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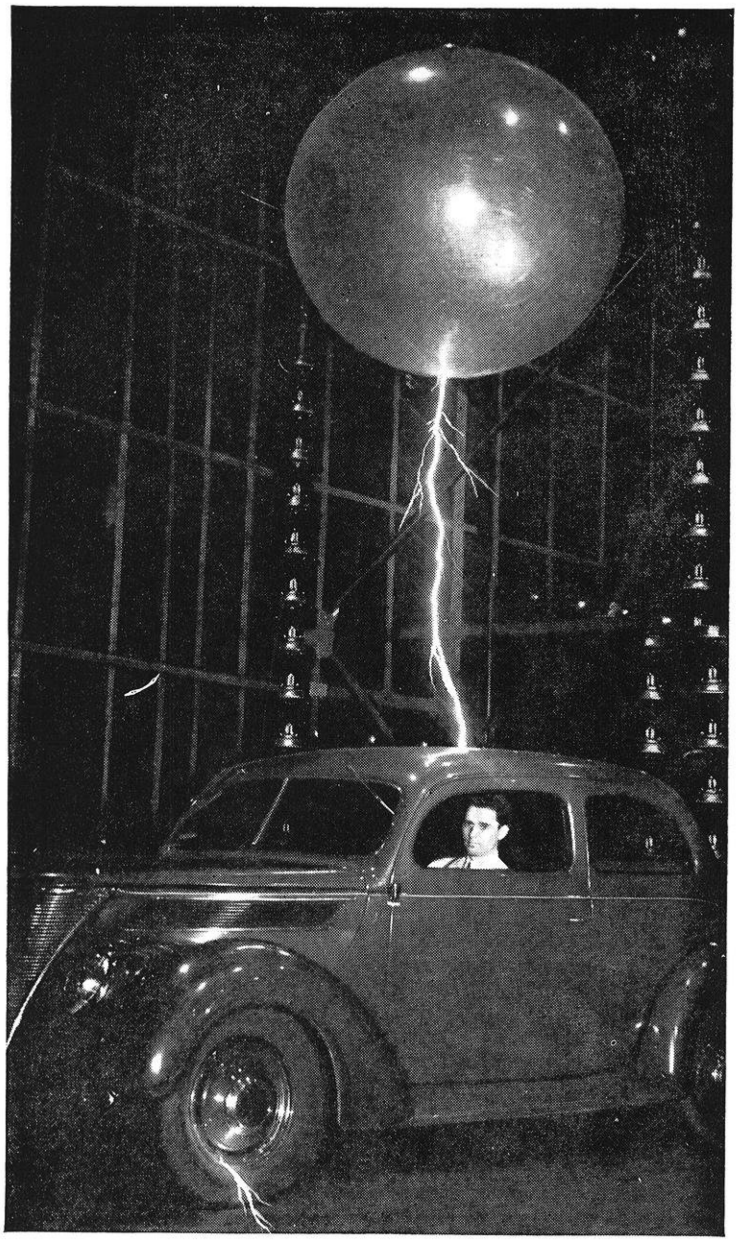
WISCONSIN ENGINEER

MEMBER ENGINEERING COLLEGE MAGAZINES ASSOCIATED

Gilbert D. McCann, Ph.D., M.S.

...Master of Thunderbolts, too!



MODERN FARADAY CAGE. Three million volts of man-made lightning hit a car in Westinghouse High Voltage Laboratories, while Dr. Gilbert D. McCann sits safely at the wheel. Dr. McCann . . . co-inventor of the "fulchronograph" for timing and measuring the intensity of thunderbolts . . . joined Westinghouse in 1939, after receiving degrees of M.S. and Ph.D. at the California Institute of Technology.

EVERY TIME you take a breath, 175 thunderbolts crash to earth somewhere.

These lightning strokes, streaking down at 600 million miles an hour, are charged with torrents of electrical power . . . as much as 200,000 amperes, at pressures as high as 25,000,000 volts.

No wonder protection against lightning has been a major problem to utility companies . . . such a problem that, up to a few years ago, lightning frequently shut down power service to industry.

Today, a properly designed power line is not likely to be put out of service by lightning *more than once in 5 or 10 years!*

Dr. Gilbert D. McCann and Charles F. Wagner, Westinghouse engineers, have done much to make this possible through their studies of natural thunderbolts and laboratory lightning.

One of their contributions is the "fulchronograph" which automatically times natural lightning strokes and measures their intensity. Oscillographs and movie cameras also are used to photograph the celestial fireworks.

These mechanical "eyes" . . . perched high on the top of scores of tall buildings, smoke stacks, and transmission-line towers . . . are constantly collecting facts about lightning phenomena that were never known before. Facts about "cold" lightning, of terrific blasting power. Facts about "hot" lightning, the incendiary bomb of the sky.

Still further knowledge is gained from the study of *artificial lightning* . . . made in the Westinghouse High Voltage Laboratories. This man-made lightning is used to bombard insulators, lightning arresters, and other protective devices to test their efficiency.

These studies are constantly adding to the store of "know how" in the field of power transmission. As a result, Westinghouse engineers have been able to design and build lightning arresters and ground-wire systems that tame the wildest thunderbolt.

The work done by Dr. McCann is contributing mightily to America's war effort by helping to keep electric power flowing night and day to our vast war industries . . . as well as by protecting ordnance plants from destruction by lightning.

America needs scientists and engineers as never before . . . to help solve the technical problems of modern warfare and to rebuild the world when the last shot is fired.

Nearly 300 young engineering graduates joined Westinghouse last Spring to carry on this work. In the Class of '43 there will be many graduates who will have an equal chance to help win the war . . . and the peace to come . . . with Westinghouse.

Westinghouse

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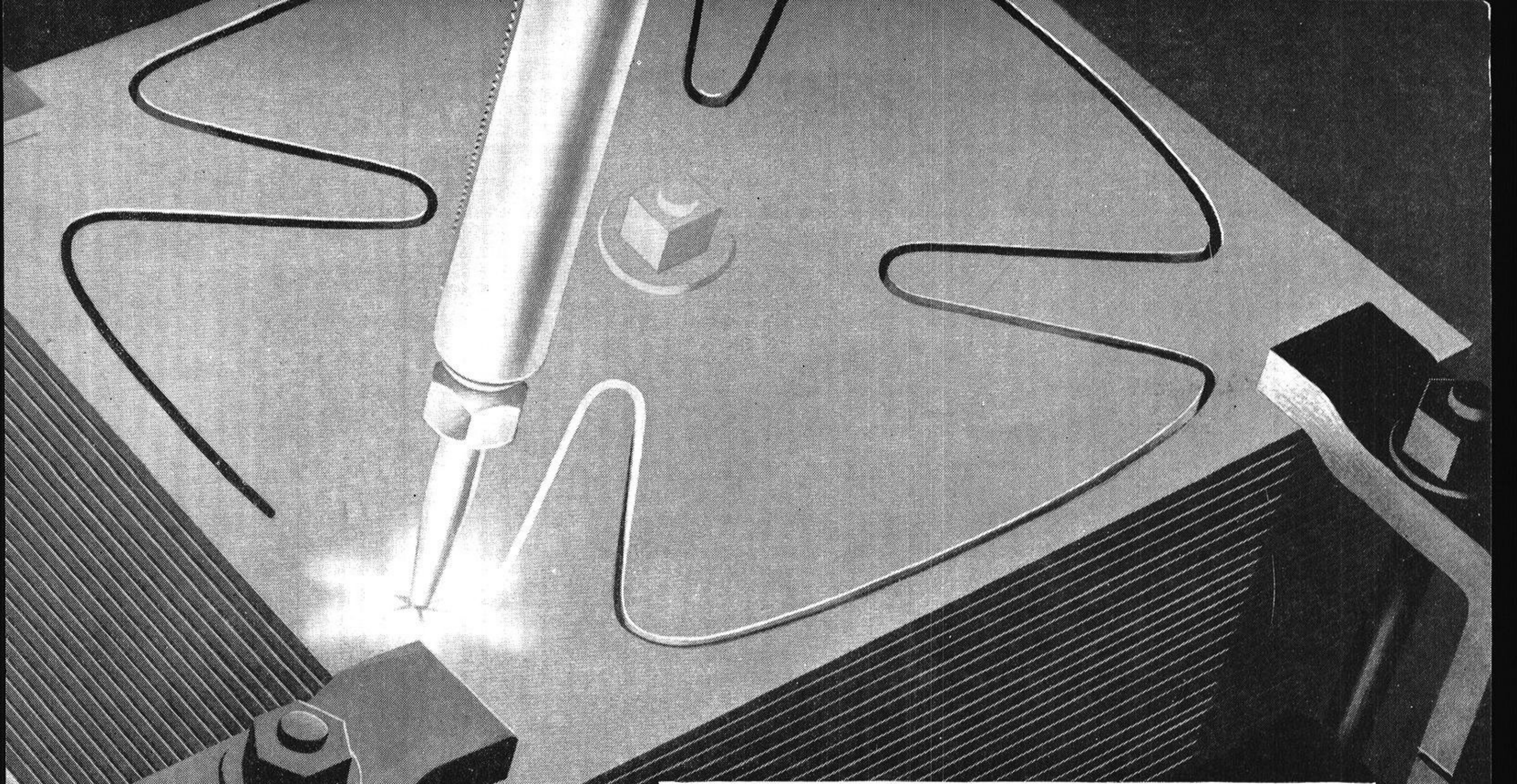

BLAZING THE WAY TO FASTER PRODUCTION

As EASILY as a knife cuts through pancakes, this white-hot oxy-acetylene flame zips through stacks of steel plates . . . turning out metal parts in a fraction of the time required by other methods.

Cutting as many as twenty plates at a time, this knife that never dulls . . . guided by positive templates . . . can follow the sharp twists and turns of highly complicated patterns. Oxy-acetylene stack-cutting saves shaping, machining, and assembly time. It produces parts of identical size and shape. It reduces scrap losses . . . makes possible substantial savings in subsequent machining and fitting operations.

Stack-cutting is only one of the many oxy-acetylene processes for cutting, fabricating, and treating metals which manufacturers are using to speed up production today. Whether cutting up scrap . . . or skinning steel alive by planing a light cut from the four sides of steel blooms as they speed down the roll table . . . or helping to shape and weld finished steel . . . the oxy-acetylene flame is a tireless worker in modern manufacturing.

Would you like to know how flame-cutting and other oxy-acetylene processes could be applied to your business? You are cordially invited to avail yourself of the store of knowledge Linde technicians have assembled over a long period of years.

• • •

The important developments in flame-cutting—and other processes and methods for producing, fabricating, and treating metals—which have been made by The Linde Air Products Company were greatly facilitated by collaboration with Union Carbide and Carbon Research Laboratories, Inc., and by the metallurgical experience of Electro Metallurgical Company and Haynes Stellite Company—all Units of Union Carbide and Carbon Corporation.

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In This Issue . . .

A Welcome to Responsibility

TO ENGINEERS—new and old, "Welcome and Well Come!" It is pleasant, in anticipation of good fellowship, to greet so many of you—the largest freshman class and the largest total engineering enrollment in Wisconsin history. But more than the friendly greting "Welcome" we cry "Well Come!" It is reassuring that in such numbers you young men recognize that you can make your most significant contribution toward world-wide victory for peace and justice by first preparing yourselves to render intelligent technical service in this war of applied science.

Keep this motive clear. Let it stimulate you to the most earnest study of your lives—no standard of performance should satisfy you except the highest, such as victory demands. "Almost" does not win!

But—care for your health. Find proper recreation day by day, for under the war-time calendar you are expected to continue right on through the long summer term next summer and those following—without interruption to graduation. Accordingly, there will be no vacation trips for change of scene nor summer employment to refill your coffers—(the government proposes to solve the latter problem by loans to you).

And also important—keep your poise and sense of values. Remember that in striving for victory we also strive for the peace that follows. Fortunately for you as engineering students it is indeed true that all your efforts to excel in the application of science will contribute directly to your ability to reconstruct and build and advance the comforts and privileges of civilization after the war. So—neglect no opportunity to acquire every refined appreciation your university associations offer in order that your post-war contributions may be most intelligent and effective.

Welcome to good fellowship and well-come to high responsibility.

F. Ellis Johnson

New Cary Mine Shaft

by Gordon Erspamer, met'44

GOING DOWN! It is the summer of 1944; the "cage" bell rings and officials of Pickands Mather and Company congratulate each other as they ride the first trip of the cage down their new 3,100 foot shaft, located at the Cary Mine in Hurley, Wis. Surrounding the shaft collar are the offices and shops of a $2,000,000 development. This is the picture in 1944 . . .

But today is 1942 and the picture is far from being the finished masterpiece we have visualized. This past summer I worked on the engineering staff of the Cary Mine, during which period the project of preparing the selected site and then sinking the shaft was begun. The Cary Mine is an iron mine, located at far-famed Hurley in the Wisconsin section of the Penokee-Gogebic Iron Range, one of the Lake Superior ore ranges also shared by Michigan's Upper Peninsula. Its product is hematite, Fe_2O_3, found in the Ironwood formation deep beneath the surface. Development in the mine proper has progressed to the thirty-first level and the need for a new production shaft has become apparent. The old inclined shaft appears to be bottomed at this depth due to loose rock encountered, and further mining around the old shaft would seriously endanger it. The new shaft will have the additional advantages of a more central location on the property and accessibility to further eastward expansion.

With the new site chosen, here, after preliminary blasting and bull-dozing had graded the area, the process of sinking the new shaft was begun. Selected by officials of Pickands Mather was the revolutionary method of shaft sinking developed by J. B. Newsom—that is, drilling a 5′6″ diameter pilot hole approximately 3,100 feet down to an intersecting crosscut driven from the old workings on the thirty-first level, then enlarging this borehole to 13′x21′ size, mucking out the additional material from the bottom of the hole, via the crosscut.

Departure from Convention

Traditional practice in the mining industry has been to sink shafts by blasting and mucking in cycles until the desired depth has been attained. The blasting operations generally break up the zone immediately surrounding the shaft, necessitating shaft supporting structures. Mucking of the broken material is a slow, laborious, and expensive process, since everything taken out for 3,100 feet of depth must be carried up through the workings to the top and disposed of from there. The advantages of the Cary Mine method over the old are apparent.

The startling innovation is the method used to drill the 5′6″ diameter borehole through the 3,100 feet of granite rock to the thirty-first level. At the Cary Mine the work is being done with a 5′6″ diameter shot drill, the entire drill structure entering the hole. Mr. J. B. Newsom, prominent mining engineer, conceived the idea and is in charge of the operation. The borehole at Hurley is the third time this method has been used and is the most ambitious undertaking of the three. Debut of the Newsom drill was in 1936 at the Idaho Maryland Mine in Grass Valley, California. The drill was 5′0″ in diameter then, and took 21 months to drill 1,125 feet in predominantly serpentine rock. Venture number two was in 1938 at Pickands Mather's Zenith Mine on the Vermilion Range, Ely, Minn. With the benefit of the experience gained on the previous job, a 1,208 foot hole was bored in greenstone within seven months, using a higher-powered, 5′6″ diameter drill. The Hurley borehole will have to descend about 3,100 feet through granite rock.

To understand how far Mr. Newsom has progressed beyond standard practise, let us briefly examine an ordinary shot drill. A typical shot drill is a string of hollow steel rods rotated by hydraulic or mechanical means. At the end of the drill rods is a cutting bit. Only the drill rods enter the hole, the rest of the equipment being embodied in the surface mechanism. The drilling is accomplished by chilled steel shot fragments smaller than bird shot,

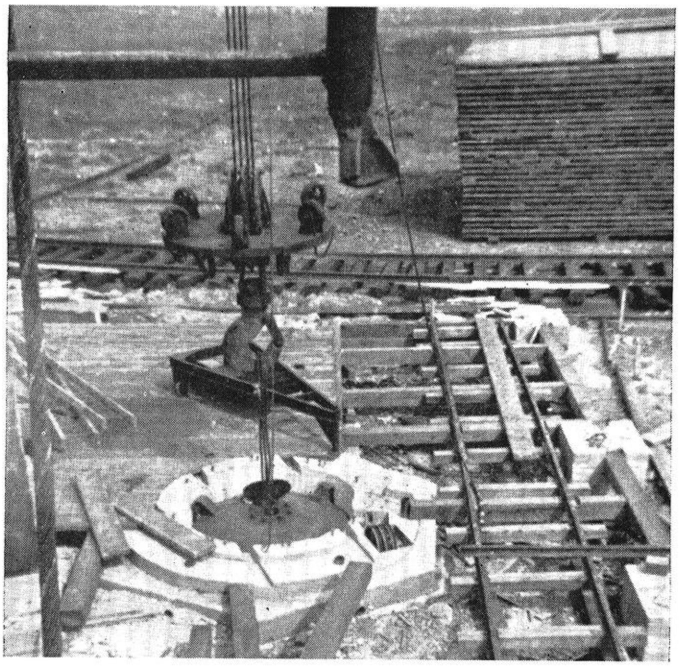


Fig. 1. Hoisting Hook and Wheel-Mounted Disk Above Shaft Collar

which are abraded against the rock by the bit as it is rotated by the surface mechanism. Cores up to 6″ in diameter can be obtained depending on size of drill. Obviously the drill rods limit the depth of drilling possible. The longer the string of drill rods, the more difficult it becomes to control the direction of the hole.

Compare this with Mr. Newsom's shot drill. The most apparent differences are its great size, and the fact that the entire assembly goes down the hole. This drill consists of driving and cutting units, driven from a cabin supported by horizontal jacks directly above it in the hole. These closely coupled units are first lowered into position

Fig. 2. Stiff-Leg Derrick Mounted on Sunken Concrete Blocks. Note Core Barrel in Foreground

by a hoist on the surface. This arrangement removes the limitation on the depth of drilling since it is no longer necessary to convey power from the surface through drill rods to the cutting tool. The cabin, core barrel and cutting tool, when assembled, weighs about 15 tons and is 30 feet long. This assembly constitutes the external drilling device.

The drive motor, located in the operator's cabin, rotates at 1750 r.p.m., is rated at 100 h.p., and operates through a set of reduction gears to reduce the core barrel speed to approximately 52 r.p.m. Drilling operations go on around the clock, three shifts a day. Each shift consists of two men, a hoistman who stays on the surface and a drill operator who goes down into the hole inside the drill cabin. In this way he can pay close attention to the controls, consisting of the motor starter button, an ammeter, a weight control mechanism, and the shot feed box and mechanism. The operator judges the progress of the drilling by watching the ammeter and listening to the sounds of the cutting shoe. Adjustments are made in the weight on the cutting shoe by turning a wheel which operates through a winch to raise or lower the core barrel, results observed by watching the weight indicator dial.

The drilling shot is contained in a box near the operator's left hand, and the shot feed mechanism is calibrated to show how much shot will be fed to the cutting shoe each time the shot feed lever is operated. With these controls at hand, close regulation of the drilling operation is possible.

The cutting shoe at the bottom of the core barrel is a ring of soft steel 1½ inches thick. Slots cut in the lower edge of this shoe provide openings through which the shot, fed downward by gravity, can be carried directly under the cutting edge. No. 6 chilled gray iron shot is used, each pellet about 3/32 inches in diameter. Since the shot is considerably harder than the low carbon cutting shoe, pellets of shot embed themselves in the bottom of the cutting edge as it turns, scraping and abrading the rock. As the core barrel rotates, it cuts a circular slot about 2 inches in width around the core.

Assembling Drill Into Position

The assembled drilling unit is lowered to drilling position in the hole by a derrick and a hoist on the surface. The ⅞ inch diameter steel hoisting rope spools through reduction sheaves to make it a four-part line between the derrick boom and the block above the hoisting hook (from which the drilling equipment is hung). This block and hoisting hook are attached above and below, respectively, to a steel disk having radially mounted rubber-covered guide wheels projecting slightly beyond its periphery. (See Fig. 1.) These guide wheels make contact with the wall of the borehole as the disk and the drill hung below it on the hook tend to swing in the small clearance. The overall diameter of the disk and its guide wheels is 5′4″.

The derrick is of the stiff-leg type, of steel, with a 60 foot boom which does not lower but turns on a 35 foot radius. The derrick stands back of the collar and overhangs it. (See Fig. 2.) In this way it can not only service the borehole, but can conveniently dispose of the cores by swinging the boom to either side.

Fig. 3. Overall view showing hoist house from which hoistman controls the drill through the derrick. Note man cage to right of derrick base.

Other surface equipment includes a 40 cu. ft. /min. air compressor with a ½ inch air hose and reel, driven by an 11 h.p. motor reducer operating through a chain drive. It is equipped with a carbon monoxide detector which will give an alarm and stop the compressor when carbon monoxide content reaches .02%. This compressor supplies fresh air to the operator in the drill cabin at the bottom of the hole. A four-conductor cable transmits power to the 100 h.p. motor in the drill cabin and is wound on a

(continued on page 33)

Voice of the Engineer

Why Study?

ENGINEERING is 10% technical knowledge and 90% horse sense. In school the most important thing we do is train our minds to reason so that we can pass from a simple law to its application. Therein lies the value of the calculus and mechanics course. It is not the technical knowledge we receive from such courses, but it is the training our mind receives in doing those problems that constitutes the main part of our college education. If you just memorized a lot of formulas and got an "A" in those courses, you have missed the most important part of your education. Such memorizing is worthless to an engineer because he is unable to apply his knowledge to problems that differ slightly from his memorized formulas. It is necessary to know a few basic formulas, but all the other formulas can be derived from these few. By working with these basic formulas in doing your classwork your mind is taught to reason, and you are able to apply a simple formula to a large number of related problems because you understand the problem and the units in which the problem is to be solved. If one knows and understands the simple formulas, he can get the special formulas from the handbook and apply them when necessary. That is why derivations should be reasoned out and not just committed to memory for a few days for a test, and then forgotten. This also is why it pays to do your studying regularly instead of letting things slide until exam time and then cramming. It may be possible to get the same grade by doing either method, but you just memorize for a few days when you cram and your mind has received no training whatsoever. The same goes for those students who are too lazy to use their minds at all and prefer to use crib notes whenever possible on exams.

After you have been out on a job several years, your advancement to higher positions will depend upon your ability to think clearly and correctly, and not on the specific technical knowledge you obtained in school. To be sure, the technical knowledge you have when you graduate will get you started in some certain line in industry, but you will stay at the bottom if you are unable to think for yourself. After you have been out of school a year or two, it is not of much concern what type of engineer you are, it only matters that you have enough brains in your head to think clearly and correctly.

In school you are expected to acquire some technical knowledge of a general nature that can be applied to any type of engineering whether mechanical, electrical, or chemical. You are not expected to know a lot of specific data that can be applied only to a certain problem, for you are quite unlikely to encounter that problem in later years. It is far better to receive a general training. Many engineers never stay in the field in which they first start because they find better opportunities in other lines of engineering.

Anybody can read a technical paper or book, but it takes a well educated student to understand and apply the principles involved. In school you are trained to use mental tools, and it depends on you alone as to how well you are trained and how well you can work with these tools when you are on the job.

The Draft, Industry, and Student Engineers

WE HAVE been hearing that a number of people resent our being in college when other young men are being drafted. This criticism makes us feel like slackers when we look at the war effort going on around us while we sit in school and study. The local draft boards have also been casting hungry eyes upon us. Although most of the juniors and seniors have obtained deferments, they will find it increasingly difficult to secure deferments in the future when the man power shortage becomes more acute. Also when the draft age is lowered to eighteen, there will be no chance at all for freshmen and sophomores to avoid being drafted under the present set-up. Yet industry and government are sorely in need of engineers and the demand far exceeds the supply. If engineers are going to graduate in the next few critical years, they must be allowed to continue their education.

This year the seniors will have a large number of jobs to choose from, and they will go where they get the most attractive offer as to wages and working conditions. This is only human nature. A large number of companies engaged in vital war work will obtain insufficient technical personnel or none at all from the graduating classes this February and June. There just aren't enough engineers to go around.

This muddle between the draft, student, and industry could be cleared up if engineering students were placed under direct control of the Man Power Commission. The engineers are anxious to aid the war program in every way possible. We believe if students entering an engineering college were placed under this Commission and were entirely out of the hands of the local draft boards, they could study the year around and graduate in three years. It would be necessary for a student to maintain a 1.5 average. Government subsidy would also be essential. When such a student graduated, he would be placed by the Man Power Commission on that job which is most essential to the war effort. This would allow the student to study unhampered by shortsighted draft boards, to receive their degree in three years, and then to work where they are most urgently needed, for the students are willing to enter either the armed forces or industry and to do their best to help win the war.

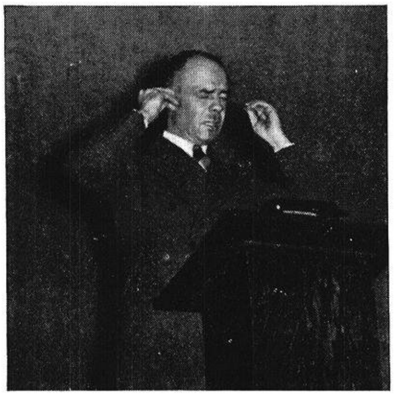
The Boys Enjoy . . .

The Engineers' Night

Photographs by Don Niles

THE ENGINEERS turned out five hundred strong in the Union Theater on September 30 for the first joint meeting of the students' professional societies. It was the most successful group meeting in several years. The only disappointing note in the entire program was the absence of Dean Johnson, who was confined to his home with a fever and severe cold.

Harold Holler, president of Polygon, was master of ceremonies. John Wilson, president of A.S.M.E., gave a short explanation of the activities and advantages of these student societies. Then came Pat Norris, prominent Madison acoustical engineer, who kept us holding our sides while he told rip-roaring jokes. His picturesque speech and imitations along with his comical satire on engineers left us weak with laughter. After an hour of this, we picked ourselves up and crowded into Great Hall. We mobbed the stands in the corner where beer, pop, and doughnuts were passed out gratis. There was a semicircle, ten men deep, packed tighter than sardines, trying to get refreshments. They really had to work to get to the tables and then back away with a glass of beer. To equitably distribute the doughnuts, they were tossed in the air and the boys grabbed for them. The pop and doughnuts soon gave out but there was plenty of beer—three quarters and two eighths being consumed in the evening. At the other end of Great Hall, the professional societies were signing up interested students.



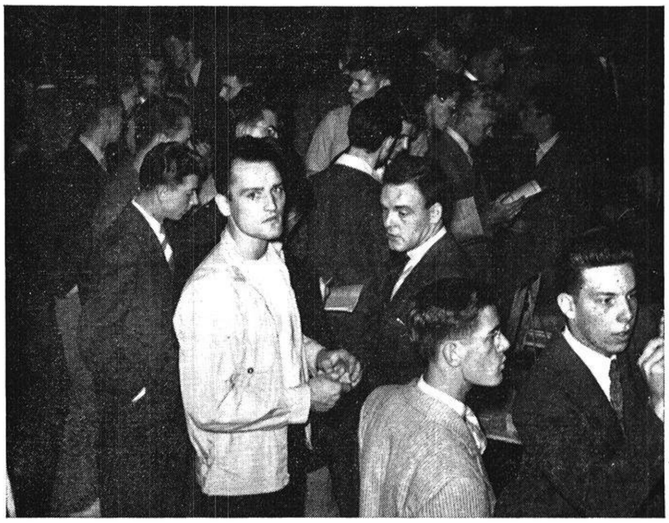
PAT NORRIS

Just another Engineer . . . Use a wire, an empty head.

A group of slide-rule baritones, glasses in hand, gathered around the piano virtuoso on the stage. Their efforts, while they would arouse no great envy in the hearts of music majors, were enthusiastically received by the boisterous audience. Pat Norris, with his endless supply of jokes, was regaling the boys with the ones he hadn't told in the Theater.

Everyone present agreed that it was a good thing for the engineers to get away from their books and enjoy themselves en masse, and hopefully expressed the opinion that it be repeated again soon in the future.

Razzle-dazzle . . . Pass the doughnuts



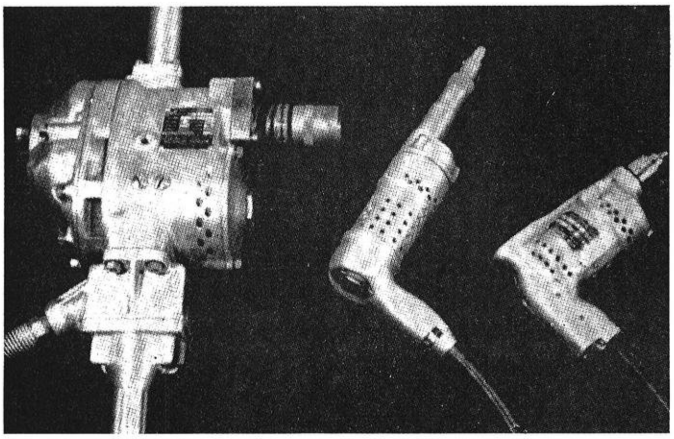
Sign here . . . on the dotted line

Magnesium Production

by Jerome Baird, met'43

MAGNESIUM, the lightest of the commercial structural metals, is listed in a recent War Production Board order as one of the five strategic and scarce metals which can be used only for war purposes. The war program calls for magnesium in quantities many times the peace time production capacity; and new magnesium plants are being rushed to completion to meet this demand.

When alloyed with small amounts of manganese, aluminum, and zinc it forms the ultra-light alloys which are essential to the aircraft industry. The outstanding characteristic of magnesium alloys is their lightness combined with adequate mechanical properties. Compared with aluminum which is 50% heavier, cast iron four times, and brass five times, magnesium has a wide variety of applications in which weight reduction is needed. Before the war it was used in core boxes, gravity conveyors, and portable tool housings. These grinders, drills, power wrenches, etc. (Fig. 1), which are used continuously throughout the working day, decrease the workers' fatigue and increase the plant efficiency.



—Courtesy Dow Chemical Co.
Fig. 1. Portable tools with sand cast magnesium housings

Airplane Applications

The magnesium industry started shortly after the turn of the century in Germany and spread to this country during the first world war. It has since grown to the point that there are now magnesium parts on every commercial airplane produced today. Sand cast magnesium alloy landing wheels are standard equipment. Blower sections, supercharger and accessory housings, intake manifold, oil pumps, and a large number of cover plates are employed in engine construction. Other uses are instrument housings, window frames, supports, brackets, tail wheel forks, and landing gear.

Although magnesium metal has been known for over a century, its commercial production and utilization has taken place in the last thirty years. The metal was first isolated in 1830 when Bussy fused anhydrous magnesium chloride with potassium; however, Davy had done considerable work at an earlier date and obtained an amalgam of the metal. In 1852 Bunsen laid the foundation for the present industry when he produced the metal by the electrolysis of a fused bath of anhydrous magnesium chloride. With some modifications his process operates on a commercial scale today as the principle source of magnesium. Many chemical reductions as well as electrolysis of aqueous electrolytes, and molten fluoride baths containing dissolved magnesium oxide were tried in the following years, but only a few of them ever reached the production stage.

Metal Output

Magnesium had a fluctuating career until the present German industry was established a few years prior to the first world war. American industry was firmly established during the early part of the war because of our inability to import the German product. The demand for the metal dropped after the cessation of hostilities because it was mainly used in military flares. It was not until the middle twenties that native production again reached the wartime level of 300,000 lbs. (150 tons) annually. Its output and use rose steadily, and in 1939 the world production was 32,000 tons. The leading producers were:

Germany	16,500 tons
England	5,000 tons
United States	4,800 tons
France	2,500 tons
Japan	1,000 tons
Russia	500 tons
Switzerland	500 tons

Then the present war mushroomed native production until an output of over 100,000 tons is expected by the end of this year. The price of virgin magnesium ingot metal prior to the first world war was $1.50 lb. It rose to $5.00 lb. in 1915, and then decreased to the current price of 23c lb. The government is subsidizing numerous plants to increase production to meet the war needs. Although Germany has been the leading world producer for many years and has had much experience with magnesium alloys, the United Nations will soon outstrip the Nazis in both quantity and quality.

Raw Materials

The element magnesium, in its various compounds, comprises 2.5% of the earth's crust. The commonest magnesium minerals are the silicates, serpentine, mica, pyroxene, etc., which occur world wide but are unsuitable for manufacture of the metal. There are extensive deposits of dolomite ($MgCO_3$. $CaCO_3$) but they usually contain much more calcium than magnesium. It is used in the metal manufacture, but the most valuable material for this purpose is magnesite, which is magnesium carbonate. Magnesite can be obtained with 97% $MgCO_3$, but it is usually contaminated with silica, lime, and the oxides of aluminum and iron. There are extensive deposits in Austria, Czechoslovakia, Greece, Manchuko, Russia, United States, and Yugoslavia that are worked in open quarries mainly for the refractories used in the steel industry.

Sea water contains only .55% $MgCl_2$ while the brine wells of Michigan have from 2 to 5%. At Strassfurt, Germany, carnallite ($MgCl_2$. KCl . $6H_2O$) is mined in considerable quantities, although now it is not the important raw material it once was. The new magnesium plants in this country will utilize sea water, salt brines, dolomite, and magnesite as raw materials.

Preparation of MgO

Raw magnesite may be employed directly in metal manufacture, although in some processes it is first calcined at 900° C. and all but 3% of the CO_2 is driven off. This is a reactive product that is also used in the flooring industry. It may also be calcined at 1600° C. to drive off all of the CO_2; and the product known as dead burned magnesite is used in the refractories industry. Metal manufacture employes both of the products.

Dolomite as a mineral type contains 45% $MgCO_3$ and 55% $CaCO_3$, but its composition varies with the locality as do the amounts of the usual impurities, of silica, iron oxide, and aluminum oxide. In addition, many deposits are better described as dolomitic limestone because they contain much more $CaCO_3$ than $MgCO_3$ and even approach pure limestone in many cases. However, dolomite is a material that is of increasing interest and importance. Dolomite may be utilized directly in the calcined or dead burnt form in some of the thermal processes where the magnesium is distilled off. Since such processes can employ either dolomite or magnesite, the plant output when using domolite is reduced by the amount of inert material (CaO) passing through. Its use depends on the locality such as in Great Britain where there are extensive dolomite deposits but no magnesite.

In the German potash industry, due to peculiar local conditions, very considerable quantities of magnesium chloride are a waste byproduct. On heating calcined dolomite with $MgCl_2$ the following chemical action takes place

$$Ca(OH)_2 \,.\, MgO + MgCl_2(aq) \longrightarrow CaCl_2(aq) + 2\,MgO + H_2O$$

and soluble $CaCl_2$ is formed with a residue of magnesia. A cheap source of $MgCl_2$ is sea water (0.55%) which can be treated with either calcined dolomite, limestone, or sea shells to precipitate the magnesia which then is filtered out. The possibilities of this unlimited raw material have been known for some time, and recently several plants in Texas have started production.

Preparation of Anhydrous $MgCl_2$

In all of the above preparations of raw material, the end product has been magnesia. The Dow Chemical Company at Midland, Michigan, because of its unusual economic setup, can recover anhydrous magnesium chloride from its solutions. It should be pointed out here that although it is possible in theory to use one of the hydrated chlorides such as the dihydrate ($MgCl_2$. $2\,H_2O$) in electrolytic cells, it is impossible to prevent hydroxyl groups, probably in the form of a basic salt, from taking part in the electrolysis and leading to appreciate current losses and considerable wear of anodes. Anhydrous magnesium chloride is essential before economical metal production by electrolysis of the chloride is possible. At Midland the aqueous $MgCl_2$ is dehydrated in several stages to the dihydrate ($MgCl_2$. $2H_2O$) without practically any decomposition taking place. Further dehydration will cause an appreciable decomposition to hydrochloric acid and magnesium oxide unless done in the presence of dry hydrochloric gas. The process does not yield completely anhydrous $McCl_2$; and the recovery and drying of the HCl gas is expensive. This process was used by Germany on an industrial scale during the war of 1914-1918 and then abandoned for economical reasons. It has proved to be economically feasible for the Dow Chemical Company only because they obtain their aqueous $MgCl_2$ as a by-product from their salt and alkali manufacture and are able to sell the chlorine from the cells and the resultant wet salts of the process as byproducts.

The difficulties in producing anhydrous $MgCl_2$ from the hydrated compound led to the development of a process in Germany in the late twenties where magnesia is reacted with carbon and chlorine.

$$MgO + C + Cl_2 \longrightarrow MgCl_2 + CO$$
$$2MgO + C + 2Cl_2 \longrightarrow 2MgCl_2 + CO_2$$

The reactions are strongly exothermic and little external heat is needed to carry out the conversion. The raw material, magnesite or magnesia produced from magnesium compounds, is mixed with suitable reducing agents and converted at high temperatures by the chlorine obtained from the electrolytic cells.

Physical Constants of Magnesium

Melting Point	
—degrees Centigrade	651
—degrees Fahrenheit	1204
Boiling Point	
—degrees Centigrade	1097
—degrees Fahrenheit	2007
Density at 20° C.	1.74
Modulus of Elesticity	6.4 x 10^6
Crystal Form	Close packed hexagonal
Atomic Weight	24.32

Electrolysis of Anhydrous $MgCl_2$

At the present time magnesium can be produced with a power consumption of less than 9 kwh. per pound of metal. The convenient arrangement of the aluminum cell in which the metal is deposited at the bottom has been tried with magnesium, but failed to yield satisfactory results. There is some difficulty in separating the electrolytic products since they come to the surface, but by a special method and the use of absolutely anhydrous $MgCl_2$, current efficiencies of 90% can be obtained with a low cell voltage.

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The electrolytic decomposition of anhydrous magnesium chloride is carried out in large rectangular cast steel pots holding several tons of molten cell bath. The steel pot serves as the cathode, while the anode consists of vertical graphite bars. The process is continuous, with the metal being removed manually at regular intervals by means of large dippers. The electrolyte, consisting of alkali chlorides and occasionally fluorides, is a mixture which inhibits the decomposition of the anhydrous $MgCl_2$ (which is appreciable when molten) and also has a favorable influence on the conductivity, specific gravity, and viscosity. External heat helps to maintain the proper cell temperature and reduces power consumption. The magnesium metal formed is lighter than the cell bath and floats on the surface of the bath but does not burn because of the protecting action of a thin film of the molten salt bath. On the other hand the sludge which forms during the normal operation of the cell is heavy and sinks immediately. The sludge is largely due to the small percentage of MgO in the cell feed. This automatic separation of metal and sludge combined with the high purity of cell feed and the washing and purifying action of the cell bath itself yields a metal of such purity that any further refinement is unnecessary. An analysis of this virgin magnesium reveals a purity of 99.9% to 99.95%.

The original process for the production of magnesium was the electrolysis of dehydrated carnallite in Germany. It was the only process for a number of years, but it is now losing importance due to the inherent electrolysis difficulties and the strict requirements regarding purity of raw material.

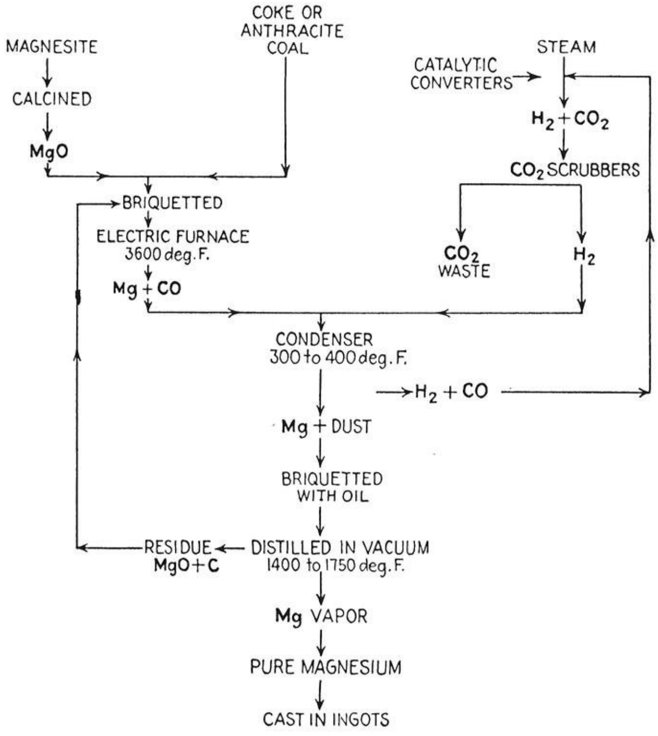
Because of the harmful effect of water in the electrolyte and the difficulty encountered in completely dehydrating $MgCl_2$, an attempt was made at the outset to avoid these difficulties entirely by producing magnesium from its oxide in fluoride melts similar to the aluminum process. Although MgO is soluble to a certain extent in some fluoride melts, its solubility is slight compared with that of Al_2O_3 in molten cryolite so that it is much more difficult to avoid local inpoverishment of MgO in the electrolyte. A further disadvantage was that the fluoride mixtures suitable for the purpose had a high melting point so that their working temperature was considerably higher than the melting point of magnesium. It is a process which has never proven profitable on an industrial scale.

Thermal Reduction

Until a few years ago all magnesium produced commercially was based on the electrolysis of fused magnesium salts, particularly anhydrous $MgCl_2$. This is still the most important process, but the war has accelerated developments in thermal reduction of magnesium both in this country and Europe, and some thermal reduction plants in operation today.

In contrast with aluminum, magnesium can be obtained by direct reduction of its compounds wtih suitable reducing agents. The future of the thermal processes is extremely bright for they disperse with the complicated pretreatment of raw material necessary for electrolysis and thus remove limitations on the producing unit. The reaction of the reducing agents with the raw material takes place above the boiling point of magnesium, and the metal is distilled from the residue and condensed in the solid or liquid form.

The reduction of MgO with carbon entails difficulties. The reaction $MgO+C=Mg+CO$ is reversible and metal is formed only above 2000°C. It is easy to produce the magnesium vapor in an electric arc furnace, but during the cooling necessary for the condensation, a reoxidation by



Flow sheet of the thermal reduction of magnesium by carbon according to Hansging

the CO is unavoidable. To counteract the reversal, the gaseous reaction products are mixed with cold hydrogen immediately on leaving the furnace chamber and rapidly cooled to 200°C. to produce a dust containing about 90% metal. An electric arc furnace with carbon electrodes is employed for reducing the charge which is a bricquetted mixture of calcined magnesite and carbon. The magnesium dust is redistilled in an inert gas and the vapors are filtered before being condensed. The hydrogen gas is treated with steam in a contact furnace to oxidize the CO to CO_2, washed to remove the carbonic soda, and then dried and returned to the process. There are several plants in Germany operating on this process. However, it has yet to prove successful in this country. The Permanente Plant in California, which used this process with a few modifications, has ceased commercial operation because of several bad explosions and the high cost of production.

(continued on page 30)

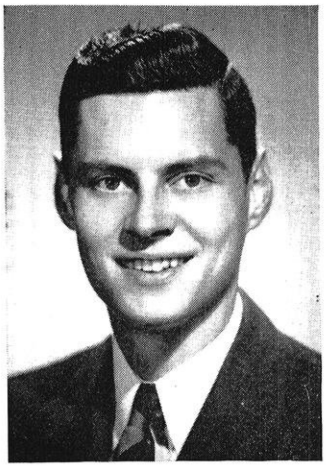
"So You Want To Be An Engineer?"

by Roger Robbins, e'42

(President of the student chapter of A.I.E.E. last year, and at present is employed by Jackson and Moreland Company, Boston, Mass.)

WHEN your Aunt Jennie asked you what you were going to study at college, you probably told her that you were going to be an engineer. But did she ever ask you what an engineer was? Probably not. Most people think that they know what an engineer is, yet few can define the term.

To us, as future engineers, a clear, concise, definite, and comprehensive conception of an engineer is essential. The dictionary definition—"one versed in or practicing any branch of engineering"—does not meet the requirements. Neither does the definition of a certain English gentleman who said, "An engineer is one who can draw sufficient conclusions from insufficient data." After all, we can hardly call ourselves engineers immediately upon completion of our first laboratory experiment in college.



ROGER ROBBINS

An engineer, in the professional sense, is one who through training, study, and practice successfully adapts and controls the materials and forces of nature to the benefit and advantage of himself, his fellow engineers, and the rest of the human family. Engineering is the art of economic application of science to social purposes. We can say, then, that the essential differences between the scientist and the engineer lies in the economic involvement of the engineer's work. To repeat an old saying, "An engineer is a man who can do with one dollar what any fool can do with two."

It has already been said that the engineer is one who adapts and controls the forces of nature through **training**, **study**, and **practice**. Now let us see of what college training should consist in the opinion of employers of engineering graduates.

Surveys show that a very large percent of the engineering graduates do not follow the type of engineering in which they specialized at school. Consequently, a very large portion of the time spent in specialized training is lost except as it teaches the individual to stabilize his thinking, and to apply the basic theories and fundamental principles to engineering problems. In other words, specialized training is fine, since it develops facility in the use of basic principles, but the most important training for the student is fundamental training—training in basic courses such as English, mathematics, physics, and chemistry. James Rowland Angell, president of Yale University, summarizes it in these words, "The modern engineer should be less a technician than a man of broad general training, less an expert mechanic, or electrician, or miner, or what not, and more a man thoroughly grounded in pure science, with especial ability to face new problems and to prosecute original investigation."

But merely knowledge of the fundamental principles is not enough. The student must also develop facility in the **use** of basic principles. Employers of engineering graduates are naturally looking for competent individuals who can fit into a particular job in the shortest possible time and with a minimum amount of training on the job.

Most employers are agreed that technical students should know how and where to find information which they do not already have. Samuel Wesley Stratton, former president of M.I.T., once said that, "In the practice of his profession the engineer cannot always be content with the scientific data at his disposal. He must often take the initiative in its production, working in conjunction with the expert mathematician, physicist, chemist, geologist, and even the biologist. To know when and how to utilize the services of experts, scientific or otherwise, is one of the things that should not be overlooked in technical training.

"The engineer or technologist must assume responsibility and guarantee results more than other professional men. The results of his work can generally be measured or tested. Therefore, the things that develop courage in taking responsibility and getting at the facts of a case must be emphasized in his training. He should look at every task with an open mind, with a view to securing information that will enable him, or someone else, to do it better in the future, a producer of knowledge, not alone a consumer, a leader as well as a follower in his profession."

"In the first few years after graduation," says Robert E. Doherty, president of Carnegie Institute of Technology, "the young engineer finds his most serious challenge. If he is to continue to advance in his profession, he must do more than acquire the technique and practices of his immediate job. His future will often depend as much on the knowledge and experience he gains through contacts with

(continued on page 35)

The Engineers Work During . . .

SUMMER VACATIONS

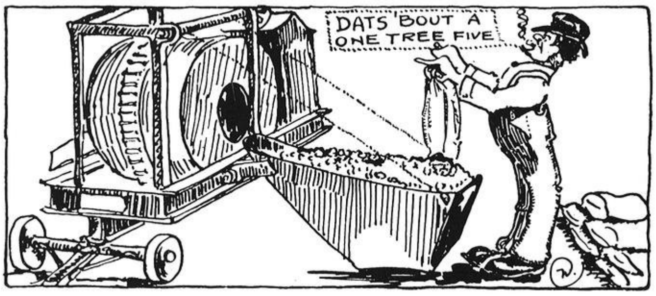
by Don Niles, m'44

ONCE every year the period referred to as summer "vacation" rolls around. To most engineers that word "vacation" is a misnomer. Webster defines the word as meaning a "school holiday." Maybe so, but if you can read about the following "vacations" and still call them "holidays," some definitions are crossed somewhere.

This article was intended primarily for the freshmen, to give them some idea of the jobs they can look forward to. The wages varied in various jobs, going from $20 per week up to $47.50 per week. Fellows on each end of the wage scale were able to save enough from their jobs to come back to school this fall.

Warren Friske, M&ME 3, worked for the Columbia Tool Steel Company of Chicago Heights, Ill. Like many of the other student engineers, he was moved from job to job so as to give him some varied experience. One of his jobs was in the metallography lab. He conducted some research on reclaiming mill scale, which always has been a waste product in steel mills. The results (expressed roughly) were to mix the mill scale with calcium carbide, coke dust, and silica, put the mixture in an electric furnace with scrap iron and proceed as usual from then on.

Another job of Warren's was the weighing up of the constituents in alloys.

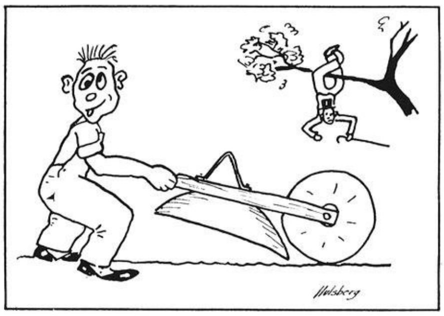


One of the interesting features of summer jobs is that not only do you get paid cash, but your engineering education is proceeding on its merry way. Warren learned several of the systems used to reclaim metal nowadays, by actually watching or participating in them. The system used to reclaim grinding dust, according to Warren, was to run an electromagnet over the days sweepings and just haul the metal out.

Not everyone gets that kind of a job. Take Frank Hansen, ME 4, for example. He spent his summer as a watchman at the Port Washington power plant. The plant was completely fenced in with only two gates. Four guards were on duty all the time to check against anyone getting in without a badge or to forestall any possible sabotage.

The guards operated on three shifts which were rotated among themselves so as to prevent one fellow from guarding at the same time for long periods. Sort of tough on sleeping habits.

Marv Woerpel, ChE 3, went in for a bit of variety. He was employed at the Badger Ordnance Works as a shovel operator (hickory handle type), and also in the lumber yard. To top off his occupations, he became a vacuum cleaner salesman — actually selling one of the things. What's more, he made money.



Phil Arnold, ME 3, was one of the several Wisconsin men to be employed by Pratt & Whitney at Hartford, Conn. Phil worked in the plant layout production engineering department.

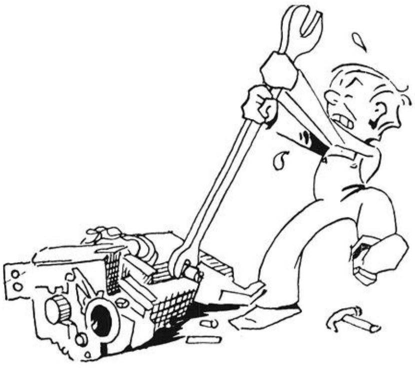
As are most companies, Pratt & Whitney is expanding extensively, building "shadow" plants nearby to make details and sub-assemblies to be carried to final assembly in the main plant. Phil and the rest of his gang had the job of going down into the shop, measuring machines, laying out templates to scale on the drawing board, and then placing these templates on the floor plan of the new plant so operations could be carried out successively with a minimum of time lost.

There were 18 university students in his department who were working for the summer, and six of those 18 were from Wisconsin, 33 1/3 per cent, not bad.

Niels Hansen, EE 3 (second semester), worked for the General Electric plant at Fort Wayne, Ind. He was drafting in the motor generator department since February. His job was to make sectional outlines of motors and generators along with some detail part drawings.

The drawing requirements will interest freshman engineers. The line weight required was very black and heavy so blueprints could be made directly from the pencil drawings (on light paper). Lettering was all upper case (caps) and either slant or vertical.

Henry Rehr, ME 3, also worked at the Badger Ordnance Works. He had two important sounding titles, field engineer or assist to supervisor. When anything broke down, Rehr was right in there knowing how to fix the damage.



A job a bit different from the rest was that of Wayne Garside, ME 3, who worked for the Carnation Company at Oconomowoc, Wis., makers of condensed milk. He "forked" cans, put the completed cans on railroad cars. He studied the system used for making cans which, in brief, is as follows: The sheets of tin plated steel are cut into rectangles of the correct size and these rectangles are formed into the rounded body of the can. A "header" then puts the top and bottom on, the can is evacuated, and the joints soldered. A "test wheel" tests the evacuated can for leaks to complete the operations.

Not all students worked at jobs. Several, including Alfred Baguhn, EE 4, went to summer school. The course lasted 12 weeks with a 13 credit maximum. Outside work was easy to find, it even being possible to work at the airport or Gisholt's and carry a few credits besides.

The summer was a good one for studying, with social activities helped by the dateless dances at the Union and the Summer Prom.

More and more engineers will be going to summer school, no doubt, as it enables one to work part time the year around and still not fall behind, or else to get ahead and graduate early.

Dick Mann, ME 3, worked as a draftsman at Gisholt. Most of his work was on ink tracings of machine tools, lathes, and balancing tools. He wears the army-navy "E" pin which was awarded Gisholt while he was there.

He, also, found the line weight heavier than he was taught in school, and the chief draftsman stressed accuracy above anything else.

Gordan Erspamer, M&ME 3, worked for the Cary Mine at Hurley (!), Wis., which is one of the suppliers of iron ore in the Great Lakes region. One of the novel features of the mine is that their workers can lease land from the company and build a home. This practice has been going on for several years with no record kept of who lived where, so things were in quite a jumble.

Gordy's job was to survey this region, determine the boundaries of the fenced-in lots, and mark them on a master map of the company's territory. Most of the lots were of irregular shape as no attempt has been made previously to survey and lay them out with precision.

Then he had to figure the area of each plot and the coordinates of its boundaries. Ink tracings of each were made to scale and located as to township, range, and section lines. Three blueprints of the completed tracing were made, one for the lessee, one for the local office, and the third for the office of Pickand, Mathers & Co., who operated the mine.

Jim (Dink) Svoboda, ChE 3, worked for the Kewaunee Shipbuilding & Engineering Company at Kewaunee, Wis. and had the title of assistant to the plant engineer. His job was surveying land layouts for laying shipways; drafting (he designed a building which collapsed, also some which didn't); observing pile penetration; filing purchase orders; operating a blueprint machine when necessary, and in his leisure moments he helped sound the waterfront. The lower half of his body was once buried alive in a cave-in in the marsh, but the the top half was left out to let the people for two miles around hear about it. (The FCC complained abut the language).

So, as you see, engineers are not very limited in alternatives for spending their summer vacations. Jobs are plentiful and relatively easy to find, and on the whole they pay quite well, both in monetary and educational dividends.

There now, aren't you glad you're in the College of Engineering?

Activities *for the* Engineers

IT IS of great importance to the engineering students that they know at the beginning of the school year the nature and value of the many extra-curricular activities on the school campus. Every engineering student should aim to obtain a sound technical education, regardless of the type of engineering work in which he is involved. However, to provide more than professional training, the schools often in conjunction with groups actively engaged in the engineering profession have sponsored many extra-curricular activities which offer a free and unrestricted opportunity for the development of the non-technical background so necessary for successful professional life.

Campus activities are usually the best means for an engineering student to branch out, contact life, meet people, and develop his personality. Despite the fact that his profession is necessarily technical, the engineer, when he is working on a job, uses many things besides his formulas. He has to utilize his initiative, his individuality, his knowledge and appreciation of music, books, and art, his grasp of people and the human equation, his understanding of world events. He must develop a philosophy, a way of life, and, above all, he must adjust himself to a compatible relationship with his fellow men. In all of these things, his existence as an engineer is overshadowed by his being an individual.

Each student must decide for himself how much time he can profitably devote to such activities, and since it is obviously impossible to engage in all of them, he must decide carefully which ones will be of most value to him. To present to engineering students a complete picture of the extra-curricular activities at Wisconsin, the **Wisconsin Engineer** has compiled the following information concerning engineering organizations and other campus groups in which engineers take an active part. The classifications given are not rigorous, but have been used mainly for the sake of clarity and convenience. In addition to general discussion, two charts have been included—one to give ideas as to some of the values to be found in engineering activities, the other to present in compact form specific information about each organization. For further information about a particular group, contact the chairman or faculty adviser as given in the table on the opposite page.

ACTIVITIES	SOME POSSIBLE BENEFITS TO BE GAINED									
	ORAL EXPRESSION	PERSONALITY DEVELOPMENT	PROFESSIONAL KNOWLEDGE	WRITING AND EDITORIAL ABILITY	BUSINESS EXPERIENCE	MEETING PROFESSIONAL MEN	ADMINISTRATIVE EXPERIENCE	LEADERSHIP	SPECIAL RECOGNITION OF ABILITY	FUN—ENJOYMENT
STUDENT SOCIETIES	X	X	X			X	X	X		X
HONORARY FRATERNITIES	X	X	X			X	X	X	X	X
WISCONSIN ENGINEER			X	X	X	X	X	X		X
TRIANGLE		X								X
KAPPA ETA KAPPA		X	X			X				X
POLYGON BOARD	X	X			X			X		X
SMOKERS AND DANCES	X	X	?		?	X	?	?	?	XX

1 STUDENT SOCIETIES

The best way for engineers to meet their fellow students and to make contacts with other people is to attend the meetings of the student societies. There are six large national engineering societies represented on the campus which cover all phases of engineering. This year all of the societies will meet on the second Wednesday of each month and some will also meet on the fourth Wednesday. The faculty of the College of Engineering has declared that they will try their best to not schedule big quizzes on the Thursdays following these meetings. However, they could not give a blanket exemption on large quizzes because some one or two credit courses that meet on Thursday that would be severely handicapped by such an agreement. We want to see all the engineers turn out for these society meetings and meet their fellow engineers and enjoy themselves. **Refreshments** are served by all of these societies. Watch for announcements as to the time and place of these meetings.

Some of their plans for future meetings are as fellows: A.I.Ch..E. has Jim Davis, the glass blower in Sterling Hall, and Dr. Gustav Egloff, of Universal Oil Products for tentative meetings; A.I.E.E. has Dr. Cameron of the Psychology Department and Professor Otto of the Philosophy Department for their November and December meetings; the A.I.M.E. has Dr. Ihrig of Globe Steel Tubes plus a fine Mining Club dinner for their November meeting; A.S.C.E. is planning a meeting with their state chap-

TYPE OF ORGANIZATION	ORGANIZATION	ENGR. GROUP	ESTAB. Nat'l	ESTAB. Local	CHAIRMAN Name	CHAIRMAN Class	FACULTY ADVISOR	INIT. FEE	DUES *Nat'l	DUES Local	MEMBERSHIP
Student Societies	A.I.Ch.E.	Chemical	1901	1923	Milton Lavrich	ChE 4	Ragatz	....	....	$1	
	A.I.E.E.	Electrical	1884	1919	Ed Dickinson	EE 4	Price	....	$3	50c	Local— payment of dues and attendance at meetings
	A.I.M.E.	Min. & Met.	1871	1916	Gerald Slavney	Met 4	Shorey	....	$2	....	
	A.S.C.E.	Civil	1852	1907	Richard Andrae	CE 4	Woodburn	....	$2	$1	National— payment of dues and signature of faculty advisor
	A.S.M.E.	Mechanical	1880	1909	John Wilson	ME 4	Nelson	....	$3	$1	
	S.A.E.	All	1904	1938	Albert Miller	ME 4	Hansen	....	$3	$1	
Honorary Fraternities	Tau Beta Pi	All	1885	1898	Robt. Borchardt	ME 4		$25	....	....	
	Chi Epsilon	Civil	1922	1925	Merten Vogel	CE 4	Cottingham	$20	....	....	Election on fulfillment of certain requirements
	Eta Kappa Nu	Electrical	1904	1910	Paul Hoffman	EE 4	Watson	$25	....	....	
	Pi Tau Sigma	Mechanical	1915	1915	Henry Geisler	ME 4	G. L. Larson	$20	....	....	
Publication	Wisconsin Engineer	All	....	1896	Jerome Baird Walter Spiegel	Met 4 ChE 4	Neill	....	....	....	Open to engr.
Executive Council	Polygon Board	All	....	1923	Harold Holler	ME 4	Hansen	....	....	....	Elect. by societies
	Presidents' Council	All	....	1942				....	....	....	Elect. by societies
Social Fraternities	Triangle	All	1907	1913	Edward Bosley	ME 4		$25	$4 yr	$4 mo	Elections
Prof. Fraternity	Kappa Eta Kappa	Electrical	1927	1927	Verland Olson	EE 4	L. C. Larson	$10	$2 yr	$2 mo	Elections

*National dues in the student societies are optional, except for juniors and seniors in A.S.M.E. and S.A.E. If national dues are paid in any of the societies, local dues are cancelled.

ter and the Marquette chapter; A.S.M.E. has an excellent 60 minute technicolor film on arc welding for its next meeting and they are also planning a joint meeting with the Rock River Valley chapter; S.A.E. has a tractor convention in Milwaukee on November 6, in addition to the local meetings with prominent industrial speakers.

2 HONORARY FRATERNITIES

The primary aim of these societies, which are chapters of national organizations, is to recognize through membership outstanding scholastic and special abilities of students and offer them social and professional programs during the year. Membership in these groups is through election after fulfillment of certain requirements and is an honor—something real and worthwhile towards which to work.

3 OTHER ENGINEERING ACTIVITIES

Polygon Board is a central committee in charge of certain special activities of the engineers, such as smokers, dances, and the St. Pat election. Its members, who represent each branch of engineering, are elected by the student societies.

The President's Council consists of the society presidents and the editor of the **Wisconsin Engineer**, who aid each other in improving the societies and sponsoring joint meetings.

The Wisconsin Engineer is the official student publication of the College of Engineering, and its purpose is to furnish students, faculty and alumni with news of the campus and other appropriate material. The **Engineer** offers students excellent opportunities to develop and make use of literary and editorial interests, as well as experience in business and advertising problems.

Triangle is a social fraternity whose membership is open only to engineers. It has the usual advantages of social fraternities plus a close association with fellow engineers.

Kappa Eta Kappa is a professional electrical engineering fraternity which was formed here at Wisconsin. This group maintains its own chapter house and in some respects performs the functions of a social fraternity.

4 ALL-UNIVERSITY ACTIVITIES

Membership in these organizations is open to all University students; however, engineers are to be found active in all of them.

University publications—Engineers are eligible to staff positions on the Daily Cardinal, campus newspaper; Octopus, campus humor magazine; and the Badger, University yearbook.

Miscellaneous—Intercollegiate and intramural athletics, musical organizations (band, orchestra, and chorus), literary and forensic groups, social fraternities. Three all-university honorary fraternities to which engineers are elected are: Phi Eta Sigma, freshman scholastic; Pi Mu Epsilon, mathematics; and Phi Kappa Phi, scholarship and activities. In addition, there are many positions in student self-government, in activities connected with the Union, and in campus co-operatives.

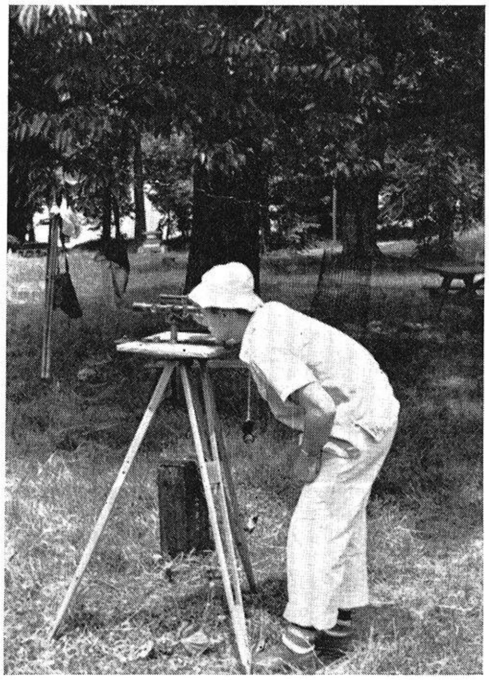
AZIMUTH CITY

by John Nelson c'43 and Robert Woboril c'43

Photos by Ed Kloman c'44

NOT MUCH is said on the University of Wisconsin campus of the hardy band of civil engineering students who every summer brave the toils and tribulations of the Engineering School's survey camp at Devil's Lake, Wisconsin. Theirs is an outdoor life, in close contact with the problems of work in the field that they may some day experience in actual engineering practice. This past summer the camp was attended by 26 civil engineering students.

This year, as usual, the camp was run by Professor Owen, while the kitchen and commissary were taken care of by Mrs. Owen. Food, perhaps the most important single item in camp, was under the capable hands of Mrs. Huntington. The camp, though a masculine stronghold, was not without its feminine charm, for the meals were served by two beautiful, efficient University co-eds, Joan Vea and Mary Hoeveler. It was difficult to determine whether the general rush at the sound of the dinner bell was because of the girls or the food.



Ed Kloman on a Plane Table

The office personnel consisted of Professor Owen, better known as Colonel Ray, in charge of land line surveying. Professor L. F. Van Hagan, known as "Van," conducted the railway engineering work, and Fred "Pop" Bertle was in charge of the stream gauging and plane table work. Mr. Empey, of the State Highway Department, spent two weeks at camp giving instruction in highway surveying. Last but not least was Associate Professor H. W. Wesle, commonly known as Handsome Herby, in charge of topography and hydrographic work.

Camp convened on May 31 and continued for six weeks, ending July 11, with two weeks being spent on railway location work and the other four on general surveying work. The work was presented just as it would be experienced in actual engineering practice. The day started at 6 a. m., with an erratic reveille by the camp bugler, Don Porath. Fifteen minutes later the breakfast bell rang, announcing the serving of a welcome, hot breakfast. At 7 o'clock field parties left camp to tackle their particular jobs for the day, which had been posted on the bulletin board the night before. Dinner was served in camp at noon, but many of the boys took their lunches with them and did not return until 4:30. At this time a bath was had by all, not the hot shower variety, but an invigorating dip into the chilly waters of Devil's Lake. Five-thirty saw the gang back in the dining hall for a hard-earned man-sized meal. This was not the end of the working day, however, for at 7 o'clock the boys went up into the old barn, which served as an office to put in about four hours of white collar work. At 11 o'clock work ceased, usually not because it had been finished, but because the lights were turned out.

Life at camp was not all work, however. Saturday night saw most of the boys with neckties and clean shaves, in search of amusement. The big problem was not where to go, but how to get there, for this year there was an acute shortage of student automobiles. In fact, there were none at all. The nearest place was the Chateau, a dance hall at the other end of the lake. This meant a four mile wilk, but there was hardly a man in camp who didn't make the trip at least once a week. Sunday afternoon was usually spent catching up on much neded sleep, and swimming or playing baseball, although by that evening most of the boys were back at their desks in the barn.

The highlight of the social season was the Prom, held on Saturday night of the fourth week of camp. Most of the dates were girl friends who came to camp for the occasion. Mrs. Owen located dates from Baraboo and the surrounding country for those who were not so fortunate. The tables were cleared out of the dining room and a juke box moved in. With a few pine boughs for decorations, the humble place was turned into a handsome ballroom. The commissary was patronized for cakes and beer. The cares of camp were forgotten as the dance continued into the early hours of the morning. This was only the beginning of the festivities, for the group as a whole boarded the two camp transportational devices, a Chevrolet truck and a 1921 Studebaker touring car, and proceeded into

Baraboo in search of further entertainment. On returning to camp, a few of the braver souls climbed to the top of West Bluff to watch the sun rise over Devil's Lake.

The Studebaker

The old red Studebaker, formerly owned by Professor Owen and kept in the barn until camp opens, is a camp relic that is used to carry the boys to surveying missions in the Devil's Lake area. Although its windshield is absent and the top gone, it is able to get the fellows around, except for steep hills. With its high wheels and loud motor, this antiquated seven passenger touring car has been known to carry eighteen engineers over a terrain that would be a stiff test for an army jeep.

The Fire Run

The Fourth of July was another day of excitement in camp. It may be celebrated by fireworks and speeches in other parts of the country, but not in Azimuth City. A fire run with the camp fire engine has been the tradition for many years and was no exception this year. Jim Lippert, who was elected fire chief, directed the activities.

The fire brigade to the rescue on the Fourth of July with Chief Jim Lippert aboard the buggy

The object of festivities was the extinguishing of a large bonfire built on the lake shore. The fire buggy was pulled by eight honorary firemen wearing their traditional helmets and driven by Chief Jim Lippert. A portable soda acid fire extinguisher was squirted on the fire as well as everyone nearby. The main event was the ducking of all participants in the lake, and also the waitresses, and those who failed to get out of bed for the ceremony. The only casualty of the day was Roy Erickson, who was run over by the fire engine.

Rattlesnakes

The field work was not all engineering, for it was sometimes interrupted by a rattlesnake chase. Two snakes were killed outright and two were captured alive with forked sticks. The two live ones, one of which was five feet long, were turned over to the University Biology Department.

Checking the current meter under the expert direction of "Pop" Bertle

The first rattlesnake of the season furnished a banquet for some of the more hardy souls, including the dining room girls and Mrs. Owen. The snake was butchered, fried, and eaten, in sections ranging from one inch to six inches, depending upon the hardihood of the eater. The flesh was reported to taste like chicken (somewhat) and to chew like rubber.

The farewell banquet was held the last week of camp. Humorous skits were presented by the boys while the instructors gave speeches.

After six weeks of strenuous work and much fun, the camp was taken down and packed away until next year when a new crop of engineers will open it up again. Although the midnight oil during the last week of camp had worn nerves to a keen edge, the last days saw a happy group, for every fellow had completed the office work. The boys departed from their summer jobs with memories of hard work mixed with plenty of fun.

The camp reunion will be held late this October. Professor Owen will prepare a steak fry while the boys talk over their strenuous experiences of the summer camp.

"Van" dubiously watching the boys trying to straighten out their curve notes

One of many new Allis-Chalmers st
turbines which are helping to power
greatest war production effort in hist

Bundles for Berlin... Power for Pittsburgh!

ALLIS-CHALMERS EQUIPMENT HELPS MAKE BOTH

Ore for Giant Aerial Torpedoes and bombs is mined with Allis-Chalmers equipment.

"A. HITLER, BERLIN, GERMANY
That's what we'd like to label just one of t
thousands of tons of ore which Allis-Chalme
equipment is helping to mine and turn in
aerial torpedoes and bombs!

And that turbine above is another All
Chalmers product that will soon be turni
out trouble for Hitler—supplying power
great war plants—helping to make America
soldiers the best equipped in the world.

These are just two examples of how tho

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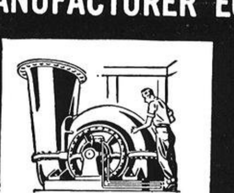
OFFERS EVERY MANUFACTURER EQUIPMENT AND ENGINEERING

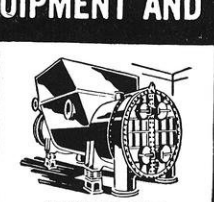
ELECTRICAL EQUIPMENT

STEAM AND HYDRAULIC TURBINES

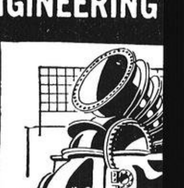
MOTORS & TEXROPE V-BELT DRIVES



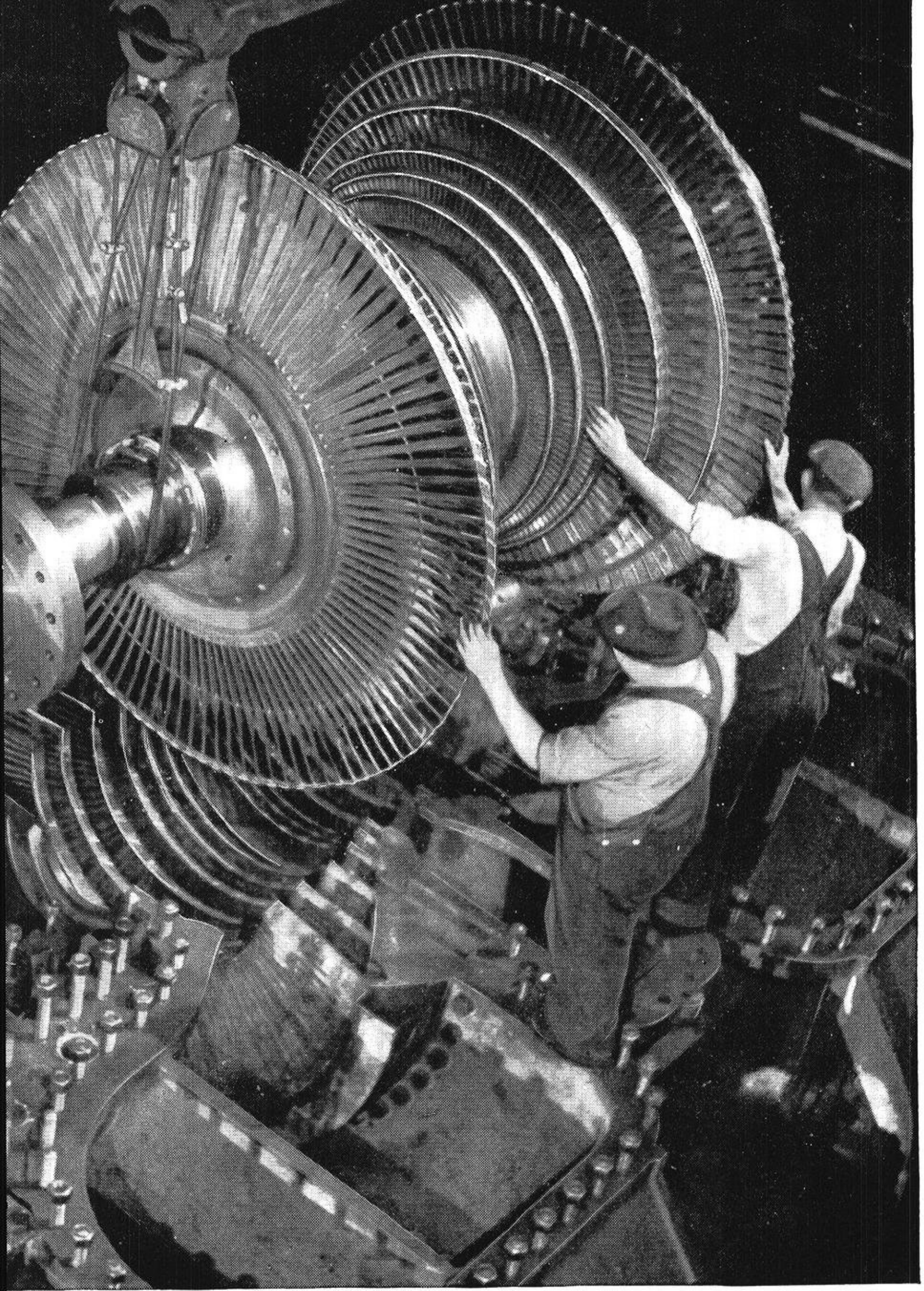
BLOWERS AND COMPRESSORS



ENGINES AND CONDENSERS



CENTRIFUGAL PUMPS



ıds of Allis-Chalmers people are fighting
: Axis—are *working for Victory!*

Over 1,600 Allis-Chalmers products are
rking in the Battle of Production. And our
operative Engineering service is helping
kers *produce more*—not just with new ma-
nes, but with *machines now on hand!*

This production experience will be of added
lue when the war is over. We work for
ctory—we plan for Peace!

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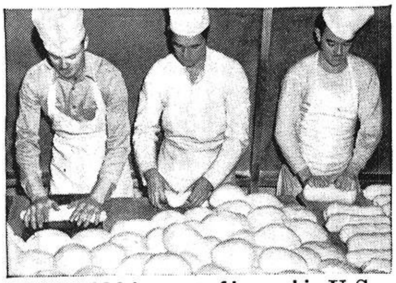


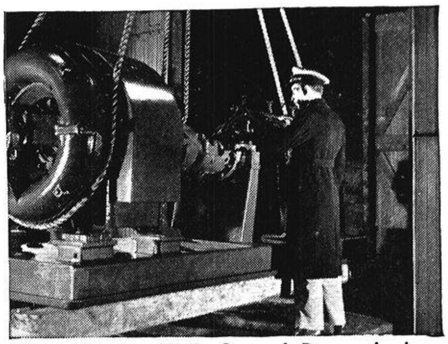
8 out of 10 loaves of bread in U.S. are made with the aid of A-C farm and flour mill equipment.

VICTORY NEWS

Washington, D. C. — Keels for more than 140 "Liberty" ships have been laid and more than 60 ships have been launched from ways which did not even exist before 1941. Original schedules have already been more than doubled.

To set the fastest shipbuilding record in history, mass production principles are used. More than 500 makers are feeding parts to Liberty ways.

From Allis-Chalmers, one of the most important of the contributing firms, comes products ranging from machine-gun cooling pumps to propulsion shafting.



Three-Stage High Speed Pump is inspected as it leaves A-C shops for a military destination. Equipment includes Allis-Chalmers motors and switchgear.

Milwaukee, Wis. — Mosquito boats no longer have to use their motors to recharge their batteries—small Allis-Chalmers rectifier units now do this job.

This unit is the newest means of obtaining nominal d.c. current from existing a.c. power lines. It eliminates need for keeping ships motors running for battery charging on shore. It also aids coast defense by helping to supply power for shore searchlights.

Industrial plants are also using the new unit to supply small amounts of d.c. for individual drives on planers and other machines, in laboratories for testing purposes, and in tool rooms.

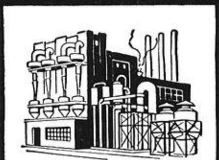
FOR VICTORY
Buy United States War Bonds

ALMERS

WE WORK FOR **VICTORY** WE PLAN FOR **PEACE**

RATION TO HELP INCREASE PRODUCTION IN THESE FIELDS...

LOUR AND SAW
ILL EQUIPMENT



CHEMICAL PROCESS
EQUIPMENT

CRUSHING, CEMENT &
MINING MACHINERY

BOILER FEED
WATER SERVICE

POWER FARMING
MACHINERY

INDUSTRIAL TRACTORS
& ROAD MACHINERY

1942 Grads On The Job

by Arne Larson, m'43

CHEMICALS

GORDON, DONALD H., Ph.D., is in the rayon division of the E. I. du Pont de Nemours & Co., Waynesboro, Va.

HOERIG, HERMAN F., Ph.D., is in the cellophane division of the E. I. du Pont de Nemours & Co., Buffalo, New York.

HUMMEL, HARRY H., M.S., is with the Pan American Oil Co., Texas City, Texas.

LUDKA, WILLIAM R., M.S., is in the Chemical Engineering Department of the Iowa State College at Ames, Iowa.

THOMAS, WALTER E., M.S., is with Sinclair Refining Co., Coffeyville, Texas.

ALBRECHT, EDMUND H., has a position with E. I. du Pont de Nemours & Co., Wilmington, Del.

ALLEN, JAMES S., is in the U. S. Army as a Second Lieutenant.

ARVOLD, WILLIAM V., is with the Standard Oil Co. of Louisiana, Baton Rouge, La.

BAKER, RALPH W., is with the Dow Chemical Co., Midland, Michigan.

BOLTON, ROBERT K., is with National Aniline, Buffalo, New York.

BRENN, JOHN N., is with the Standard Oil Co. of Louisiana, Baton Rouge, La.

BURCZYK, CASIMIR A., is with National Aniline, Buffalo, New York.

CLEMENS, ROWLAND A., is in the ammonia division of E. I. du Pont de Nemours & Co., Morgantown, West Va.

DAWLEY, GEORGE V., is with National Aniline, Buffalo, New York.

DONAHUE, JEROME T., is with the Kankakee Ordnance Works, Kankakee, Ill.

DOWIE, DOUGLAS W., is a Second Lieutenant in the U. S. Army.

DU DOMAINE, JOHN H., is with the Barett Company, New York, New York.

DU VALL, WILLIAM M., is with the Bethlehem Steel Co., Bethlehem, Pa.

ECKMANN, KENNETH C., is in the explosives division of the E. I. du Pont de Nemours & Co., Wilmington, Del.

GEHRKE, WILLARD H., is with the Monsanto Chemical Co., St. Louis, Mo.

GILBERT, JULES, is with the Westvaco Chlorine Products Corporation, South Charleston, W. Va.

HABECK, BRUCE W., is with the Goodyear Tire & Rubber Co., Akron, Ohio.

HAHNSCH, ROBERT O., is with the National Tube Co., Lorain, Ohio.

HIGGINS, HOWARD L., is with the National Tube Co., Lorain, Ohio.

HUSSA, OWEN L., is with Procter and Gamble, Ivorydale, Ohio.

KNIPFER, FRANK P., is with the Kankakee Ordnance Works, Kankakee, Ill.

KUBAL, FRED J., is with the Kankakee Ordnance Works, Kankakee, Ill.

LEVANDOSKI, EUGENE J., is with the Goodyear Tire & Rubber Co., Akron, Ohio.

LOETHER, JOHN M., is in the explosives division of the E. I. du Pont de Nemours & Company, Wilmington, Del.

LUFTER, CARL H., is with the B. F. Goodrich Rubber Co., Akron, Ohio.

MARTIN, LESTER J., is with National Aniline, Buffalo, New York.

MASSEY, LESTER G., is an ensign in the U. S. Naval Reserve.

McDONELL, DONALD J., is with National Aniline, Buffalo, New York.

MILLONIG, LAWRENCE E., is with the U. S. Rubber Co., Detroit, Michigan.

MORLEY, FRANK G., is in the explosives division of the E. I. du Pont de Nemours & Company, Wilmington, Del.

MUELLER, FLOYD F., is with the Hercules Powder Co., Wilmington, Del.

NUSSBAUM, LEONARD C., is with the Westvoca Chlorine Products Corp., South Charleston, W. Va.

PETERSON, HAROLD E., is with the Kimberly Clark Corp., Neenah, Wis.

RANFTL, JOSEPH W., is with the Buick Motor Co., Detroit, Michigan.

ROBERTS, ARTHUR J., is with Procter and Gamble, Ivorydale, Ohio.

ROWE, CARL H., is with Procter and and Gamble, Ivorydale, Ohio.

SCHMALZ, HENRY H., is with the Radio Corporation of America, Camden, New Jersey.

SCHULTZ, KENNETH E., is with the B. F. Goodrich Rubber Co., Akron, Ohio.

SINGER, BERNARD, is with General Electric Co., Pittsfield, Mass.

STARR, D. KEITH, is with the Westvoca Chlorine Products Corp., South Charleston, W. Va.

STOLZE, GEORGE A., is with the Allis Chalmers Manufacturing Co., West Allis, Wisconsin.

STUEBER, GRANT E., is with the B. F. Goodrich Rubber Co., Akron, Ohio.

STUEWER, GERALD D., is a Second Lieutenant in the U. S. Army.

SWAN, VERNON W., is with Curtiss-Wright, Cincinnati, Ohio.

SZELONSKI, MITCHELL, is with the Westvoca Chlorine Products Corp., South Charleston, W. Va.

TORKE, ELMER P., is an ensign in the U. S. Naval Reserve.

VLICHNY, ROBERT M., is with the the Ladish Drop Forge Co., Cudahy, Wisconsin.

UYEHARA, OTTO, is a graduate student in the Chemical Engineering Department of the University of Wisconsin.

VETTER, EDWARD R., is an ensign in the U. S. Naval Reserve.

WAMSER, ROBERT G., is with the Hercules Powder Co., Wilmington, Del.

WESTFAHL, JEROME C., is with the B. F. Goodrich Rubber Co., Akron, Ohio.

WHITE, H. DONALD, is with the Hercules Powder Co., Wilmington, Del.

WILSON, ROBERT W., is with the B. F. Goodrich Rubber Co., Akron, Ohio.

WITTER, WILLIAM M., is with the National Tube Co., Loraine, Ohio.

WRIGHT, WILLIAM N., is with the Monsanto Chemical Co., St. Louis, Mo.

ZEDLER, RICHARD E., is with the Westvoca Chlorine Products Corp., South Charleston, W. Va.

ZINSMEISTER, ROBERT H., is with the Hercules Powder Co., Wilmington, Del.

ZOLIN, BYRON I., is with the Curtiss-Wright Aeronautical Corp., Cincinnati, Ohio.

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CIVILS

BAILER, HOWARD R., is with the Pittsburgh-Des Moines Steel Co. at Pittsburgh, Pa.

BERTLE, FRED A., is working in the TVA soils laboratory at the Kentucky Dam at Gilbertsville, Ky.

BERSCHENS, JOHN I., Second Lieutenant in the U. S. Engineers, is taking a training course at Harvard University.

BERZOWSKI, ROMAN C., after a summer of work in the soils laboratory on the Madison Airport job, reported early in September for duty as ensign in the U. S. N. R.

BROKAW, MAX P., has been with Mason & Hanger on the construction of the Badger Ordnance Plant at Merrimac.

DIXON, DUANE E., since July 1 has been with the U. S. Engineers engaged on the location of the Alaskan Highway in Canada.

EKLUND, C. DONALD, is with TVA in the hydrological data division, stationed at Savannah, Tenn.

ELLIOTT, JOHN F., reported on July 12 at the U. S. Naval Construction Training Center, Camp Allen, Norfolk, Va., for a course of training with a naval construction battalion.

FELDHAUSEN, GORDON J. JR., is with the McDonnell Aircraft Corp., Lambert-St. Louis Airport, Robertson, Mo.

FISK, CHARLES C., is with TVA in the water control planning department at Knoxville, Tenn.

GLENN, ALFRED H., is in the drafting room of the Chicago Bridge & Iron Co. at Chicago, Ill.

GREEN, RICHARD C., is with the McDonnel Aircraft Corp. at St. Louis, Mo.

HANSON, WILLIAM JR., is probably across the sea. He is with Co. D, 19th Engineers at Second Lieutenant.

HENKEL, WALTER A. No report.

HUBER, WALLACE G., is believed to be with the Bethlehem Steel Corp., taking the Loop Course.

INGERSOLL, ALFRED C., is with Linde Air Products at Tanawanda, New York.

JOHNSON, HERBERT E., is in the aircraft plant of the Goodyear Tire & Rubber Co. at Akron, Ohio.

JOINER, ROBERT G., is believed to be overseas. He is Second Lieutenant in Co. B, 19th Engineers.

LANDSNESS, GERHARDT T. O., is a private in Co. A, E. T. Bn., at Ft. Leonard Wood, Mo.

LUEBKE, JAMES H., is an ensign in the U. S. N. R.

McBURNEY, ROBERT S., is with the Forest Products Laboratory at Madison, Wis.

MILAEGER, RALPH E., who has been water waste inspector with the U. S. Engineers Office at Boston, received his appointment late in the summer as ensign in the U. S. N. R.

NERO, MILTON A., is with Dravo Corp. at Pittsburgh in the estimating department.

NORDLIE, ROBERT W., is with the aircraft plant at the Goodyear Tire & Rubber Co. at Akron, Ohio.

PENTZIEN, ROGER L., is Second Lieutenant, Co. B, 13th Engineers, on the West Coast.

PETERS, ROGER W., is with the National Advisory Committee for Aeronautics at Langley Field, Va.

REE, MELVIN C., ensign in the U. S. N. R., spent the summer working on the Madison Airport. He reported to Ft. Schuyler, New York, on August 20.

RESNICK, SOL D., is with TVA in water control planning at Knoxville, Tenn.

SANDNER, FRANK X. JR., is ensign, U. S. N. R., Bureau of Ships, stationed at Norfolk, Va.

SCOTT, DOUGLAS R., is with Dravo Corp., working in the shipyard on Neville Island, Pittsburgh, Pa.

SODEMANN, PAUL C., is with TVA in Knoxville, Tenn.

SPIEDERMANN, JOHN C. JR., is with the Boeing Aircraft Co., in Seattle, Wash.

THOMPSON, MYRON O., is with the Boeing Aircraft Co. in Seattle, Wash.

TICE, CLIFFORD J. JR., is with Dravo Corp., laying out work in the shipyard on Neville Island, Pittsburgh, Pa.

WAGNER, JOHN O., is with TVA at Knoxville, in the water control planning department.

WARZYN, WILLARD W., is with the Dravo Corp. at Pittsburgh, Pa.

WILKE, EDWARD A., is with the U. S. Engineers Office at Cincinnati, Ohio.

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ELECTRICALS

ACREE, GEORGE W., is with the General Electric Co., Schenectady, New York.

ANCELL, J. E., is in the U. S. Naval Reserve.

BARTZ, MARCUS E., is with the General Electric Co., Schenectady, New York.

BAUMAN, H. W., is in the Signal Corps Laboratory at Ft. Monmouth.

BEITZ, R. E., is in the radio division of the General Electric Co. of Schenectady, New York.

BROGDEN, JACK W., is with the Naval Research Laboratory in Washington.

CARTER, E. T., is with Boeing Aircraft.

CUSTIN, T. G., is in the radio division of the General Electric Co. of Schenectady, New York.

DAVIS, N. L., is in the Naval Research Laboratory in Washington.

DEERHAKE, W. J., is with Hy-Grade Sylvania Corp., Salem, Mass.

EISING, J. P., is with the General Electric Co. of Schenectady, New York.

ELLIS, H. N., is in the Reserve Officers Training Corps.

ELMERGREEN, LESTER G., is with the General Electric Co. of Schenectady, New York.

FISHER, PAUL M., is also with the General Electric Co. of Schenectady, New York.

FRERES, C., is in the Navy Radio & Sound Laboratory at Washington.

GIBBS, C. L., is with General Motors Co. of Grand Rapids, Mich.

GLEASON, R. F., is in the Naval Research Laboratory at Washington.

HANSEN, B., is with the Sperry Gyroscope Co., New York.

HARRISON, EMANUEL H., is in the Navy.

HERDEGEN, R. T., is in the Air Corps.

HORNBERG, K. O., is in the Naval Research Laboratory at the Anacosta Station, Wash.

HOUSE, J. P., is in the R. O. T. C. Signal Corps.

IMM, R. A., is with the General Electric Co., Schenectady, New York.

KAHL, L. W., no report.

KAPLAN, M. W., is in the Signal Corps Laboratory at Ft. Monmouth. mouth.

KEMNITZ, WARREN E., is with the General Electric Co., Schenectady, New York.

KORDATZKY, R. W., is in the Signal Corps Laboratory at Ft. Monmouth.

KROHN, R., has a position as an assistant in the Physics Department at the University of Wisconsin.

LARSON, R. W., is doing research at M. I. T.

LINDSLEY, W. F., is with the General Electric Co. of Schenectady, New York.

LOGEMAN, H., is doing research at M. I. T.

LUNDBERG, E. J., is with the General Electric Co. of Schenectady, New York.

MAY, H. E., is with the Hy-Grade Sylvania Corp., Salem, Mass.

MILLER, R. D., is with the Electromotive Corp., LaGrange, Ill.

NESVIG, E. M., is in the Reserve Officers Training Corps.

OLSON, S. E., is with the General Electric Co. of Schenectady, New York.

PETERSON, R. A., is with Boeing Aircraft.

PIPER, W. M., is with the Bonnerville Power Project, Portland, Ore.

PRICE, HOWARD R., no report.

RETZER, T. C., is in the Signal Corps Laboratory.

REUTER, P. L., no report.

RICHARD, V. W., is with the General Electric Co. of Schenectady, New York.

ROBBINS, R. W., is with the Jackson & Moreland Co., Boston, Mass.

SANDEN, L. H., is with the Allis-Chalmers Co., West Allis, Wis.

SCHLINTZ, HARVEY A., is in the Signal Corps at Camp Evans in Belmont, New Jersey.

SCHMIDT, C. J., is in the Signal Corps Laboratory.

SCHMITZ, N. L., is with the Cutler-Hammer Co. of Milwaukee, Wis.

SCHNEIDER, HOMER J., is with the General Electric Co., Schenectady, New York.

SCHWALBACK, H. N., is with R. C. A.

SHENG, JU-GEE, is with the Hy-Grade Sylvania Corp., Salem, Mass.

SUPITILOV, M. C., is doing research at M. I. T.

THOMASGARD, R. B., is with the General Electric Co., Schenectady, New York.

TOPP, I. H., is in the U. S. Naval Reserve.

TOY, E. M., no report.

TREIT, T. J., is with the General Electric Co., Schenectady, New York.

WERDERMAN, F. W., is in the U. S. Naval Reserve.

WHEELER, B. G., is with the General Electric Co., Schenectady, New York.

(continued on next page)

MECHANICALS

(continued from previous page)

ATKINS, THOMAS R. JR., is an ensign in the U. S. Naval Reserve.

BAISCH, STEPHEN J., is a Second Lieutenant in the U. S. Army.

BOGART, JESS D., is with Cutler-Hammer, Inc., Milwaukee, Wis.

BOLLER, CARLTON W., is with Pratt & Whitney, East Hartford, Conn.

BOSSART, DONALD J., is with the General Electric Co., Schenectady, New York.

BOSSER, ROBERT P., is in the Curtiss-Wright Airplane Division at Columbus, Ohio.

BRIGHAM, STEVE J., is in a Naval Aircraft Factory in Philadelphia, Pa.

BRUCE, ROBERT V., was with the Falk Corporation of Milwaukee this summer but is signed up with the U. S. Naval Reserve.

BUHNER, MARVIN H., is with the Harnischfeger Corp. in West Allis, Wis.

CAMERON, FRANK T., is a Second Lieutenant in the Infantry of the U. S. Army.

CULBERTSON, GEORGE W., is with the Allis-Chalmers Manufacturing Co. of West Allis, Wis.

DIBBLE, ROBERT T., is in the U. S. Army.

DINGS, LLOYD M. JR., is a student engineer at the Allis-Chalmers Manufacturing Co. of West Allis, Wis.

DORWARD, HOWARD M., is an ensign in the Bureau of Aeronautics of the U. S. Naval Reserve.

DURZO, FRANK J., is with the R. C. A. Manufacturing Co., Camden, New Jersey.

EHLERT, GEORGE, is in the Aircraft Pump Division of the Thompson Products, Inc., Cleveland, Ohio.

ENGER, ROBERT C., is with the Linde Air Products, Tonawanda, New York.

ENTERS, EDWARD W., is also with the Linde Air Products, Tonawanda, New York.

ERWIN, JOHN R., is with the National Advisory Committee for Aeronautics at Langley Field, Va.

FAVILLE, HUGH C., is with Hamilton Standard Propellers, E. Hartford, Conn.

FEIEREISEN, WILLIAM J., is an instructor in Mechanical Engineering at the University of Wisconsin.

FISHER, EDWIN L., has a position at Fairbanks, Morse & Co in Beloit, Wis.

FRANK, DONALD F., is with Pratt & Whitney in East Hartford, Conn.

GIANOS, JOHN H., no report.

GOEDJEN, RUSSELL C., is an ensign in the U. S. Naval Reserve.

GRUENWALD, KENNETH H., is with the Allis-Chalmers Manufacturing Co., West Allis, Wis.

HARP, CHARLES W., is with the E. I. du Pont de Nemours & Co., Childersburg, Alabama.

HARRIS, GEORGE N., is with the General Electric Co., Schenectady, New York.

HEAGLE, RUSK E., is also with the General Electric Co., Schenectady, New York.

HECKRODT, WILLIAM F., is with the Dow Chemical Co., Midland, Mich.

HENNINGFELD, DONALD S., is with the Allis-Chalmers Manufacturing Co. of West Allis, Wis.

HUEBNER, WALLACE, is with the Monsanto Chemical Co., St. Louis, Mo.

HEFFERNON, CULVER A., is with the Linde Air Products, New York, New York.

HOENIG, K. JOSEF, is a junior engineer in the Curtiss-Wright Co., at Paterson, New Jersey.

HOTH, CARL L., is a junior engineer in the Rock Island Arsenal, Clock Tower Bldg., U. S. Engineer's office, Rock Island, Ill.

HUNTER, JAMES A., is an ensign in the U. S. Naval Reserve.

JAMES, RICHARD D., is an engineering trainee at the Curtiss-Wright Corp., Paterson, New Jersey.

JIRUCHA, LESTER L., is with the U. S. Rubber Co., Detroit, Mich.

JOHNSON, THOMAS L., is with General Electric in Schenectady, New York.

JOHNSON, WESLEY O., is with the Monsanto Chemical Co., in St. Louis, Mo.

KAISER, CLYDE L., is with the Electro-Motive Corp. in LaGrange, Ill.

KISTLER, DALE E., is in a Naval Aircraft Factory in Philadelphia, Pa.

KLAUS, DANIEL E., is with Remington Arms (DuPont) in Illion, New York.

KLEINMANN, EARL E., is with Phillips Petroleum Co., Bartlesville, Okla.

KNAPPE, HERMAN E., is a Junior Engineer in the U. S. Engineer's Office in Milwaukee, Wis.

KNUTSEN, HERBERT K., is with the Sturgeon Bay Shipbuilding & Dry Dock Co., Sturgeon Bay, Wis.

KOEHNE, ANTHONY J., is a Second Lieutenant in the Engineer Corps of the U. S. Army.

KOJIS, JOHN J., is with the General Electric Co. of Schenectady, New York.

KRESSIN, HARLEY, is in a U. S. Naval Aircraft Factory, Philadelphia, Pa.

LAHIFF, ROBERT F., is a Junior Engineer with the General Motors Corp. at Grand Rapids, Mich.

LAVIN, HAROLD J., is with the Chain Belt Co., Milwaukee, Wis.

LUCAS, WOODROW, is with the Electro-Motive Corp. of LaGrange, Ill.

LUEBKE, HERMAN C., is with the Allis-Chalmers Manufacturing Co. of Milwaukee, Wis.

MacARTHUR, ROBERT H., is a Second Lieutenant in the U. S. Army Corps of Engineers.

MAINZER, KENNETH C., is an Aviation Cadet in the U. S. Naval Reserve.

MANN, FREEMAN, is with the General Motors Corp. in Grand Rapids, Mich.

MEYER, ROBERT E., is with Pratt & Whitney Aircraft, East Hartford, Conn.

MILAUC, FRANK JR., is with Allis-Chalmers Co., Milwaukee, Wis.

MINCH, FRANK, is a Junior Engi- in the U. S. War Department at Rock Island, Ill.

NIESE, MAX J., is with the General Electric Co. of Schenectady, New York.

ODEGAARD, EUGENE A., is with the Babcock & Wilcox Co., New York, N. Y.

ORTH, CHARLES D., is with Curtiss-Wright in Buffalo, New York.

PARDUHN, EWALD H., is with the Allis-Chalmers Manufacturing Co. in West Allis, Wis.

PERCHONOK, EUGENE, is with the National Advisory Committee for Aeronautics at Langley Field, Hampton, Va.

PERRY, RUSSELL S., is with the E. I. du Pont de Nemours & Co., Charleston, W. Va.

PFISTER, RALPH J., has a position as a production engineer doing a time and motion study for the International Harvester Co., Milwaukee, Wis.

PRINZ, FRANK J., is with Hamilton Standard Propellers, E. Hartford, Conn.

REED, KENNETH D., is with the Curtiss-Wright Co., Cincinnati, Ohio.

REINECK, LESTER W., is also with the Curtiss-Wright Co., of Cincinnati, Ohio.

REUSCHLEIN, CLIFFORD J., is with the Remington Arms (duPont), Bridgeport, Conn.

ROGERS, JAMES G., is a Second Lieutenant in the U. S. Army.

ROWE, CARL B., is with Pratt & Whitney, E. Hartford, Conn.

ROWE, WILLIAM H., is an ensign with the U. S. Naval Reserve.

SALTER, MILO J., is with the Allis-Chalmers Co. of West Allis, Wis.

SCHAACK, GEORGE C., has a position with the General Electric Co., Schenectady, New York.

SCHMOOK, EDWARD JR., is with the General Electric Co., Schenectady, New York.

SCHROEDER, KENNETH A., is with E. I. du Pont de Nemours in Charleston, W. Va.

SCHINDHELM, R. M., is an engineer trainee at the Curtiss Airplane Division of the Curtiss-Wright Port Columbus Plant, Columbus, Ohio.

SCOFIELD, WILLIAM, is a technical engineer for Curtiss-Wright at Paterson, New Jersey.

SCOTT, HARLO W., is an ensign in the U. S. Naval Reserve.

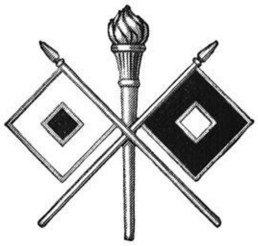
SHARROW, ROBERT F., is with the General Electric Co., Schenectady, New York.

SMITH, JAMES G., is with the Wright Aeronautical Corp., Paterson, N. J.

SMITH, NEWELL L., is with Pratt & Whitney in East Hartford, Conn.

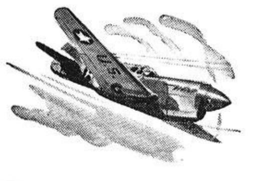
(continued on page 29)

COMMUNICATIONS
. . . directing arm of combat



"Get the message through!" That's the tradition of the men who wear this insignia. Of the 18,000 Bell System people now in the armed forces, nearly 4,500 are with the Signal Corps. Young men can serve their country and obtain specialized training in communications in this great branch of the Army.

...and Western Electric equipment goes to every battle front



Army planes fly and fight with Western Electric radio command sets, which keep the planes of a squadron in contact with each other and with the ground forces.

Wherever American soldiers fight in tanks, they get their orders over Western Electric radio sets—vital in coordinating today's mechanized warfare.

Observers report front-line action to Army commanders over Western Electric field telephones, field wire, field switchboards.

A major source for this specialized equipment is Western Electric—for 60 years manufacturer for the Bell System—one industry with over 70,000 skilled men and women dedicated to *"keep 'em in contact."*

Western Electric

ARSENAL OF COMMUNICATIONS

ARMY E NAVY

On The Campus

FACULTY CHANGES

The faculty list for the College of Engineering, according to Dean Johnson's office, shows that twelve members from last year's staff have departed while only nine new appointments were made. In addition, there are seven promotions.

The Chemical Engineering Department heads the list of new appointments with five men—Kenneth M. Watson (an assistant professor until he left the campus in 1931) appointed as professor, L. H. Beckberger, R. B. Beckmann, Albert E. Pufahl, and Rollin Taecker as instructors. Elmer H. Scheibe has been appointed to the Electrical Engineering Department as instructor, and W. J. Feiereisen, John W. Medlin, and Philip S. Meyers are the new instructors in Mechanical Engineering.

Promotions are as follows: Professor from associate professor—Roland A. Ragatz, chemical engineering; J. F. Oesterle, metallurgical engineering. Associate professor from assistant professor — W. S. Cottingham, civil engineering; K. G. Shiels, descriptive geometry; Glenn Koehler, electrical engineering; J. W. McNaul, mechanical engineering. G. W. Washa, mechanics, was promoted to assistant professor.

•

A.S.C.E.

The University of Wisconsin student chapter of the A.S.C.E. held its first meeting of the present year Wednesday evening, September 23, at the Hydraulics Laboratory. Earl Maas was elected Polygon representative. Following this brief business meeting, Prof. Woodburn presented colored movies of his trip to the West this summer. These pictures included scenes of several water power and irrigation projects and also of several western college campuses. Prof. Owen also presented a series of movies, showing the 1941 Work Day (Lake Road Project), and also the "Fire Run" at the 1942 summer survey camp. For those who are unacquainted with this ceremony, it starts as an attempt to extinquish a bonfire, but it seems that the civils get a little playful and spray each other with the hose. This affair ends in a general ducking in Devil's Lake.

•

LOANS FOR ENGINEERS

The U. S. Office of Education has recently announced a loan fund to assist college students in accelerating training for certain war-essential technical and professional fields. To qualify, you must have had two years of engineering and satisfactory grades. The loans are handled through the University and carry an interest rate of 2½% per annum. For further details see Registrar Merriman in Bascom Hall.

(continued on page 32)

REGISTRATION, COLLEGE OF ENGINEERING, — 1940-41, 1941-42, and 1942-43

	Chemical			Civil			Electrical			Mechanical			Mining and Metallurgy			Totals		
	1940-41	1941-42	1942-43	1940-41	1941-42	1942-43	1940-41	1941-42	1942-43	1940-41	1941-42	1942-43	1940-41	1941-42	1942-43	1940-41	1941-42	1942-43
Freshmen	105	120	171	44	52	104	58	74	84	197	211	252	20	24	26	424	481	637
Non-Prom. Freshmen	9	14	15	10	9	9	8	9	5	30	37	53	9	4	9	66	73	91
Sophomores	101	107	100	33	42	28	77	54	55	127	160	164	24	28	13	362	391	360
Juniors	73	72	76	40	28	30	83	73	52	128	113	98	21	17	22	345	303	278
Seniors	50	66	61	50	38	25	63	60	40	98	100	88	14	25	12	275	289	226
Total	338	379	423	177	169	196	289	270	236	580	621	655	88	98	82	1472	1538	1592

TOTAL REGISTRATION

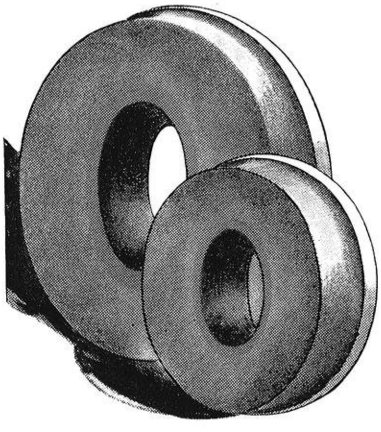
1917	510
1918	856
1919	1084
1920	1166
1921	1240
1922	1163
1923	1100
1924	1032
1925	953
1926	926
1927	962
1928	962
1929	1039
1930	1086
1931	1084
1932	922
1933	833
1934	915
1935	1020
1936	1163
1937	1371
1938	1497
1939	1447
1940	1472
1941	1538
1942	1592

Smallest freshman registration: 181 in 1932; largest, 637 in 1942.

The giant "Pencil Sharpener" that grinds out projectiles!

Imagine a machine that grinds out 37-mm projectiles almost as easily as you'd sharpen a pencil! Getting the precision of form and finish necessary for accurate shooting was once a much slower procedure. But that was before Carborundum helped develop the wheels for centerless grinding of projectiles. Now the process is simple. First, slice off a piece of cold rolled steel bar stock to exact length with an abrasive cutting off wheel, turn the nose to approximate profile and heat treat to required hardness. Then feed this piece between the specially shaped wheels of a centerless grinder...and...out pops a projectile!

Centerless grinding is performing hundreds of operations in a fraction of the time previously required. And Carborundum has led in developing centerless grinding wheels, which are speeding the output of valves, pistons, shafts, and other products necessary to win the war.



At Carborundum, all our energies are centered on the single objective of helping industry do a better job through the better use of abrasives. When you need information on grinding, our facilities and experiences are at your disposal. The Carborundum Company, Niagara Falls, New York.

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ALUMNI NOTES

by Arne V. Larson, m'43

Chemicals

ALTPETER, PROF. R. J., '31, became the father of a son, Franz Richard Altpeter, July 17, 1942.

STERBA, MELVIN J., '32, is a research chemical engineer for the Universal Oil Products Co. of Chicago, Ill. Melvin Sterba, Jr. arrived July 31, 1942.

GAHNZ, ALVIN, '33, is an inspector of Naval Ordnance at La Crosse, Wis.

REZBA, JOHN, '39, an ensign in the U. S. Coast Guard Reserve, has been on active duty since July 22. He is Duty Officer in the Chicago District Office.

LEOPOLD, GLENN, '40, is now with the Allis-Chalmers Mfg. Co., West Allis, Wis. He is in the research, metallurgical, and chemistry department.

SCHWENN, MARVIN, '41, was married to Helen Kopp of Chicago, Ill., May 29, 1942. They are making their home in Buffalo, N. Y.

PETERSON, HAROLD, '42, was greeted with a son, Robert Peterson, Aug. 3, 1942.

TURGASEN, HARRY W., ex. '42, of Mauston, Wis., died April 30, 1942 of suffocation while working in a tightly sealed low pressure chamber at San Antonio, Texas. He was a graduate of the low pressure chamber course at Wright Field, Ohio.

•

Mechanicals

DORNER, FRED H., '05, died May 5, 1942. He was the man who was so influential in obtaining the present Mechanical Engineering Building. He also furnished the pictures as well as the bronze plaque. He will be remembered as a very much respected man who gave a good share of his time and money to better the engineering profession. He was a member of Pi Tau Sigma and was also a former member of the Board of Visitors of the University of Wisconsin as well as being a member of many different clubs, societies, and councils, and past president of a good share of them.

ANDERTON, MAJ. HARRY C., '15, is in the accounting procurement division of the Air Corps with headquarters at Utica, N. Y.

SENFT, JOHN H., '39, a Lt. in the U. S. Naval Reserve, has been temporarily assigned to the Massachusetts Institute of Technology as an Aviation Officer in Aeronautical Engineering.

BOSSER, ROBERT P., '42, is now working on the production of Curtiss-Helldiver dive bombers and Seagull scouting planes for the U. S. Navy in the engineering department of the Columbus, Ohio plant of the Curtiss-Wright Corp.

Electricals

BOLLENS, FRED H., '25, is an electrical engineer with the City of Detroit Public Light Comm. in Detroit, Mich. He visited in Madison June 30, 1942.

•

Miners and Metallurgists

ALBERS, FRANCIS O., '40, was married on July 25 to Alvera Lindgren of Canton, Ohio. They are making their home at the Naval Proving Ground at Dahlgren, Va. Mr. Albers, an ensign in the U. S. Naval Reserve, was the head of the first Engineering Exposition at the University of Wisconsin.

DU MONT, CHARLES S., '42, was married September 22 to Jean Meyer of Sheboygan, Wis. They will live in Niagara Falls.

McINTOSH, ROY, '42, has enrolled in the off-campus graduate class of the Department of Mining & Metallurgy in Milwaukee.

•

Civils

FRATT, FREDERICK W., '82, died on May 15 at Kansas City at the age of 82. He was one of the generation of railroad builders. He became chief engineer of the Wisconsin Central R. R. in 1888. In 1892 he became chief engineer in charge of construction for the Missouri, Kansas and Texas Lines in Texas. He went to Kansas City in 1904 to supervise the construction of the new Union Station. In his later years he was engaged in consulting practice in Kansas City.

LAURGAARD, OLAF, '03, is with the Maritime Commission as resident engineer in the Bethlehem Shipyard at Alameda, Calif.

MORITZ, ERNEST A., '04, is director of power at Boulder City, Nevada, for the U. S. Bureau of Reclamation.

REMP, RICHARD W., ex-'04, who has been with the Dravo Corporation of Pittsburgh for many years, was recently made vice-president with headquarters at Wilmington, Del.

HUNT, HENRY J., '06, member of the Madison firm of Mead, Ward and Hunt, has been appointed a member of the Madison Metropolitan Sewerage Commission.

GRAFF, BJARNE HALFDAN, '08, is a civil engineer with the U. S. Navy, stationed at the Mare Island Navy Yard, California.

Prof. L. H. Kessler informs us that the following men, not previously reported, are now working with the U. S. Engineers on sanitary work under his direction: **CHESTER A. OBMA, '32**, is a first lieutenant and is stationed at Omaha; **ALFRED J. STEFFEN, '33**, is a first lieutenant and is stationed in the Division Utility Office, Merchandise Mart, Chicago; **WAYNE W. JOHNSON, '37**, is at Atlanta, Ga.; **ROBERT D. GODDIER, '40**, is at Chicago, and **EDMUND J. RYAN, '41**, is at Omaha.

The Alaskan Railway and the Alaskan Highway projects are commanding attention at this time and are attracting some of the Wisconsin graduates. **RICHARD E. WOLFF, '31**, is office engineer for the Seattle office of the Trans-Canadian Alaska Railway. He writes, "This is a 1,500-mile survey to determine the feasibility of a rail connection to Alaska. Twenty-two parties are working on it and are expected to finish by October 1." **DAVE L. HARKER, '28**, who has been with the Wisconsin Highway Commission, **JOHN J. FITTON, '41**, who has been with the U. S. Bureau of Public Roads, and **DUANE E. DIXON, '42**, are reported to be working on the Alaskan Highway.

QUIMBY FRANK K., '20, is with the U. S. Engineers at Chicago as sanitary engineer in charge of the maintenance of sanitary utilities in the Sixth Corps area.

WIEPKING, CHRIS A., '21, for many years city testing engineer for Milwaukee, is now with the Forest Products Laboratory in Madison.

FIELD, GEORGE H., '25, who was appointed regional federal works director for Illinois, Michigan, Indiana, Wisconsin, Ohio, and Kentucky early in June, was appointed deputy commissioner of the WPA early in August and assumed his new post in Washington immediately. He entered government service in 1933 as a CWA engineer.

SMITH, RALPH A., '25, who has been with Consoer, Towsend, and Quinlan, consulting engineers of Chicago for many years, has been appointed senior lieutenant in the USNR.

WHITE, OMAR W., '25, is design engineer with the National Advisory Committee for Aeronautics, located at Cleveland, Ohio.

POSS, ROBERT J., '30, after many years with the U. S. Engineers at Milwaukee, has been appointed city engineer for Algoma, Wis.

MEDLER, SAMUEL W., '31, has been with Stone and Webster Eng. Corp. since January, 1941. At present he is supervising construction work at Chattanooga, Tenn.

THOMPSON, WILLIAM E., '32, for several years instructor at the South Dakota School of Mines at Rapid City, is reported to be city engineer of Spearfish, S. Dak.

(continued on page 34)

STATIC . . .

by Mildred & Virginia

Virginia Morrick on the phone and Mildred Bowar typewriting

These hard-working girls in Dean Johnson's office are familiar to all seniors, and since we gave the Dean's message earlier in this issue, we could not pass by his two capable and beautiful secretaries. As for you sophomores and juniors who have yet to cross the threshold to their lovely office, don't be bashful, just walk in and tell them all your woes and they will console you and send you in to see Dean Johnson. Incidentally, they have most of the information on how to get deferments. They have dedicated the following humor to all those in class 1A in the College of Engineering.

•

POETRY

Algy saw a bear
The bear saw Algy
The bear was bulgy
The bulge was Algy.

•

A policeman stopped by a pool in the park, in front of which was a huge sign which read: SWIMMING POSITIVELY FORBIDDEN.

In the pool a man was splashing about.

The officer walked to the edge of the water.

"I'm going to arrest you as soon as you get out of there!" he said.

"Ha-ha-ha!" the man chortled, "I'm not coming out—I'm committing suicide."

•

Frosh: "Hello, Cutie, would you like a lemon with your tea?"

She: "No, I prefer to be alone."

In the days of Queen Elizabeth,, 'tis said, some of the ladies liked to curl up with a good book, while others preferred individual pages.

•

INFIRM THE FOUNDATION

She has a spare tire
That she'd like to conceal—
But her flimsy foundation
Lacks rubber and steel!

•

He: "Shall we walk or take a taxi?"

She: "My shoulders hurt. Let's walk."

•

Women's slacks are all right at the cuffs but don't they look funny around the bottom?

•

Mother: "Sonny, don't use such bad words."

Son: "Shakespeare used them."

Mother: "Well, don't play with him."

•

ODE TO THE LOVELORN

He grabbed me by my slender neck
I could not cry or scream
And drug me to his dingy room
Where we could not be seen
He tore away my flimsy wrap
And gazed upon my form
I was so cold and wet and scared
But he was hot and warm
He pressed his feverish lips to mine
And drained me every drop
I gave him of my very self
I could not make him stop
He made me what I am today
That's why you find me here
A broken bottle thrown away
That once was filled with beer

•

St. Peter: "How did you get up here?"

Latest Arrival: "Flu."

•

He: "We certainly had a big time last night for ten cents."

She: "Yeah, I wonder how my little brother spent it."

•

A true music lover is a person who, when he hears a soprano in the bathroom, puts his ear to the keyhole.

(continued on page 36)

42 Grads - - -

(continued from page 22)

SOMMER, WARREN L., is a Second Lieutenant in the U. S. Army.

STONEMAN, DONALD C., is a test engineer for the General Electric Co., Schenectady, New York.

SWEET, LEONARD E., has a position with the Panama Canal, Panama Canal Zone.

THIES, HARRY L., is with the Standard Oil Company of Ohio, Cleveland, Ohio.

THOMPSON, LLOYD B., is with Curtiss-Wright at Paterson, New Jersey.

THORNBERRY, JAMES M., is an ensign in the U. S. Naval Reserve.

TOLLEFSON, BENNETT H., is a student engineer at the General Electric Co., Erie, Pa.

UECKER, DONALD F., is with Du Pont, Inc., Wilmington, Del.

URBANSKI, MITCHELL, is an Assistant Research and Maintenance Engineer for the Perfex Corp., Milwaukee, Wis.

WEGE, ERVIN C., has a position with the Oilgear Co., Milwaukee, Wis.

WEIDNER, RALPH B., is with the War Department, U. S. Engineer's Office, U. S. Army Federal Bldg., Milwaukee, Wis.

WIBBERT, GORDON A., is an ensign in the U. S. Naval Reserve.

WILLIAMS, FRANKLIN C., is also an ensign in the U. S. Naval Reserve.

WILSON, JAMES M., is with the General Electric Co. of Schenectady, New York.

WULFF, CARL, is a Second Lieutenant in the U. S. Army.

ZARN, CLARENCE E., is also a Second Lieutenant in the U. S. Army.

ZOELLNER, ROBERT E., is with the General Electric Co., Schenectady, New York.

ZOERB, RAYMOND JR., is Junior Engineer in the Tool Engineering Department of the Thompson Products, Inc., Cleveland, Ohio.

ZUCKERSTEIN, MAURICE M., is with the U. S. Rubber Co., Detroit, Mich.

•

MINING AND METALLURGY

KRENZKY, FRED, M.S., is with the Dow Chemical Co., Midland, Michigan.

BEMM, ROBERT A., is with the American Steel and Wire Co. at Duluth, Minn.

BUSWELL, DONALD P., is with the General Motors Corp., Buick Division.

DU MONT, CHARLES, is with the Electro - Metallurgical Corp., Niagara Falls, New York.

GIBBENS, DAVE, has a position with the Oliver Iron Mining Co., at Virginia, Minn.

GRAY, LESTER S., is with the Bethlehem Steel Co.

KOSS, WILLIAM J., has joined the U. S. Navy.

LOCHEN, ROBERT, is with the Allis-Chalmers Manufacturing Co. of West Allis, Wis.

McGUIRE, WALTER, is with the Oliver Iron Mining Co. at Hibbing, Minn.

McINTOSH, ROY, is with the Belle City Malleable Iron Co. of Racine, Wis.

McKLOSKEY, AMBROSE, is with the Curtiss-Wright Co.

PHILLIPS, CHARLES, has a position with the Dow Chemical Company of Midland, Mich.

SCHLASS, JEROME, is with the Caterpillar Tractor Co. at Peoria, Ill.

SCHMIDT, ERWIN H., is with the A. O. Smith Corp., Milwaukee, Wis.

SCHULTZ, JACK, is with the Aluminum Company of America.

SHORT, ROBERT, has joined the U. S. Navy and is now stationed in Washington, D. C.

STERN, MARVIN, is with the Minnesota Steel Co. of Duluth, Minn.

STEWART, ROBERT, is in the Supercharger Plant at Allis - Chalmers Manufacturing Co., West Allis, Wis.

WAULTERS, ERVIN, is associated with the Federal Civil Service in Metallurgy.

Freshmen In Our Library

by Prof. F. E. Volk, Librarian

"MAY a freshman use the Engineering Library, or is it only for upper classmen?" That is not a strange question, but one which any thoughtful freshman engineer might ask. All his classes are on the far side of the campus, a fifteen minute walk from this library. None of his courses require the use of the library, and when he goes there he finds nothing but technical material, and the people using the reading room are upper classmen or faculty members. Considering the handicaps it is not strange that the first year man seldom gets to the library and when he does concludes it is no place for a freshman. That is a mistake! There is a great deal of interesting and not too technical material here which the young engineer can use to his advantage. Unfortunately, it is so intermingled with the highly technical material that the inexperienced library user does not readily find it.

For the benefit of those seeking such material the new "seven day book" section has just been inaugurated. Here is gathered a great variety of material of general interest to engineers. It is not just for freshmen but for all engineers who want some recreational reading in their own field. The material will be changed from time to time and suggestions for the list will be appreciated. It was made a "seven day" collection to keep the material circulating.

The following titles will indicate something of the variety of the material: "A Short History of Science," "Problems in Human Engineering," "Building the Canadian West," "Engineering Opportunities," "Accounting for Engineers," "The Boulder Dam Project," "Engineering Economic Analysis," "Famous American Flyers," "Industrial Waste Treatment Practice," "Technical Report Writing," "Adventures of a White Collar Man," "The Engineering Profession," "Aerial Bombardment Protection," "What the Citizen Should Know About the Army Engineer," "Public Speaking for Engineers," and "Industrial Camouflage."

Another question with the new student is how much red tape is tied up with the borrowing of a book. Very little! A copy of the University Library rules is posted on the first section of the Linedex Bulletin board beside the delivery desk. These rules are few and were designed to secure the greatest good to the greatest number, and to avoid any unncessary restrictions. Of course there are some restrictions such as the length of time a person may keep a book. Obviously a book which is gathering dust on someone's study table does no one any good.

Your fee card is also your library card. Bring it with you and present it each time you borrow a book. Ask the attendant to help you find what you want. He will be glad to help and to show you about.

Magnesium . . .

(continued from page 10)

Magnesium oxide and magnesium chloride can be reduced to metallic magnesium in vacuum by means of calcium carbide at temperatures between 1200 and 1600°C. according to the following equations:

$$MgO + CaC_2 \longrightarrow Mg + CaO + 2C$$
$$MgCl_2 + CaC_2 \longrightarrow Mg + CaCl_2 + 2C$$

The metal is obtained in the vapor form with a solid residue of carbon and calcium oxide or chloride. These reactions can be speeded up by the additon of fluorspar.

Silicon as a Reducing Agent

The reduction of raw material containing magnesia by means of silica offers one of the best prospects for cheap magnesium production in the near future. The dolomite and silica react thus:

$$2MgO\ .\ 2CaO + Si \longrightarrow 2CaO\ .\ SiO_2 + 2Mg$$

with the calcium oxide in the dolomite neutralizing the silicon to calcium orthosilicate. The magnesia in the dolomite is completely reduced. The advantages of silicon over carbon are that a cheaper raw material dolomite is used instead of magnesia, compact magnesium metal is produced in one operation instead of a rich magnesium dust which requires more complicated treatment, and the process is carried on at a temperature from 1200 to 1400° C. instead of over 2000°C.

The war program has accelerated magnesium production at a tremendous pace, so that magnesium can economically compete with aluminum and steel as a structural metal. It will be interesting to see if this ultra light metal can hold its present position against the other metals and the plastics after the war boom is over. Next month an article on the fabrication of magnesium will point the potentialities and the limitations of the metal. For more complete information on magnesium, see the English translation of the German book, "Magnesium and Its Alloys," A. Beck, Hughes Ltd., London, England, 1940.

LIBRARY HOURS

of the Engineering Library

on the third floor, west wing of the

MECHANICAL ENGINEERING BUILDING

are as follows:

Monday through Saturday

8:00 a.m.-12:00 noon

1:00 p.m.-5:30 p.m.

Monday through Friday

7:00 p.m.-10:00 p.m.

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HERE this hottest flame known to man is giving gear teeth a protective "face." The wearing surface of each tooth is readily flame hardened to an easily controllable depth and to any desired degree of hardness, yet its core retains its original toughness and shock-resistance. Gear teeth, wearing surfaces, shafts, sprockets, and a multitude of shapes of any size and form are economically and speedily hardened this modern Airco way.

Because of its many and varied applications, the oxyacetylene flame has been drafted into service to speed defense by cleaning metal surfaces for quicker and long-lasting paint jobs, by shaping steel faster than ever before, by gouging out metal with astonishing speed and accuracy, and by welding it into a homogeneous, permanent unit.

So that you may become better acquainted with the many industrial applications of the Airco oxyacetylene flame, we have prepared a pictorial review of "Airco in the News".

Write to the Airco Public Relations Department, Room 1656, 60 East 42nd Street, New York, New York for a copy today.

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On the Campus---

(continued from page 24)

STAFF CHANGES

Three juniors were appointed assistant editors of this magazine by the board of directors of the Wisconsin Engineering Journalism Association at their meeting of September 30. They are Don Niles, ME; Bill Jacobson, ChE; and Gordon Erspamer, M&ME. Niles has been Campus News editor for the past several issues, while Erspamer and Jacobson were feature writers.

We mourn the loss of Herb Blocki, our associate editor last semester, for he was unable to return to school. He is continuing to work at Merrimac as a surveyor. We will miss Herb's expert help and sly wit when making up the mag. At the present he is staying at the Deke house and commuting daily to Merrimac, while sporting a 1A classification.

•

KENNETH M. WATSON

The Chemical Engineering Department this fall welcomes back Prof. Kenneth M. Watson, who was an assistant professor here before he left in 1931 to enter the petroleum industry.

Prof. Watson received his entire university training here, obtaining his Ph.D. in 1929. He served as instructor for the five years preceding this, and was then appointed as assistant professor. While taking his Ph.D., he was connected with the Western Electric Company, having spent a year as assistant engineer in their development branch. During his tenure here he also acted as assistant to the Wisconsin State Sanitary Engineer, investigating paper mill wastes, and was a metallurgical consultant for the A. O. Smith Corporation.

He left here in 1931 to assume charge of pilot plant and physio-chemical research for the Universal Oil Products Company. From 1936 to 1941 he was director of engineer-in research there. The past year he was with the engineering department of the Gulf Oil Corporation, and was the Gulf representative and chairman of the joint technical committee of major oil companies responsible for the development and design of synthetic rubber processes.

Prof. Watson will continue his relations with the petroleum industry as a consulting engineer, and also expects his varied research here to include further work on petroleum and hydrocarbons. At the present he is working a problem for the WPB, and is conducting a graduate course in distillation.

Senior chems know him as the co-author with Prof. Hougen of "Industrial Chemical Calculations." He has also written a section of "The Science of Petroleum," and has published many papers and bulletins in various technical journals, principally in "Industrial and Engineering Chemistry." He has approximately 10 patents issued and pending on various phases of petroleum engineering and technology. At the present he is a member of the Publications Committee of the American Institute of Chemical Engineers and of the Symposium Committee of the Industrial Division of the American Chemical Society.

•

PHY ED

Last spring the university faculty voted to remove the physical education requirements for junior and senior engineers because of their heavy schedules. At first glance this might seem as though the upperclassmen were getting soft, but such is not the case, for they keep in top physical shape by running from the ME Building to the ChE Building, EE Lab, or Ed & Engr. Building to make their classes on time.

•

FROSH BRAIN TRUST

As has been the tradition for years past, some members of each freshman class get good grades, and last year's class was no exception to that tradition. Here is a list of those who made honors and high honors as received from Dean Millar's office.

•

HIGH HONOR RATE

Fischer, D. W.	3.00
Hirchert, W. F., Jr.	3.00
Rose, L. W.	2.94
Brenner, E. J.	2.94
Brenner, E. J.	2.92
Lange, S. R.	2.84
Knight, M. B.	2.83
Wendt, E. A.	2.80
Manteufel, R. J.	2.79
McNall, P. E.	2.78
DeLong, Wm. R.	2.77
Earle, D. H.	2.76

HONOR RATE

Fein, R. S.	2.73
March, J. W.	2.67
Bennett, D. H.	2.66
Steinhart, V.	2.66
Goldbeck, C. W.	2.66
Hibbard, F. G.	2.65
Young, W. C.	2.63
Scheuring, R. P.	2.62
Thompson, K. L.	2.61
Starke, G. O.	2.60
Rowlands, M. J.	2.59
Tanghe, J. H.	2.59
Stabnow, R. J.	2.58
Oleson, M. W.	2.55
Baumgarth, V. H.	2.53
Wendt, W. R., Jr.	2.52
Jacky, G. F.	2.50
Johnson, M. H., Jr.	2.50
Petrie, W. C.	2.50
Young, E. P.	2.50
Blackburn, R. T.	2.47
*Zimmerman, N.	2.47
Kaesberg, P. J.	2.46
Adams, A. L., Jr.	2.46
Johann, J.	2.46
Miller, Wm. S.	2.44
Gulli, F. J.	2.42
*Hoftiezer, W. A.	2.39
McMahon, R. E.	2.38
Holmes, A. W.	2.37
Cochrane, W. C.	2.36
Brown, R. C.	2.35
Koehler, F. J.	2.29
Schulze, O. A.	2.27
Hyland, F. G.	2.27
Ille, Wm. B.	2.26

*Second Semester only.

(continued on page 34)

Cary Mine Shaft . . .

(continued from page 5)

5 foot diameter reel connected to a 25 h.p. motor. A single-drum main hoist, driven by a 200 h.p. motor through a single reduction, handles the boring equipment, using a $\frac{7}{8}$ inch wire rope. The man hoist has a single drum, winds a $\frac{5}{8}$ inch cable, and is driven by a 25 h.p. motor. It handles the man cage, a torpedo-shaped cage with a two-man capacity.

When a core has been cut to a depth of about 10 feet, the operator disconnects the air and power lines and the drill is lifted to the surface and swung away from the collar. The core is broken off by wedging it to one side, and is then removed by means of a core-puller. This core-puller consists of a tapered ring with a number of fluted dogs inside. When the ring is lowered over the core the dogs slide down, but when the puller is raised they contract and grip the core, enabling it to be pulled up by the hoist. Then the operator goes back down into the hole to remove broken rock and to make certain that the bottom is clear for the next cycle.

Actual drilling of the borehole began the first week in September and it will be approximately a year before the full 3,100 feet of the hole is completed. Another year is estimated by Mr. H. W. Johnson, district engineer, for the enlarging of this pilot hole into a production shaft and for the building program which will center around the completed shaft. When it is completed, the Cary Mine will have the most modern production facilities of any on the ranges and is generally expected to be one of our foremost producers of iron ore.

On The Campus...

(continued from page 32)

CLASS OF '44 HONORS

SOPHOMORE HIGH HONORS

Chemical Engineering

Gohlke, Gerhardt A.	2.94
Jacobson, E. William	2.65
Keating, James C.	2.64
Martin, A. Harold	2.72

Civil Engineering

Christensen, Lester E.	2.85

Electrical Engineering

Baillargeon, Ralph E.	2.76
Palmatier, Francis N.	2.91
Plass, Harold J.	2.57
Sell, John H.	2.71

Mechanical Engineering

Charley, Philip J.	2.69
Geiger, Felix, E.	2.56
Hirchert, Walter F., Jr.	2.93
Pennau, Karl L.	2.89
Schuette, John F.	2.71
Teuschek, Max J.	2.76
Verhaeghe, Robert C.	2.81
Wegener, Karl O.	2.59

Mining and Metallurgical Engineering

Wollering, Walter R.	2.65

SOPHOMORE HONORS

Chemical Engineering

Beyer, James N.	2.24
Caldwell, John R.	2.57
Devine, James E.	2.37
Dismon, Solomon	2.47
Kazan, John	2.38
Latondress, Edward G.	2.12
Leverance, Gilbert W.	2.37
Swoboda, Thomas J.	2.51
Tomlinson, Charles W.	2.38
Yundt, Charles G.	2.46

Civil Engineering

Bauman, Merritt R.	2.21
Jaehnig, Gordon H.	2.53

Electrical Engineering

Buxbaum, John	2.49
Ehlers, Walter H.	2.24
Hill, Gilman A.	2.52
Luecker, George E.	2.46

Mechanical Engineering

Anderson, Roy I.	2.24
Coliz, James T.	2.43
Dieckmann, J. Robert	2.26
Garside, Wayne H.	2.27
Holton, Raymond R.	2.41
Leffingwell, Wm. B.	2.49
Martin, John D.	2.41
Mason, Richard G.	2.51
Mikunda, Louis J.	2.64
Niles, Donald E.	2.65
Notbohm, Willard C.	2.35
Possell, Clarence R.	2.48
Puidokas, Stanley V.	2.14
Rawson, Edward R.	2.47
Spradling, Joseph W.	2.40

Mining and Metallurgical Engineering

Eck, Robert W.	2.56
Erspamer, E. Gordon	2.21
Wright, Richard E.	2.55

CIVIL SERVICE

The U. S. Army Air Corps at Wright Field, Dayton, Ohio, are in urgent need of engineers in the mechanical, electrical, and aeronautical fields. Openings are available for immediate appointment at $2400 per annum. Graduate engineers with no experience as well as those physically handicapped may qualify. For further information, get in touch with the recruiting section, Seventh U. S. Civil Service Region, Room 1107, New Post Office Building, Chicago, Ill.

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FRED REHM

Basketball star, honor student, and homecoming chairman, Fred Rehm, is running for senior class president. His campaign against shady campus politics deserves the support of all engineers.

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Alumni Notes . . .

(continued from page 26)

FREAS, ALAN D., '33, who has been on the engineering staff of the Forest Products Laboratory at Madison, has been called to active duty and is now a captain in the Army Air Corps, assigned to the materials laboratory, Experimental Engr. Sec., at Wright Field, Dayton, Ohio.

KOCH, FRED O., '34, is working for the Duffy Construction Corp. on a project in Philadelphia.

SPARS, RAYMOND F., '34, assistant engineer for the C.M.St.P. & P. R.R., was transferred on June 1 to the Chicago Terminal Division.

ACKERMANN, WILLIAM C., '35, was married on May 6 to Margaret Adele Koepsell of Sheboygan. He is with TVA.

KURTH, JAMES A., '35, ensign in the USNR and fire control officer, Bureau of Ordnance, Washington, was married on May 16 to Dorothy Carolyn Sanborn of Salisbury, N. H.

BLERSCH, JOHN A., '36, who has been with the Great Lakes Division of the U. S. Engineers, was drafted early in the summer.

DRESSER, J. GILBERT, '36, who was with the Carnegie-Illinois Steel Corp for five years, is now assistant to the plant manager of the Inland Container Corp. of Milwaukee.

HENRY, JAY E., '36, captain in the Corps of Engineers, USA, announces the arrival of a new son, Steven Dexter, on Aug. 1.

RHODES, JAMES A., '36, since January has been with the U. S. Engineer Office at Savannah, Ga., as assistant engineer investigating and planning power development of the Savannah and Altamaha Rivers.

KUTCHERA, DON H., '37, announces the arrival of a third child, Doris Jean, on August 4. He is a structural designer with Allis-Chalmers Co., in Milwaukee.

ALEXANDER, FREDERICK C., '38, who is with Allis-Chalmers Co., in the publicity department, was married on May 31, to Esther Leah Schlossmann of Milwaukee.

ENGDAHL, ROBERT L., '38, who was city engineer at River Falls, Wis., is with the U. S. Coast and Geodetic Survey.

VAUGHAN, JAMES S., '38, captain in the USA, was married on June 6 to Kathryn Kuechenmeister of Thiensville, Wis.

VOREL, EMERSON, '38, is with Giffels & Vallet, architect and engineer on the Nebraska Ordnance Plant at Wahoo, Neb.

KUTCHERA, RALPH J., '39, is concrete designer for the Austin Co. of Cleveland, contractors for a new plant for the Dow Chemical Co., at Midland, Mich.

CHLADEK, KOLAR B., '40, lieutenant in the USA and stationed at the University of Wisconsin, was married on July 18 to Dorothy Louise Blasing of Delavan, Wis.

DIETZ, JESSE C., '40, lieutenant in the 819th Engineer Bn. is now in England. Before leaving this country, he was married in Tucson, on April 24, to Dr. Elen Davison, who is on the faculty of the University of Arizona.

HANCOCK, WILLIAM F., '40, is an ensign in the civil engineering corps of the USNR, in training at Camp Allen, Norfolk.

CLARKE, HARRY D., '41, a lieutenant in the U. S. Marine Corps, is at present stationed on the U.S.S. Ranger.

CURRY, DONALD A., ex-'42, lieutenant in the U.S.A. and stationed at Cap Cod, Mass., was married on March 18 to Lois M. Saeck of Madison.

WARZYN, WILLIARD W., '42, who is with the Dravo Corp. of Pittsburgh, was married on June 1 to Jeanne Carroll of Chippewa Falls, Wis.

So You Want To Be An Engineer . . .

(continued from page 11)

fellow engineers." Unfortunately, very few colleges give adequate training in what may be termed "human engineering" or human relationships. But the subject of human relations is becoming more and more important in the engineering field. The ability to get along with fellow engineers is essential.

In summary, then, the engineering graduate should be trained in the basic theories and fundamental principles of science, in the use of those theories and principles, in the art of knowing how and where to find information and when and how to utilize the services of experts, and in what may be termed "human engineering" or human relations. These factors, in brief, constitute the training which, when supplemented by continued study and practice, will enable the graduate to "successfully adapt and control the materials and forces of nature to the benefit and advantage of himself, his fellow engineers, and the rest of the human family."

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Horizontal boring mills have horizontal spindles and vertical boring mills have vertical spindles.

STATIC - - -

(continued from page 28)

To remind us illiterate engineers to write to our friends who are in the armed forces, Mildred has given us the following approved form:

States of Younted
Septer Day 41

Mine Dear Hans:

I take up mine pen und ink und write mid a led pencil. Ve don't liff vere ve moved. I am so offly sorry since we are seperated together und wish ve vere closed apart. Ve are having more vether up here then ve had last year.

Mine dear aunt Katrinka is dead. She died of newmonia on New Year's day is 15 minutes in front of life. He breath all leaked out. De doctor gave up all hope of saving her when she died. She leafs a family of two boys and two cows. Her sister is having de mumps, und is having a swell time. She is at Deaths Door de doctor think dey can pull her through.

Mine bruder yust granulated from de cow college. He is an electricution engineer, und stenograger. He is now got a job in livery stable stenografting hay down to the hosses. De oder day he took our dog up to de saw mill. De dog got in a fight mid de circular saw und the fight only lasted one round.

We half a cat und tree chickens. Die chickens lay eggs und de cat lays by der radiator. De college was cold de udder day, so my brudder calt up der janitor und made it hot for him. I am making money fast. Yesterday I deposited a hundred dollars in de bank und today I vent down und wrote mine-self a check for a hundred dollars und deposited it, so now I haff two hundred dollars.

I am sending your overcoat by express. To save charges I cutt off de buttons. You will find dem in de inside pocket I can tink of nudding more to write. I hope this finds you de same.

Your Cozzing
FRITZ

P. S. If you don't get dis letter write und I will send you another.

2 Times P. S. I have just received the fife dollars I owe you, but have closed dis letter and can't get it in.

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CARRYING THE FREIGHT

"All right back there?" called the conductor from the front of the car.

"Hold on!" came a feminine voice. "Wait 'til I get my clothes on."

The entire car full turned around and craned their necks expectantly. A girl got on with a basket of laundry.

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"I'm glad I didn't marry him. My friends told me how foolish he looked, waiting there at the church for me."