems

The use of high pressures offers numerous advantages familiar to technical students, such as: (1) forcing an equilibrium in the direction of a volume decrease, (2) overcoming the reversing effect of high temperatures in exothermic reactions, (3) increasing reaction and through-put rates and (4) providing, in some cases, a liquid phase which might not otherwise be present.

The synthesis of urea from carbon dioxide and ammonia is a good illustration of some of these principles:

$$CO_2 + 2NH_3 \rightleftharpoons CO(NH_2)_2 + H_2O$$

With three moles of reactants and only two of resultants, increase of pressure gives an expected increase in conversion. At the same time, the gaseous reactants are forced into the liquid phase to give higher concentrations and again better conversion. The reaction rate and therefore the rate of passage through the reaction chamber are both increased by increasing the temperature under high pressure conditions. There are other equilibrium considerations that affect the industrial production of urea, but they are too lengthy to discuss here.

Along with its advantages, the use of high pressure gives rise to problems that often severely tax the abilities of engineers and chemists. For example, (1) difficulties of design of packing glands, valves, connecting rods, closures, etc., increase rapidly with increased pressure, (2) extraordinary corrosion problems arise in which even stainless steels are attacked and cannot be used, (3) ordinary steels are permeable to hydrogen at higher pressures and temperatures. These are but a few illustrations of the challenge that high pressure studies present to the technical man and particularly to the metallurgical and mechanical engineer.

High pressure synthesis has now become a separate field of industrial chemistry with an apparently limitless future.

Questions College Men ask about working with Du Pont

What kind of a technical organization does Du Pont have?

There are ten manufacturing departments in Du Pont, each operating as a separate organization and each with its own research and engineering staff. In addition, there is a central chemical department and a central engineering department. Consequently there is a wide variety of research and engineering work available to chemists, engineers and other technical specialists. For further information write for the new booklet "The Du Pont Company and the College Graduate," 2521 Nemours Bldg., Wilmington, Delaware.

DU PONT
REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

E. I. DU PONT DE NEMOURS & CO. (INC.)
WILMINGTON 98, DELAWARE

More facts about Du Pont—**Listen to "Cavalcade of America," Mondays, 8 P.M. EST, on NBC**

Wire Recording . . .

(continued from page 15)

ferric oxide. Using this tape and longitudinal magnetization, they obtained a frequency response up to 10,000 cycles with low background noise. Work is being done in this country along similar lines to produce an economical tape employing a paper base. A tape of this kind offers several advantages over a wire besides being more economical. A predetermined program of musical selections can be built up merely by gluing together a number of small tapes just as movie film is handled. There would be no annoying scratchy sounds produced between selections if the magnetic coating is missing at the point of junction, and in general, the background noise produced by a thin flexible tape is less than that produced by a stiff wire. These combined advantages tend to indicate that metallized tape recording holds the greatest promise of widespread use of magnetic recording. It is only a matter of time before magnetic records will make their appearance on many house radios of all sizes because of their simplicity and practicably of operation.

For those interested in the technical aspects of wire recording, an excellent article appeared in the August 1946 **I.R.E.** p. 597. For constructional details of a practical wire recorder see Jan. 1938 **Electronics** p. 30.

Song of the Engineer

When the long day's work is over
and you go back into town,
you limp into a restaurant
and find a place to settle down.
You're dusty, hot and sweaty,
and tired as home-made sin.
And the waitress looks you over
like the cat had dragged you in.
When the dressed up lads and lassies
curl their lips and sneer,
then you know just what they're thinking
YOU'RE AN ENGINEER.

When the contract's going badly
and the supe's been on a spree,
and there's not a bit of progress made
that anyone can see.
When a truck has knocked the stakes out,
and the foreman's just been fired
and a wild-eyed drunken skinner's
got his "CAT" completely mired.
When the equipment's all gone haywire
and the whole job's out of gear,
who gits the blame for everything—
IT'S AN ENGINEER.

When you go home for the weekend(?)
and your wife is feeling blue,
and the kids have caught the measles
and the rent has fallen due,
The yard is rough and woolly
like it never had been mowed,
and your desk is piled with statements,
for most of the check is owed,
then the world looks dark and dismal
and one thing is awfully clear—
Life ain't no bed of roses
FOR AN ENGINEER.

Yet, when cyclones, floods and soot storms
leave the nation in distress,
when the roads have gone to pieces,
and the country's in a mess,
when new roads, dams, bridges and highways,
must be built to save the day.
And some one has to hit the rough,
to map out "right of way"
when there's jobs in need of doing
that fills men's souls with fear,
then the U.S. sends an S.O.S.
FOR AN ENGINEER.

—**Wis. Professional Engineer.**

CAMPUS HIGHLIGHTS

(continued from page 14)

Officers for the Spring semester were elected at the first meeting after the initiation. Those elected were: Vet Holmes, President; Karl Wegener, Vice-President; Paul Tausche, Corresponding Secretary; and Toru Iura, Recording Secretary.

Plans for a party to be held in Turner Hall of the Men's Dormitories in February were discussed. Arrangements are being made by the Social Committee consisting of Al Pahnke, Walter Friedman, and Paul Tausche.

•

FWD Research Project

A grant of $50,000 has been made to the university by the Four-Wheel-Drive Company of Clintonville, Wisconsin, for the development of a research project "to promote safe, economic, and efficient highway transportation" by investigating the comparative operation and design characteristics of two- and four-wheel drive trucks. The project is being conducted for the College of Engineering by Archie H. Easton, director, Harry H. Miller, electronics engineer, and the Truck Research Project Committee consisting of faculty members Prof. L. F. Rader, chairman, Prof. K. F. Wendt, and Prof. P. H. Hyland.

Mr. Easton was formerly in the Automotive Division at the Aberdeen Proving Ground, Maryland. Harry Miller is a recent U.W. electrical engineering graduate.

•

W9MHX Goes on Air

Chemical engineers of Alpha Chi Sigma fraternity have been hearing dots and dashes ringing in their ears ever since Rolland McElwee, ChE, started operating his 300 watt amateur station W9MHX on the 80 meter band early this month. He and his room-mate, Clem Scheibelhut, also a ChE, have been building the transmitter for several weeks and are now enjoying the fruits of their labors by daily contacts with distant stations.

(continued on page 28)

WE'RE VERY SORRY *or*—,

WE DON'T KNOW OUR SLIDE RULE

If you had trouble with the article, "Do You Know Your Slide Rule?" in the last issue, suppose you start over, but this time interchange Figures I and II. Another error will be found on page 10, column 2, the next to the last line. This should have read: "2^{-x}, however, must be, etc."

CAMPUS HIGHLIGHTS

(continued from page 27)

Alpha Chi Sigma

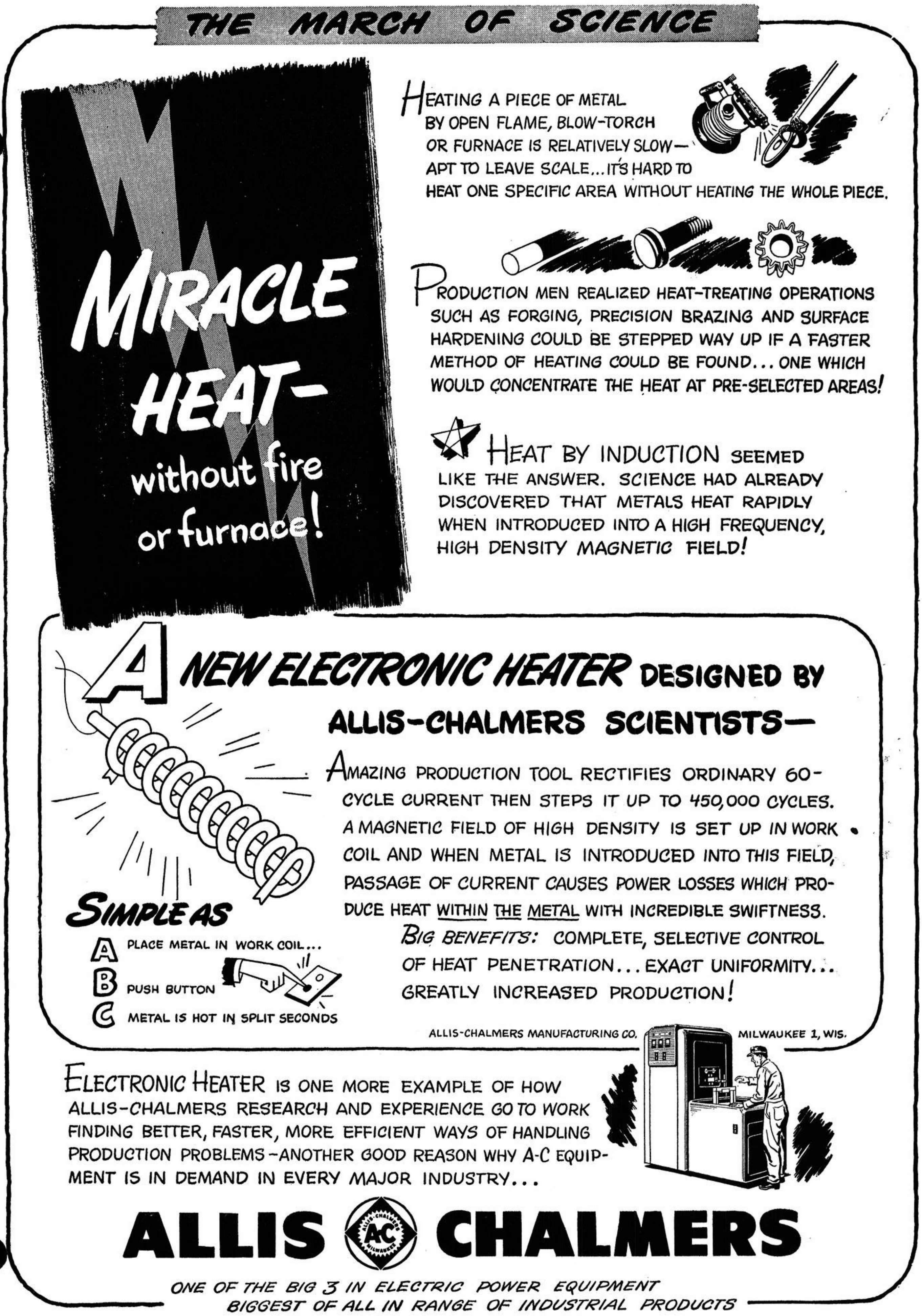
Alpha Chi Sigma, fraternity of chemical engineers and chemistry students, held initiation of 10 students on Saturday, January 4. Those initiated were: B. R. Dunshee, D. M. Heideman, B. Iwancrow, N. Mailander, R. F. McElwee, S. Dal Nogare, R. G. Parrish, R. J. Stoves, R. A. Strehlow, K. M. Watson.

Following the initiation ceremony a banquet was held at which Dr. Aaron J. Ihde of the Chemistry Department spoke. A party in honor of the new initiates was held later that evening in the chapter house.

Tau Beta Pi Initiates

Tau Beta Pi, honorary engineering fraternity, initiated thirty men at a meeting and dinner at the Capital Hotel on Thursday, December 12. Speaker of the evening was Frank A. Ecker, graduate assistant in political science, who addressed the group on "Our Foreign Policy in China." Prof. G. L. Larson of the mechanical engineering department was toastmaster.

The newly initiated members are: H. K. Anspach, H. C. Addler, V. H. Baumgarth, E. J. Bligard, H. P. Boettcher, R. E. Buddinger, C. L. Crosby, E. E. Dangle, J. L. Drnek, W. E. Gray, H. A. Johnson, F. J. Koehler, R. H. Laughlin, W. R. Lewis, M. Luck, D. J. McDonald, D. B. McIntire, W. W. Oleson, K. H. Rhodes, I. V. Rudy, J. W. Spradling, M. C. Stamp, W. J. Whitney, M. W. Cutter, P. A. Fry, R. P. Scheuring, J. G. Slater, P. E. Tausche, and R. R. Weeks.


THE MARCH OF SCIENCE
MIRACLE HEAT—
without fire or furnace!
HEATING A PIECE OF METAL BY OPEN FLAME, BLOW-TORCH OR FURNACE IS RELATIVELY SLOW— APT TO LEAVE SCALE...IT'S HARD TO HEAT ONE SPECIFIC AREA WITHOUT HEATING THE WHOLE PIECE.
PRODUCTION MEN REALIZED HEAT-TREATING OPERATIONS SUCH AS FORGING, PRECISION BRAZING AND SURFACE HARDENING COULD BE STEPPED WAY UP IF A FASTER METHOD OF HEATING COULD BE FOUND... ONE WHICH WOULD CONCENTRATE THE HEAT AT PRE-SELECTED AREAS!
HEAT BY INDUCTION SEEMED LIKE THE ANSWER. SCIENCE HAD ALREADY DISCOVERED THAT METALS HEAT RAPIDLY WHEN INTRODUCED INTO A HIGH FREQUENCY, HIGH DENSITY MAGNETIC FIELD!
A NEW ELECTRONIC HEATER DESIGNED BY ALLIS-CHALMERS SCIENTISTS—
AMAZING PRODUCTION TOOL RECTIFIES ORDINARY 60-CYCLE CURRENT THEN STEPS IT UP TO 450,000 CYCLES. A MAGNETIC FIELD OF HIGH DENSITY IS SET UP IN WORK COIL AND WHEN METAL IS INTRODUCED INTO THIS FIELD, PASSAGE OF CURRENT CAUSES POWER LOSSES WHICH PRODUCE HEAT WITHIN THE METAL WITH INCREDIBLE SWIFTNESS.
BIG BENEFITS: COMPLETE, SELECTIVE CONTROL OF HEAT PENETRATION... EXACT UNIFORMITY... GREATLY INCREASED PRODUCTION!
SIMPLE AS
A PLACE METAL IN WORK COIL...
B PUSH BUTTON
C METAL IS HOT IN SPLIT SECONDS
ALLIS-CHALMERS MANUFACTURING CO.
MILWAUKEE 1, WIS.
ELECTRONIC HEATER IS ONE MORE EXAMPLE OF HOW ALLIS-CHALMERS RESEARCH AND EXPERIENCE GO TO WORK FINDING BETTER, FASTER, MORE EFFICIENT WAYS OF HANDLING PRODUCTION PROBLEMS—ANOTHER GOOD REASON WHY A-C EQUIPMENT IS IN DEMAND IN EVERY MAJOR INDUSTRY...
ALLIS CHALMERS
ONE OF THE BIG 3 IN ELECTRIC POWER EQUIPMENT
BIGGEST OF ALL IN RANGE OF INDUSTRIAL PRODUCTS

S-t-a-t-i-c

(continued from page 23)

Prof. VanHagan: "What is your rule for punctuating?"

CE: "I set as long as I can hold my breath and then I put in a comma, when I yawn I put in a semicolon, when the ashes fall off my cigar it's a period, and when I want a chew of tobacco I make a paragraph."

•

"What a wonderful view," said the explorer . . . as he stepped into the woman's shower by mistake.

•

"It takes guts to do a thing like this," said the bug as he was about to be smashed against the windshield.

•

The guy who claims that his gal is cold should remember that so is dynamite until you start fooling around with it.

•

"What's the matter, Alice?"
"I've got rheumatism in my muscles."
"You ought to visit a masseur."
"What's that?"
"A man who pinches you all over."
"Oh, you mean an engineer."

•

Her name is Grace,
She's one of the best,
So tonight I'll put her to the test.
She looks so sweet, so pretty and slim,
The night is dark, the light is dim,
I'm so excited my heart's missing a beat
For I know that I'm in for a darn good treat,
I've seen her strip, I've seen her bare,
I've looked her over everywhere.
She's just one big thrill, the best in the land,
She's the P-38 of the fighter command.

•

No man likes to be beaten to the punch, especially if it's filled with gin.

•

Newton's 33rd Law: The dimmer the porch light, the greater the scandal power.

•

A censor is a lovely man—
I know you think so too:
He sees three meanings in a joke—
When there are only two!

•

According to the most recent report, dogs in Siberia are the fastest in the world. The theory is that it's probably because the trees are so far apart.