Winter 1-1943

Volume 52 - Issue 6 - January, 1943

Rose Technic Staff
Rose-Hulman Institute of Technology

ROSE TECHNIC

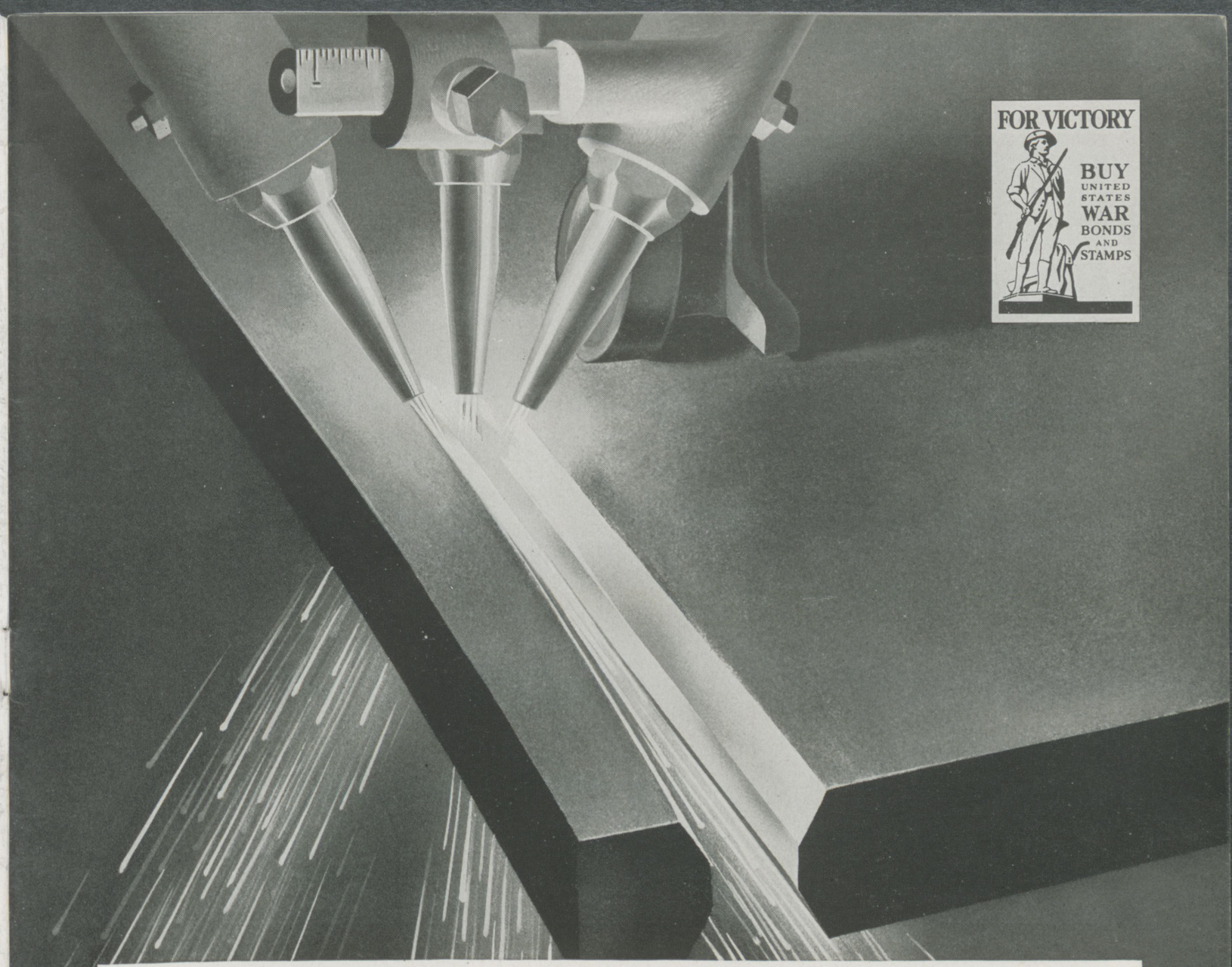
JANUARY 1943

MEMBER OF
ECMA

The Army - Navy - Manpower Commission announcements of plans for training officer candidates and civilians should be followed closely by all high school students. More than 100,000 young men will be selected annually for from eight to thirty-two months of college education with all expenses paid. Much of this training will be in the field of engineering.

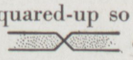
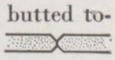
ROSE POLYTECHNIC INSTITUTE

TERRE HAUTE, INDIANA



FLAMES THAT CUT TIME!

TODAY, ships are needed as never before. And today, ships are being built as never before . . . and built faster, stronger, and with less steel . . . thanks to welding!

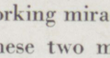
But before welding can take place, steel plates have to have their edges beveled and squared-up so that, when butted together, they look like this:  or like this: 

In the past, preparing plates in this manner was done by heavy machine tools. Cutting was slow and costly. Each plate had to be handled many times. Plate cutting on this basis could hardly keep pace with welding today.

Now, oxy-acetylene flames . . . *cutting in different planes simultaneously* . . . prepare the edges of steel plates of any commercial thickness *at one pass* . . . in a fraction of the time required by mechanical methods!

This Linde flame-planing method is as simple as ABC. It is economical . . . and easy to use. It cuts plates so smoothly and accurately that *no machining is necessary!* And it uses materials which can be produced in abundance.

On-the-job power requirements for flame-shaping are negligible . . . for the reaction of the cutting oxygen jet with the hot steel does all the work . . . and only fractional horsepower is required to move the cutting nozzles along the line of cut.

In conjunction with "Unionmelt" Welding . . . an amazing electrical welding process that unites plates of any commercial thickness faster than any similarly applicable method . . . like this  . . . the Linde method of plate-edge preparation is working miracles in speeding up shipbuilding.

These two methods are also helping to break production records in other fields. Great pressure vessels . . . locomotive boilers . . . huge pipes . . . heavy chemical tanks . . . combat tanks . . . artillery mounts . . . and other vital equipment are being turned out faster because of them.

Linde research, intensified today, is constantly solving new problems in flame-cutting, flame-fabricating, and flame-conditioning of metals for war production.

The important developments in flame-cutting—and other processes and methods used in the production, fabrication and treating of metals—which have been made by The Linde Air Products Company were 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.

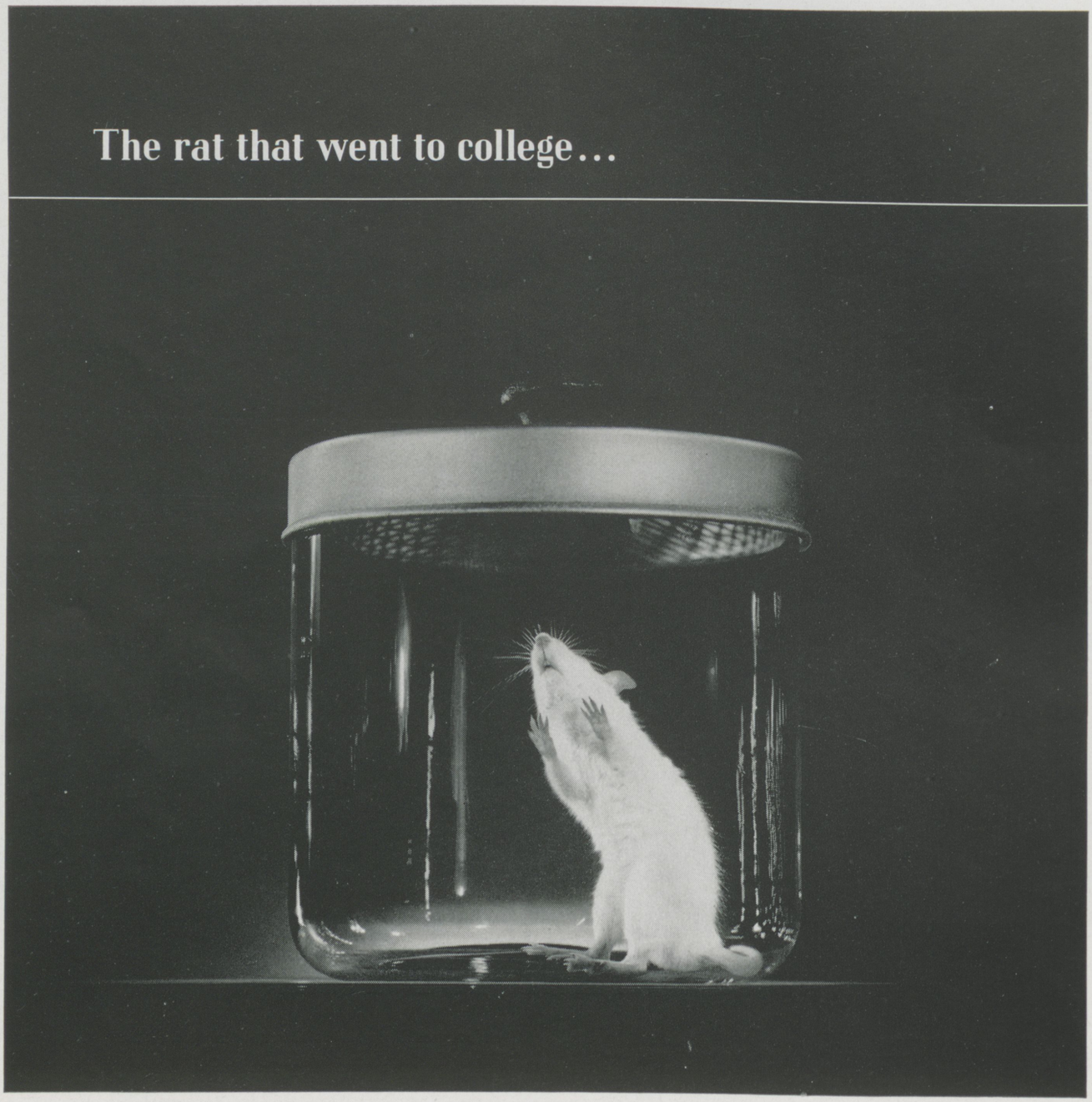
THE LINDE AIR PRODUCTS COMPANY

Unit of Union Carbide and Carbon Corporation

UCC

General Offices: New York, N. Y. **Offices in Principal Cities**

The rat that went to college...



CHARLEY, the large and healthy white rat shown above, not only goes to college but he lives in a glass house!

For Charley is one of the thousands of white rats used for scientific research in American college laboratories. His glass house is a Pyrex animal jar, for a couple of good reasons: One, because of its exceptional mechanical strength. Two, because Pyrex glass can be sterilized in live steam without breaking or becoming cloudy, which makes it a favorite with laboratory men.

Pyrex laboratory ware, developed during the last war to replace imported glass, is just one of Corning's many research contributions to better living. Others are everywhere. The glass tubes in your radio. Beacons that guide American planes. Glass pumps and piping in busy chemical and food plants. Signal lights and insulators on our warships.

Corning knows glass. Knows how to make it resistant to chemicals and heat, strong and hard to withstand impact and abrasion, accurate to tolerances ranging as low as 0.00002 of an inch.

This knowledge is being put to good use today. A special sanitary glass piping, for example, has just been developed to ease the dairy industry's shortage of metal. The communications industry, faced with a sudden wartime demand for insulators in intricate shapes and with special electrical characteristics, is using glass insulators quickly developed by Corning.

Design engineers who are licking this war's problems are finding ever new uses for glass. For tomorrow's engineers also, glass is the material with unlimited possibilities. Industrial Division, Corning Glass Works, Corning, New York.

CORNING
means
Research in Glass

ROSE TECHNIC

VOLUME LII JANUARY, 1943 NUMBER 6

TABLE OF CONTENTS

FRONTISPIECE

Floor man directing movement of electric cranes.
—Courtesy of Westinghouse

COVER

Rose Polytechnic as the night students see it.
Photo by Rose

STAFF

SUBSCRIPTION, $2.00 PER 8 ISSUES. ADDRESS ALL COMMUNICATIONS TO THE ROSE TECHNIC, TERRE HAUTE, INDIANA. ENTERED IN THE POST-OFFICE AT TERRE HAUTE AS SECOND-CLASS MATTER, AS A MONTHLY DURING THE SCHOOL YEAR, UNDER THE ACT OF MARCH 3, 1879. ACCEPTANCE FOR MAILING AT SPECIAL RATE OF POSTAGE PROVIDED FOR IN SECTION 1103, ACT OF OCTOBER 3, 1917, AUTHORIZED DECEMBER 13, 1918.

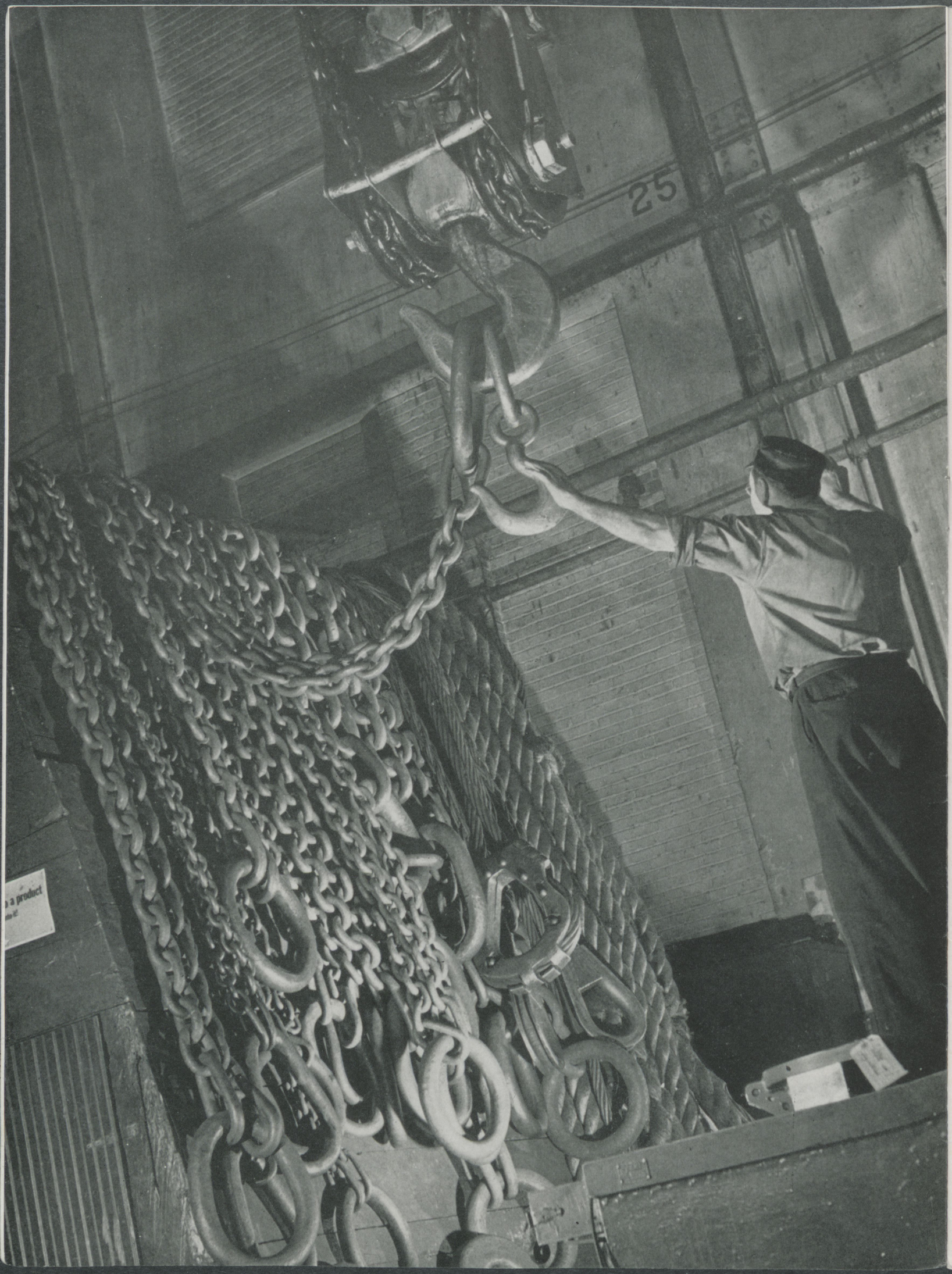
ENGINEERING COLLEGE MAGAZINES ASSOCIATED

Robert L. Taylor, Chairman

Monsanto Chemical Company, St. Louis, Missouri

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

Published Monthly except June and August by the Students and Alumni of Rose Polytechnic Institute.


25

Salute to The Retiring Staff

Along with the New Year and new year resolutions comes a new staff for the first time in the history of the Rose Technic. This being the first publication of the new 1943 staff we feel it proper to devote this space to reviewing the accomplishments of the retiring staff and to pay tribute to the fine work that this staff has done.

First, and most important, the Technic has been published ten times this year as compared with the eight issues originally planned. As may be expected, the additional publication of two issues brought on an unproportional increase in printing and engraving expenses and this added expenditure necessitated the formation of a new and highly successful plan for soliciting advertising from alumni members.

Secondly, because of the location of several defense industries within the Terre Haute area, the Technic's printer and engraver has been swamped with Government orders. Even though the more essential war contracts come first, the Technic luckily has been able to find a place in the twenty-four hour working day without undue confusion and the time is yet to come when it is the printer's fault that the Technic is not out on time. Even then, the old staff has been living in constant fear that some issue will roll off the presses with Government form 44 NA—69 NZY 72 in place of the joke page even though from recent reports, it probably would be a great deal more amusing.

Lastly, we must mention the journalistic examples and awards won by the retiring staff members. In addition to winning a first place, a second place and two honorable mention awards at the annual Engineering College Magazines Association Convention, the Technic has been awarded straight A ratings through the past year.

Seriously, however, the Rose Technic has always been published with a sort of horseplay among the staff and it is this attitude that makes working on the staff a pleasure. It has often been said that one must have a sense of humor to want to become a staff member of the Technic, and one certainly must be crazy to become editor; for the editor must have a special quality in order to be able to grin when copy is four days late; and to smile when cuts fail to arrive; or to laugh when the printer calls to say that the cover colors won't blend and still maintain a diplomatic air when the faculty censors a joke.

The Business Manager must also bear a multitude of burdens yet be able to convince the creditors that their bills will be paid just as soon as the advertisers send their checks which will be in the mail as soon as the next issue is circulated and all the time know that the Technic is already two days late.

Because of their unfailing ability to publish a better Technic month after month, we say thanks to the old staff. Thanks to editor Al Ker, to business manager Bud Holthaus and to every member of the retiring staff for giving to us, the 1943 staff, a better Technic than was given you. A better Technic because you have put into it a bit of your sweat just as has every staff member of the fifty-one years of publication of the Rose Technic. You fellows have put a lot more into the Technic than you got out of it but that is why the quality of the Technic has been improving every year. . . . because every staff member has worked hard to leave with the Institute a publication that will live long after his name is forgotten. Rest well on your laurels, you earned them.

by William H. Plenge, soph., e.e.

Welding Aluminum

JOHN G. MEHAGAN, m.e., '42

The various methods of welding aluminum and its alloys are rapidly becoming of major importance in the defense of our country. Aluminum, a very light-weight metal, is being used extensively because weapons, tanks, and aircraft made from it are easily transported.

In this article Mr. Mehagen, Rose '42, discusses the various welding processes of aluminum in great detail.

ALUMINUM is joined by welding in common commercial practice. There are two classes of aluminum welding, namely fusion welding and resistance welding.

A fusion weld may be made either by means of a torch or an electric-arc. Torch welding is done by either an oxyacetylene or an oxyhydrogen flame. Torch welding is generally applicable to all types of light-weight construction. Fuel tanks for aircraft and gasoline trucks are common examples of torch welding.

A very recent development in the welding of aluminum is the electric-arc process. It has the advantages of greater speed and less distortion of the part as compared with torch welding; there is, moreover, less harmful effect on the structure of the metal because heat is concentrated on a much smaller area than in torch welding.

There are three types of resistance welding. These are spot, seam, and butt welds. Spot welding has been developed to replace riveting. It has the advantages of reduced cost and greater speed of operation. Seam welding is a special application of spot welding. In this process rollers are used for electrodes. Seam welding is used almost entirely in the construction of liquid and gas-tight containers. Butt welding is a special process for joining bars and rods. The pieces to be joined are clamped together in movable dies. A heavy current is applied, and when the metal reaches a semi-molten state, mechanical pressure forces the pieces together.

The fabrication of aluminum by welding has several distinct advantages over the fabrication of aluminum by riveting. In the construction of liquid and gas-tight tanks, welded joints are more efficient than riveted joints. If appearance is a necessary requirement, a finished aluminum weld is far superior to a riveted joint. For aluminum construction in which strength is the important factor, riveted joints are still superior to welded joints.

The increased use of aluminum and its alloys has quite naturally brought about a great demand for methods adaptable to the joining of these materials. Welding provided a suitable means for making permanent joints and repairs, and it is the most widely used method in the aluminum industry today. The only other practical method of joining aluminum and its alloys is riveting.

Welding is defined by the American Welding Society as:

> The localized intimate union of metal parts in the plastic or plastic and molten states with the application of mechanical pressure or blows, and in the molten states without the application of mechanical pressure or blows.

The first type is known as pressure welding and it is just beginning to be developed in the aluminum industry. The second type, known as fusion welding, is the method most commonly used at the present time.

Before proceeding with a discussion of the several welding methods, it will be of advantage to consider first several of the physical properties of aluminum. The chief qualities of aluminum are: (1) ease of fabrication, (2) high thermal and electrical conductivity in the purer states, and (3) resistance to the corrosive action of the atmosphere. Aluminum and its alloys have 50 to 100 percent higher coefficient of expansion than iron, copper, or nickel. They also have a 100 percent higher specific heat and a 50 to 100 percent higher latent heat than iron, copper, or nickel; these advantages, however, are offset by a low solidification temperature. The two important factors to consider in the welding of aluminum are its tendency to oxidize and its hot shortness. The first difficulty may be eliminated by the proper selection and use of flux, and the latter difficulty may be largely eliminated by guarding against shrinkage and reaction stresses in the hot metal.

When the properties and methods of working aluminum are considered, it is necessary to distinguish between aluminum in the pure state and aluminum hardened by the addition of alloys. Pure cast aluminum had little or no application in actual practice because the majority of aluminum products are produced from aluminum alloys. It is important to note, however, that pure cast aluminum represents the first stage in the production of aluminum sheets, wire, and extruded shapes.

Fusion Welding

The most common type of an aluminum weld is the fusion weld. A fusion weld is made while the metal is in a molten state, and it does not require any mechanical pressure. There are two general classes of fusion welding. The first class is known as arc welding. This type has come more and more into use in the aluminum industry in the past ten years. The second class is known as torch or gas welding with an oxyacetylene or oxyhydrogen flame.

Torch Welding

The torch welding of aluminum is applicable to the same type of weld as used with any other metal. Aluminum welds have certain characteristics which require a definite technique on the part of the welder, but

this does not in any way distract from the fact that aluminum is one of the most readily welded metals on the market today.

The apparatus required for the torch welding of aluminum consists of a supply of oxygen and hydrogen or oxygen and acetylene, reducing valves, torches, and a series of tips. The approximate tip sizes and the relative gas pressures used in torch welding are given in published commercial tables. When aluminum is welded, it is preferable to use the oxyhydrogen flame on sections less than 3/8 inch thick. For sections greater than 3/8 inch thick it is generally necessary to use the oxyacetylene flame because more heat is requird to melt the metal. The maximum thickness for welding by either of these two methods is 1.2 inches.

It is necessary to use flux to produce a sound weld because all aluminum, either in the pure or alloy state, is coated with a thin film of aluminum oxide. At one time mechanical methods were used to remove the oxide film, but this proved to be very unsatisfactory. As a result, the use of flux is now the universal method employed to remove the oxide film.

The proper selection of a filler rod is of utmost importance because the success or failure of the job depends largely on this one fact alone. In general a filler rod should be the same thickness as the material to be welded. The rod, however, should not have a diameter less than 0.08 inches nor greater than 0.25 inches. A pure aluminum rod is used for aluminum manganese alloys, and a five percent silicon rod is used for all other alloys.

Aluminum sheets greater than 3/8 inch thick must be preheated to prevent cracks and distortion. In large castings the preheating temperature is between 700 degrees F. and 800 degrees F. Preheating in excess of 800 degrees F. is likely to cause the collapse of large castings in the preheating furnace.

The actual welding of aluminum is accomplished in the same manner as with any other metal; however, it is not advisable to have a two or more layer weld. If this is done, the weld is apt to be very porous. It is of interest to note that aluminum can be welded with approximately the same speed as steel.

When the weld is completed and allowed to cool, it should immediately be washed to remove all traces of flux. Flux, if allowed to remain in contact with the metal, will cause excessive corrosion when exposed to atmospheric moisture.

Oxyacetylene and oxyhydrogen welding are used generally for light weight construction. The largest field of application is in the construction of fuel tanks for aircraft and gasoline trucks. Other applications include automobile and bus bodies, chemical apparatus, and railway coaches.

Arc Welding

The most recent development in aluminum welding is the electric-arc process. There are two classes of the electric-arc weld, namely, metallic-arc and carbon-arc. The metallic-arc welding process is the most widely used at present because it is particularly applicable to certain classes of work. Both types of electric-arc welding, however, are limited to alloys that are not heat treated.

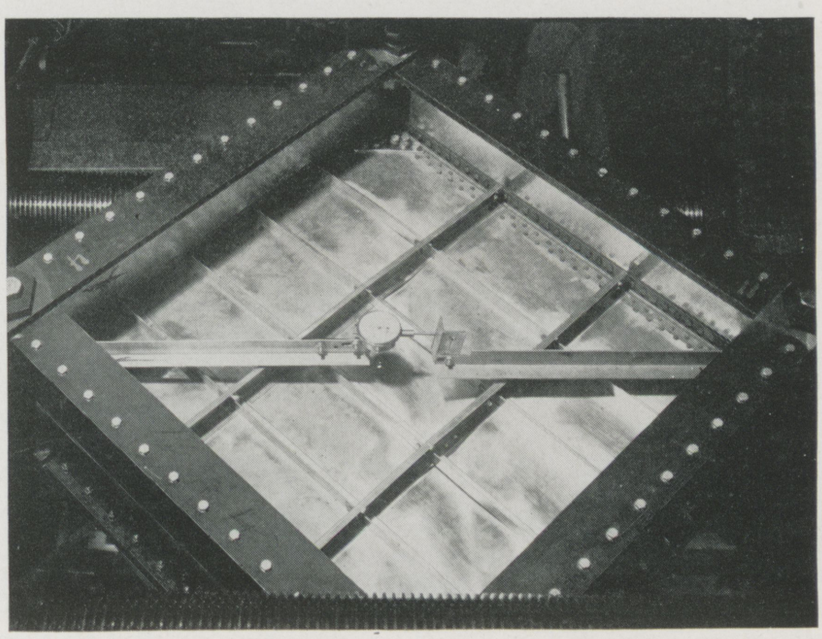
The equipment required for arc welding aluminum consists of a welding generator, a pair of flexible cables, an electrode holder, ground clamp, and a supply of electrodes.

Direct current is almost universally used for arc welding. Alternating current can be used, but this method requires additional equipment to produce a superimposed high frequency current. The various currents required in the direct current welding processes are also found in commercial tables.

Covered electrodes are always used because they give a more stable arc and more fluidity to the metal. The size of electrode used is governed by the same rule as given under torch welding. The composition of the electrode is also the same as that used for the filler rod in torch welding except that 0.2 percent titanium is sometimes added to give higher tensile strength and additional corrosion resistance.

The use of proper flux is just as essential in arc welding as in torch welding. Its purpose is the same, namely, to remove the oxide film and to permit the molten metal to flow freely from the electrode. There is one additional requirement for a satisfactory flux than those given under torch welding, the flux must have a specific gravity less than that

(*Continued on Page* 22)



Courtesy of American Welding Journal

Sheer Test of Welded Joints.

Our Second Front

CHARLES W. NEWLIN, soph., c.e.

The industrial United States has been asked to meet a production situation that would have staggered it under ordinary conditions. President Roosevelt has asked for equipment in such large quantities that most people think the task impossible for even modern industry.

In this article Mr. Newlin tells how the many industries are fighting and winning the battle of mass production.

GENERAL George Washington during the eighteenth century was the first person to seriously think of surveying the war productive possibilities of private industry in the United States. Before the outbreak of World War II a survey was taken of our modern industries but on a scope not conceivable in the time of Washington. To early statesmen the United States meant only a small congregation of peoples from thirteen huddled states fighting for their existence, not the most powerful industrial nation in the world stretching from the Atlantic to the Pacific coast. This twentieth century mobilization was brought about by a period of strife similar to that of Revolutionary War days except that we, allied with our former enemy, England, are fighting for our democratic principles.

Although we knew trouble was brewing for the United States when hostilities first arose in Europe, it took the fall of France to shock the American people to the realization of the fact that they soon might be at war and that the difficult problem of organizing our production facilities must be faced immediately.

Upon our entrance into the war President Roosevelt stated production goals which staggered military observers of the world. He asked our industries to produce 60,000 airplanes in 1942 and 125,000 the following year. This goal meant an airplane produced every four minutes. Fifteen million automobiles were scheduled to roll off the assembly lines last year and this huge total was even to be increased in the year 1943 to thirty million. In these times when every other article Mr. John Public reads in a daily newspaper deals in statistics containing almost unconceivably large numbers, any number such as 30,000,000 does not really strike home. But if this is compared to the total number of motor vehicles registered in the United States during the year 1941, which totaled 33,725,000, we can realize the tremendous job that lies ahead if the President's wishes are to be fulfilled.

In the fourteen years up to 1934 there were only thirty tanks produced in this country and these took shape only as experimental models for the army. Mr. Roosevelt asked for 45,000 tanks to be produced in 1942 and 75,000 in 1943.

During the days of the famous clipper ships the United States had one of the greatest merchant marines in the world but the merchant ships gradually decreased in number until only four cargo vessels were produced here from the years 1922 to 1938. In order to better than hold our own against axis submarine raiders, the President wanted 800 new merchant ships to be produced last year and 1500 to slide into the sea this year.

We must realize that such a huge productive program was necessary if we consider the fact that the military machine was running in low gear up to the year 1941. Our enemies, Germany and Japan, had a head start of as much as ten years; Japan starting her armament in 1930 and Germany in 1933. In order to compete with these powers the United Nations not only had to equal them in production but produce a quantity of war materials which they could never match. This job naturally fell on the shoulders of American mechanical genius since we were the greatest industrial nation and possessed an endless supply of necessary war materials.

Can we meet the goals set by Roosevelt and have we met them in the year 1942? In 1942 we have fallen short of his wishes but our steady increase presents a pleasing outlook. Such a complete organization of private industry as is required presents some of the most complex political and industrial problems known in American history. To date the job is far from complete. It has been a muddled mess with delicate problems arising on every front. We have only organized forty to fifty percent of our industrial strength. The United States lags far behind Britain in complete industrial mobilization.

The scope of our industrial program can only be realized when it is compared to former programs and to problems met in everyday life. The enlargement of our aircraft industry alone can be compared to increasing a city of 500,000 people to one of 12,000,000. These airplane factories which have assembly rooms the size of four football fields are producing more aircraft than the Axis combined. Their present peak, 4,000 planes every month, is gradually increasing. On military construction alone (camps, factories, ship yards, etc.) we have already spent more money than the total cost of the World War I. In the coming year the United States should turn out military goods worth $80,000,000,000 which is equal to the total national income of our boom year, 1929. This means that in war goods alone we will equal the total of all goods produced in this country in 1929. At present American production is eight times greater than before Pearl Harbor.

General Somervell, Chief of Services of Supply of the U. S. Army, seemed to hit the nail on the head

(*Continued on Page* 24)

Research and Development

Edited by C. PHILLIP BOWNE, soph., m.e.

Pure Water for Our Armed Forces

As the rapidly expanding United States Army grows ever larger, the problems of pure water procurement and sewage disposal become more acute. The recruit who could drink a glass of water at home and feel reasonably sure that it was non-contaminated must be cautioned to check the source of untested water before sampling. He is faced anew with water contamination by human as well as natural elements, made more critical by the congested conditions of our army camps. The temporary purification methods such as the field water bag or the mobile Army Water Purification Unit are not sufficient for permanent encampments. We, as a people, give little thought to the problems encountered in supplying us with good water. Our yearly supply of water would drain a sea 550 miles in area and a mile deep, and most of this must be filtered and purified.

To combat this vital problem our Army and Navy engineers are constructing permanent modern purification and sewage disposal units at some of our largest camps. From the lessons learned in years of experience, our water engineers will apply chemical processes to the water which would be impractical with temporary units. Not only will the disease rate of our army camps be greatly reduced, but the soldier will enjoy better drinking water. Furthermore, there will be no manufacturing bottlenecks in the procurement of chemicals. The processes being chemically the same, the chemicals—chiefly chlorine and aluminum sulfate—will require no further compounding by the chemical manufacturer.

Tiny Powder Particles are Measured

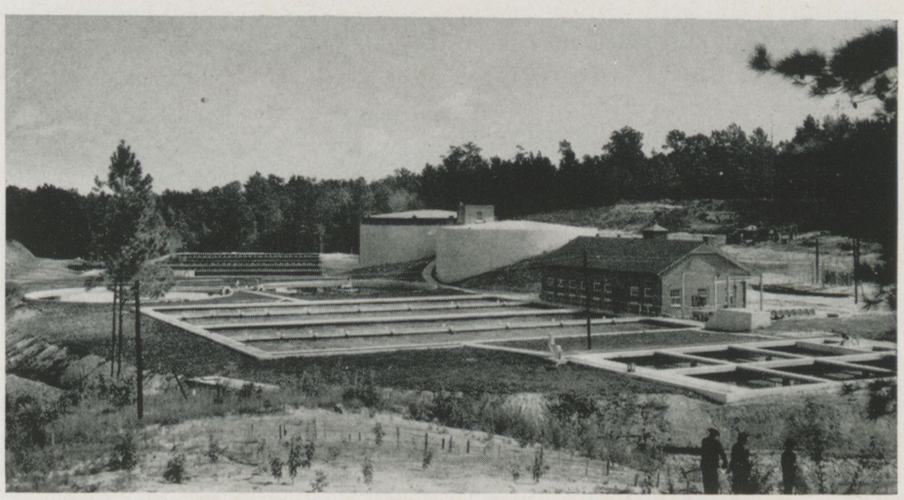
With the onrushing demand for plastics it is necessary to introduce some method to make it possible to measure powder particles. Before being fused into a solid, plastics are reduced to a powdered form. Such properties as strength, durability, and malleability in plastics are largely attributed to the fundamental characteristics of the grain, outstanding of which is grain uniformity.

Previously, the grain size was determined by floating the particles on glycerine and observing the settling time, this process requiring about eight hours and giving inaccurate grain composition proportions. Mr. P. R. Kalischer, Westinghouse engineer, has introduced a method, simple in construction, but of such accuracy that he can measure the average grain size of metallic powders as small as one to four microns (1/25,000 inch) as well as being able to determine the proportionality among the grain sizes in the powder.

The apparatus used consists of a photoelectric cell, a milliammeter, a long glass tube, and a source of light. One gram of the powder under test is thoroughly mixed with 100 cubic centimeters of acetone in the presence of a small amount of some wetting agent such as isopropyl xanthate. The purpose of the wetting agent is to encourage the powder particles to adhere to the acetone with the result that no air bubbles will form between the liquid and solid. By placing the tube containing this mixture between the light source and the photoelectric cell, the light will pass through the mixture and register upon the cell. As the liquid clears due to sedimentation, the rate being dependent upon the size of the particles, more light will reach the cell, the amount of which is indicated by the milliammeter. The amount of photocurrent is regulated by the opacity of the mixture. Standards have been established with powders of definite grain proportions, settling periods, and opacity readings. Data obtained from an unknown specimen is then compared with these standards and the grain size ascertained.

World's Largest Petroleum Pipe Line

Spanning some 1261 miles from Baton Rouge, Louisiana, to Greensboro, North Carolina, is the world's largest petroleum pipeline. Incredible as it may seem, the line was put



Courtesy Monsanto Magazine

Type of modern sewage disposal plant to be incorporated in our permanent army camps.

into operation 180 days after work began on the project. This feat was accomplished through the use of electricity, for the ten and twelve-inch pipe sections were electrically welded. The petroleum is pumped by 39 pumps in 16 stations driven by explosion-resisting induction motors, some being the largest of their kind in existence. Each of the motors has two steps, one having twice the horsepower rating of the other. A switch from one to another is made by changing the blower with little variation in the efficiency.

Oddly enough the line does not carry a continuous stream of only one product, but one of several products not unlike a freight train of tank cars. At the present time eight different products—several grades of gasoline, kerosene, Diesel fuel, etc., are delivered at seventeen points along the line, and at times all eight products may be coursing through the system at once. It is possible to make multiple deliveries simultaneously along the line.

Operating like a brain center of a huge nervous system, a dispatcher's office located in Atlanta, Georgia, provides continuous teletype intercommunication to all stations of the system, issuing all orders affecting the distribution of the products. The greatest danger in a multi-product line of this type is the intermixing of the successive products, called "tenders", as they surge through the pipe. This possibility is evaded by maintaining a velocity of flow in the line higher than the critical minimum flow. To have a lower velocity than the minimum would give rise to a condition very similar to laminar flow, conducive to greater intermixing.

Aside from color dissimilarities, the change from one tender to another is told by a very sensitive instrument, the gravitometer, which instantaneously records on a chart the change in weight of the liquids in terms of specific gravity. The gravitometer is a spherical weighing chamber of known volume through which a constant stream of the liquid diverted from the main line passes. Thus the weight of the liquid, correct in respect to temperature change, is converted to and recorded as specific gravity.

On the twelve-inch section of the line, two 600 horsepower, 3600 r.p.m., motor-driven, main-line pumps at each of the seven stations force as much as 60,000 barrels of gasoline daily through the line. Through the ten-inch line, 42,000 barrels are pumped daily by two 450 horsepower units. In an emergency the capacity may be raised by the addition of a series of intermediate pressure increments without surpassing the maximum allowable working pressure.

Wood Replaces Essential War Metals

The prediction that wood will be struck from our manufacturing lists as an out-moded and uneconomical construction material in the world of tomorrow is very unlikely. Our war effort and inventive genius is bringing out this fact more and more with the prolongation of the war. Together the Army and War Production Board have compiled a list of some 1100 articles before made of metal, now to be made by wood. A single Army order called for a quarter million demountable wood beds, a saving of enough steel to lay 376 miles of railroad.

Wood substitutes include a new type sectioned all-wood culvert capable of supporting thousands of pounds, prefabricated houses ideal for temporary living quarters, superstructure and ribwork of cargo freighters, wooden pontoons for emergency bridges, and resin-bonded plywood warplanes, which are giving commendable results in the grueling tests. Superior to metal in many respects, plywood does not splinter or "flower" when pierced by bullets, nor does it become fatigued when subjected to severe stresses as does welded metal. Plywood airplane "skins" do not "ripple" at high speeds because of reduced wind drag on their smoother surfaces. Plywood conducts heat and sound poorly, is stronger than steel, more resistant to oil and water than metal, and more flameproof. These among others are reasons why our military experts are ordering boats, pontoons, planes, and auxiliary combat equipment made of plywood.

Goggles: Battle Windows for Army

A new twist added to the Army's protective gear is plastic goggles. As it was seen in World War I and more so in the present conflict, the eyes must be safe-guarded. Following several rather unsuccessful attempts to produce a satisfactory pair of goggles, Edwin H. Land, young scientist with the Polaroid corporation, in his study of the physics of light, found the solution. Land's problem was to develop a plastic lens which gave no distortion or dimming of vision.

Briefly his deductions follow: light travels in waves which radiate outward at right angles to its line of travel. These waves, upon striking a surface—water for instance—are vibrated or bent in one direction, a phenomenon called polarization. Compare a single light wave to a rope held loosely by two men. The rope may be whipped into horizontal or vertical waves by the proper coordination of the men's movements. If, however, a stake is placed on either side of the rope, the horizontal waves will be broken upon contact of the rope with the stakes. Land constructed his goggle lens with a crystal structure of infinitesimally small parallel crystals. Consider the crystals analogous to the stakes and penetrating light waves, as reflected from sand or snow which so easily cause eye fatigue and snow-blindness, analogous to the rope. The light waves, as are the vibrations of the rope, are dispersed or diffused, rendering them harmless to the eyes.

The goggles consist of a one-piece, interchangeable plastic lens in a one-piece molded rubber frame. The lens may be interchanged to comply with existing conditions. They are held in the frame by four metal snaps and the pressure of the head band. The goggles are practically unbreakable,

fog-proof, and flexible to the extent that they are adjustable to any shape head. They give a clear, unobstructed view with vision equivalent to that obtained with ground and polished sunglasses.

Invaluable Materials Recovered from Smoke

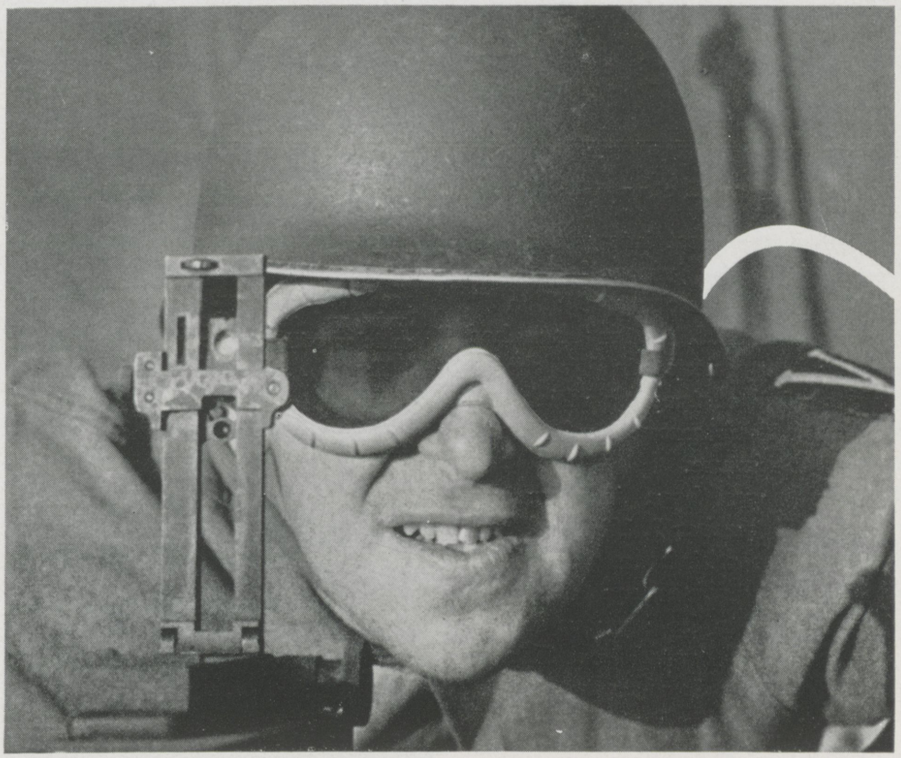
A vast store of wealth has been pouring forth from our industrial smokestacks in a gaseous mixture which we designate as smoke. Millions of dollars worth of metal particles, which before have been swept off our ore smelters to be scattered by the four winds, are now being recovered. Gold and silver are being salvaged from the smoke of their smelters, tons of cadmium and bismuth are saved yearly from lead and zinc smelters, and sulphuric acid from fumes resulting from the liberation of sulphur in copper refining. Moreover, a great percentage of cement is reclaimed as it is whipped up the flue as dust by the burning gases from the kiln.

Although numerous devices are used to retrieve these materials, they are primarily either mechanical cyclonic collectors or electrical precipitators. Besides recovering necessary materials these devices perform other functions such as: removing dust and obnoxious foreign matter from the smoke which would otherwise prove a public nuisance to the surrounding town, cleaning blast furnace gases making them usable as fuel, purifying manufactured gases, and eliminating from air inhaled by industrial workers those particles that cause silicosis and hay fever.

The working principles of these processes are basically the same namely, that of precipitating the suspended articles from the mixture. In the whirlwind type precipitator the suspended matter is forced from the fumes by centifugal force, and in the electrical, or Cottrell, method by electrical attraction. If the whirlwind method is used, the smoke is blown into conical tubes, called "multiclones", where the particles are whirled to the sides by rotating blades to fall into receiving hoppers. The multiclones vary in size from a few inches to several feet in diameter. They are 97 per cent efficient in capturing particles as small as three to four microns in diameter. To better illustrate their efficiency, a 400 mesh screen, through which water cannot pass, will permit particles no larger than 30 microns to pass through.

The Cottrell process, however, is practically 100 per cent efficient. As the heavy smoke bellows up the chimney, it passes through a precipitation tube. Inside the tube is a discharge electrode attached to a high voltage rectifier grounded through the wall of the tube. With the flow of current, the particles in the smoke become ionized, precipitate to the sides of the tube, collect in flaky forms, and are knocked off into hoppers below.

Not only are the precipitators netting huge savings of essential material, but they are minimizing large bills for cleaning and painting in industrial and business sections of our large cities.



Courtesy Monsanto Magazine

Soldier's eyes protected from glare of light by new plastic goggles.

Research engineers believe the opening of a new field will result from this work. They believe that, after certain problems are overcome, ores of complex chemical content which cannot be reduced to useful minerals with present-day processes may be subjected to intense heats, volatilized, and recovered by electrical precipitation.

Six bladed dual-rotation propellors, designed for planes equipped with 2,000 horsepower engines have been developed by the Curtis-Wright Corporation, and are being delivered to the air force for high altitude planes. The new propellor which is comprised actually of two propellors mounted one behind the other on coaxial shafts, each with three hollow, pitch-adjustable blades, and revolving in opposite directions is the development of several years of extensive resarch. Design engineers estimate the efficiency will be increased at least five per-cent and that its tendency to counter-act torque, will do much to improve the operation of single engine planes.

Cross Section

E. Harold Stanfield

One of the most interesting personalities in the junior class to be graduated in October, 1943, is E. Harold Stanfield. "Stan" has had practical experience in his chosen field of civil engineering which will without a doubt prove invaluable to him in the future.

Harold was born in Seymour, Indiana, December 9, 1913 and Seymour has been his home all his life.

Stanfield's pre-college education was obtained in the Seymour schools and he was graduated from Shield's High School in Seymour in 1932.

Although he graduated from high school into the midst of the '29 depression, Stan obtained all his practical experience during this period. The depression squelched temporarily Stanfield's ambitions to go to college immediately following his graduation from high school.

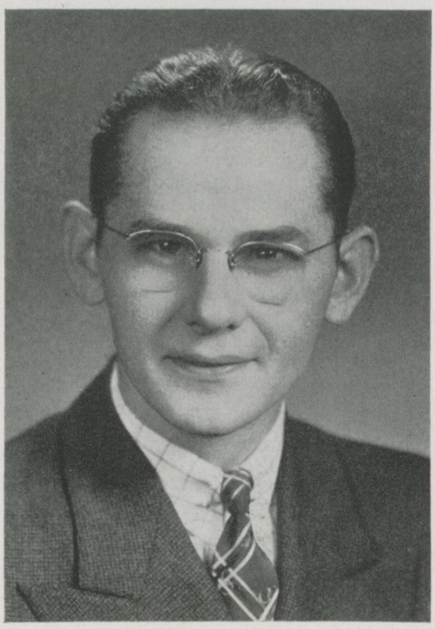
From the year 1932 to the year 1940, when Stan entered Rose, he held numerous jobs in the field of civil engineering. For the first two years following his graduation from high school, Stan worked for his father, O. T. Stanfield, a road contractor, as a bull-dozer operator. Stan learned his preliminary civil engineering the hard way. In the winters of the years 1934 and 1935, Stanfield worked for the Noblitt-Sparks Industries, makers of Arvin radios, heaters and automobile parts. Stan also acted as foreman of production of seat-frames and cross tubes for the Ford automobile. The next five years (1935-1940) he worked for Mr. E. H. Brown, consulting engineer for southern Indiana and northern Kentucky, as an instrument man and draftsman. It was during this time that Stan picked up most of his knowledge of highway engineering.

It was in the year 1939 that Stanfield decided it was time to get his

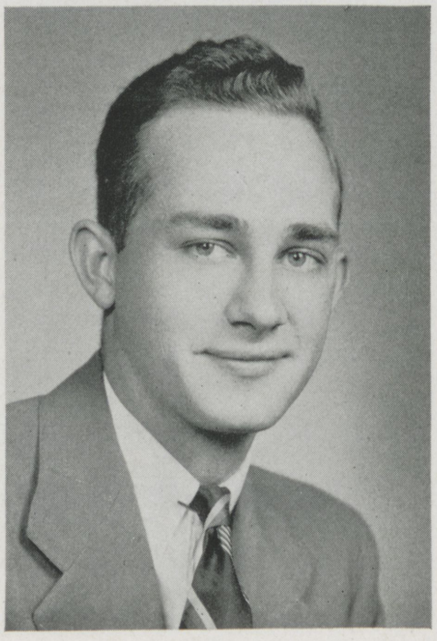
(*Continued on Page* 25)

Previous issues of the Technic have contained interesting articles concerning various members of the 1943 (February) senior class. The new staff believes these articles are read with interest by the student body and so in the future, similar articles will appear under this section.

The articles this month come as a result of interviews with E. Harold Stanfield (c.e. '43) and Joe Valentine (e.e. '43).



Harold Stanfield



Joe Valentine

Joe Valentine

Joe Max Valentine is one of the most unusual men on the Rose campus. As are the great majority of Rose men, Joe is working his way through college and this biography is written to show those who must pay their own way and still want to participate in extra-curricular activities, that it can be done.

Joe was born on July 1, 1922 and spent most of his early life around Sullivan, Indiana. During his early youth, Joe and a friend journeyed to New York City and of New York, with typical Valentine straightforwardness, Joe said, "I was disappointed to discover that Times Square wasn't square."

In Sullivan High School, Joe found his greatest talent that of leading the student body at football games and student assemblies after he had been rudely rejected as football material. At Rose, he still confines his athletic ability to the sidelines and sells coca cola at home games even though near-zero weather prevails.

Joe has lived in the dormitory for three years, and during that time has washed dishes, served as waiter and acted as nursemaid to the homesick freshmen. In his sophomore year, he helped pay his expenses by selling corsages, stationery and Christmas cards. During his junior year he added a partner, George Blakey, , to his business which by then included the sale of cigarettes, candy, cokes, corsages, class keys and pins. Being a born salesman, he was also taken on as clerk in the bookstore. The worst of his business ventures was buying 500 signs to sell to the students when only 300 were registered in school.

Joe Valentine is one of the most popular men on the campus. Besides working his way through school, he has found time to participate in the activities of the Radio Club, A. I.

(*Continued on Page* 25)

Alumni News

Edited by ROBERT GREGER, freshman

The Grads Advance

'06 Arnold E. Freudenreich, e. e., was appointed assistant plant manager of the Buffington plant of the Universal Atlas Cement Company, New York, January 1. Freudenreich joined the engineering department of this company in 1910, was made superintendent of construction at the Buffington plant in 1922, became assistant superintendent in 1923, and later superintendent of mill No. 6. He subsequently became general operating foreman of the Buffington plant, which position he held until his recent appointment.

'08 Carl B. Andrews (Heminway Medal; M.S., '09; C.E., '17; M.E., M. I. T., '28) has retired from the University of Hawaii where he has been Professor of engineering for 22 years. He now has a temporary teaching position at Michigan State College.

Before entering Rose with the class of '08, Mr. Andrews, who lived in Hawaii, worked in a printing office at Honolulu. After working in the printing office some time he was employed as a photographer and photo-engraver. Since working there, Mr. Andrews has retained his interest in photography and has made it his hobby.

Upon graduating from Rose, Mr. Andrews was employed by Baldwin and Alexander, Surveyors, Honolulu. He was next employed as assistant engineer, Mawi County, Hawaii Territory; chief engineer of Oahn Railway, Honolulu; captain in the engineer corp of the U. S. Army, 1918; chief engineer of the Pampanga Sugar Development Company, Philippines.

Mr. Andrews married Laura A. Merrill in June of 1911. They have no children.

Mr. Andrews would advise a young man to study engineering (at Rose) if he is attracted by this kind of work. As prime requisites of a successful life in engineering, he lists loyalty, dependability, honesty, and intelligence.

'16 William H. Motz, m. e., is supervising engineer for the Jefferson Ice Company of Chicago.

'18 Frederick G. Klatte, m.e., with the Checker Cab Manufacturing Corporation, was made assistant chassis engineer. He was formerly chief chassis draftsman.

'21 Carl W. Schroeder, e. e., has taken a position as engineer with the Zenith Carburetor Company at Detroit, Michigan.

'24 Sidney L. Freers, m. e., is now with Packard Motor Car Company at Detroit, Michigan. Mr. Freers was formerly with Nash Kelvinator Corporation in the same city.

'27 W. Robert Ferris, e. e., (Heminway Medal; with high honors; M.S., Union '32) has been transferred to the R. C. A. Research Laboratories at Princeton, New Jersey. Mr. Ferris was previously at Harrison, New Jersey with R. C. A. Manufacturing Company, Inc.

'28 George J. Mason, c. e., has been promoted to major. Major Mason is in the Quartermaster Corps at Camp Lee, Virginia.

'33 Allan F. Sebree, m. e., formerly with the 58th Engineers at Camp Shelby, Mississippi, was graduated from the Officers' Candidate School at Aberdeen Proving Ground, Maryland.

William C. Heidenreich, Jr., ch. e., employed by Carbide and Carbon Chemicals Corporation at South Charleston, West Virginia, is now unit head. Since his association with the chemical company, Mr. Heidenreich has progressed from shift foreman, to assistant unit head, to his present position.

Mr. Heidenreich was born in Terre Haute, Indiana where he attended grade school and graduated from Wiley high school. Several years of his early life, however, were spent in Texas. Upon graduating from Rose Mr. Heidenreich, who was graduated with honors, worked at Quaker Maid Company a year and a half. Since that time he has been with the chemical company.

Chemical engineering design and operations claim Mr. Heidenreich's special interests along engineering lines. As his hobbies, he enjoys reading, studying, photography, and woodworking.

In March, 1932 Mr. Heidenreich married Rosa E. Carr. They have a daughter, Alice Jane, and a son, John William.

As prime requisites of a successful life, Mr. Heidenreich lists health, family, deep interest in your work, education, and tolerance.

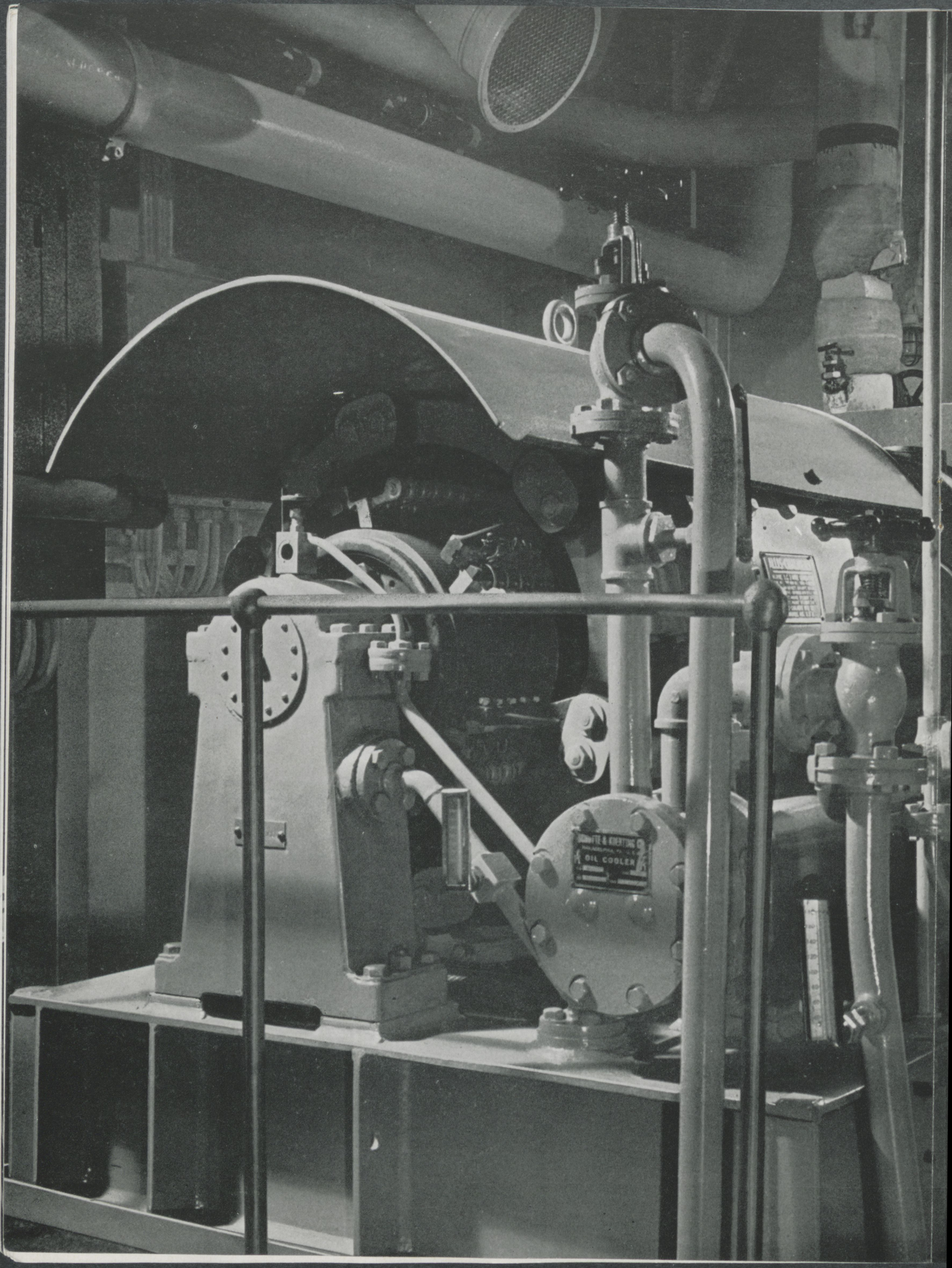
'35 John H. Welsh, m. e., is now a captain with the 95th Engineering Regiment, A.P.O. 998, Seattle, Washington. Captain Welsh was formerly Secretary-Treasurer of Parker Miller Heating Company, Inc., at Louisville, Kentucky.

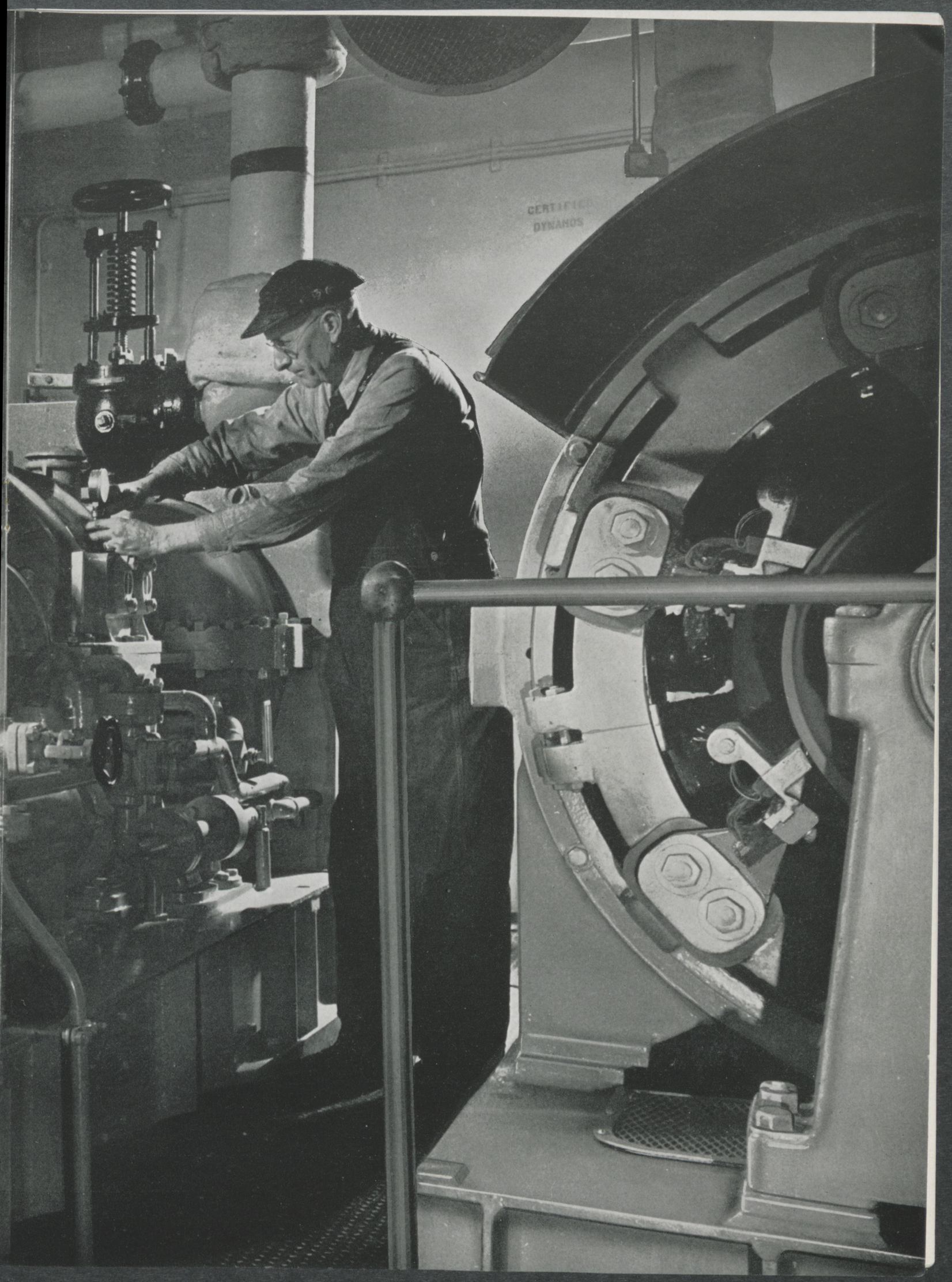
Ernest J. Welsh is an ensign in the U. S. N. R. at Charlestown, South Carolina. Ensign Welsh was employed by the B. F. Shaw Company, Charlestown, Indiana, as an engineer before entering the service.

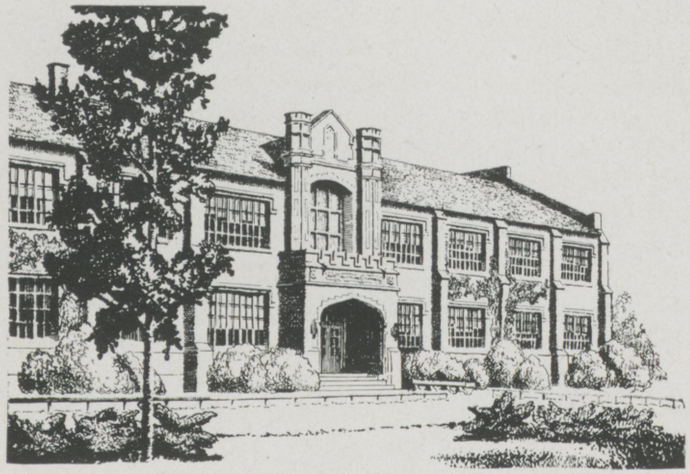
(*Continued on Page* 25)

ON FOLLOWING PAGES: As necessary as fighting ships during wartime are the cargo vessels that bring supplies to our Army, Navy, and allies. Here are two 250 kw auxiliary turbo-generator sets abroad a recently launched C1-A ship.

Courtesy Allis-Chalmers Electrical Review


OIL COOLER


DYNAMOS



Campus Survey

JOHN T. HARRIS, soph., c.e.

Tau Beta Pi and Blue Key Tapping

The second tapping of Tau Beta Pi and Blue Key for the current school year was held at a general assembly, December 18, 1942. Tau Beta Pi, a national honorary engineering fraternity, chooses its members from the seniors who rank in the upper fifth of their class scholastically and juniors ranking in the upper tenth of their class scholastically. Further basis for selection is on outside activities, leadership and character. The men chosen for Tau Beta Pi were: Professor Clarence C. Knipmeyer, Richard C. Mott (senior), Michael W. Percopo (senior), Frank W. Peak (junior), and Gordon MacBeth (junior).

The Blue Key fraternity selects its members from the all-campus men at college. Selections are made on the basis of scholarship, leadership, ability, and participation in extra-curricular activities. Eligibility requires that a student be engaged in at least two major and two minor activities on the campus. The men chosen by Blue Key at this tapping were: William R. Kniptash (junior), Raymond I. Kopan (junior) and E. Harold Stanfield (junior).

Selection for membership in either of these fraternities is one of the greatest honors that can come to a Rose student and the members are to be congratulated for their long and continuous labor which has made them eligible.

Rose and Blue Dance

The Rose and Blue dance was held at the men's gymnasium of Indiana State Teachers College, December 12, 1942. The dance was sponsored by the R men of Rose under the leadership of Mr. Joseph O'Connell and the I men of Indiana State under the leadership of Mr. Paul Selge. The main idea back of this dance was to foster better relations between the men of both schools. In this respect and in every other way, the dance was a complete success. A large group from both schools attended and all thoroughly enjoyed themselves.

The gymnasium was appropriately decorated with the various fraternity emblems of both schools. These emblems were electrically lighted and displayed on the bleachers at one side of the floor.

Music was furnished by Wayne MacIntyre and his orchestra. Professor and Mrs. MacLean and Professor and Mrs. White were chaperones.

A. S. C. E.

AMERICAN SOCIETY OF CIVIL ENGINEERS FOUNDED 1852

A meeting of the student chapter of A. S. C. E. was held on Tuesday, evening, December 22, in the Civil Lab. Following a cafeteria style dinner, a report on the A. S. C. E. convention of November 14 and 15 at the University of Illinois was given by Wally Nellis.

The speaker of the evening was introduced by President Robert Mitchell. He was O. T. Arbaugh, concrete technician with the Vigo Ordnance Works. Mr. Arbaugh discussed the concrete used in various types of construction work and pointed out that the general trend in concrete mixing at present is the use of smaller aggregate, which makes for better binding properties.

Slides were then shown giving the various construction phases of Grand Coulee Dam, narrated by William Prescott. These were followed by a talk on the engineering features of

Jumpin Jive

the dam by Mr. Prescott, taken from a paper written by himself and John Newlin.

A. I. E. E.

During the past few months the Rose student branch of the American Institute of Electrical Engineers has been carrying out a program similar to that followed during the summer semester. Under the direction of Mr. Joseph Pipp, chairman of the program committee, and Mr. R. E. Miller, chairman of the A. I. E. E., a program consisting of a series of varied technical and non-technical papers have been presented by the senior electrical students. A few weeks ago the branch was happy to have as its guest, Mr. Edward B. Denehie, Rose, '36. Mr. Denehie, sales engineer with the Public Service Company of Indiana, gave a very interesting talk concerning the problems of the young graduate engineer. Several amusing personal experiences were told by Mr. Denehie in illustrating his points.

On December 9, a very interesting evening was spent by the branch members and their guests, the sophomore electricals. Two motion pictures were shown through the courtesy of the General Electric Company. The first, entitled "There's A Difference", was a forty minute black and white picture on the history, development, and manufacture of the electrical transformer. The second film was a technicolor production which took the audience on a thirty minute inspection tour of the General Electric watthour meter plant at West Lynn, Massachusetts. Entitled "West Lynn", this picture was appreciated by all who were present. Following the showing of the films, the society treated its members and guests to refreshments. This meeting was by far the most successful carried out during this season.

In connection with the meeting special mention should be made of the tableware used. The branch has at present about 30 white enameled tin plates and cups. These were the present of the Columbian Enameling and Stamping Company in Terre Haute. The members wish to take this opportunity to publically express their wholehearted gratitude for this very friendly gesture.

The last meeting of the A. I. E. E. was for the purpose of reviewing some film slides which have recently been purchased by the Electrical Engineering Department. These slides are to be used as an aid in introducing electrical engineering to the beginning students. All seniors submitted papers to Professor Knipmeyer containing comments regarding the slides.

S. A. M. E.

Late in the summer semester of last year, a student branch of the Society of American Military Engineers, an honorary fraternity, was installed at Rose. Through the efforts of several senior R. O. T. C. students and Colonel M. J. Noyes, Professor of Military Science and Tactics, the Rose Polytechnic Institute Post of the Society of American Military Engineers was founded.

During the years 1909 to 1919 inclusive, the United States Corps of Engineers published a bimonthly service journal called *Professional Memoirs*. Subscribers to this journal included most of the officers of the Corps of Engineers and many of the engineers of the United States Engineering Department. Funds received from subscriptions bore the costs of engraving and printing, while the editing personnel was detailed from the regular army. This very excellent journal had to do with subjects pertaining both to the military and civil activities of the Corps of Engineers.

During World War I it was realized that this service journal had not familiarized the engineers and industrialists with the requirements of the military engineering service in war. At the close of the war, several engineer officers and other officials, with the approval of the Chief of Engineers, organized a society to be dedicated to the national defense and to be devoted to disseminating information about military engineering matters. The name given that society was The Society of American Military Engineers. With the assets which had been acquired through the publication of the *Professional Memoirs, The Military Engineer* was first published in January, 1920.

Starting with about 3500 members the Society has grown until at present it has well over 18,000 members. A considerable portion of this number are civilian engineers and industrialists who are as much concerned with national defense and as anxious to learn about military engineering

Chambermaid's Knee.

operations as are the engineers in federal service.

The local post here at Rose has been granted a charter, approved and signed by the officers of the Society in Washington, D. C. Its officers at present are: Ralph E. Brown, president; Richard C. Ellsworth, vice-president; William T. Weinhardt, treasurer; and Darrell E. Criss, secretary. Several committees have been appointed to prepare programs and entertainment. One of the proposed programs of the Post is an inspection trip to the Vigo Ordnance Plant, south of Terre Haute. This trip has been arranged by Colonel Noyes and will take place as soon as the weather permits.

Obstacle Course

As this issue goes to press, the student body is being introduced to a recent brain child of Philanthropist Phil Brown. This time Phil is taking it upon himself to see that "ye olde physiques" of the R. P. I. men do not deteriorate during the ensuing months. His method of attack is an obstacle course, which has been erected on the football field. Consisting of a tunnel, hurdles, duck waddle, scaling wall and other instruments of torture, the course appears to have all the earmarks of a regular commando training setup. The schedule calls for two hours per week of this but the majority agree that nothing short of an auxiliary hospital or sanitarium here on the campus, could allow the schedule to function very long.

Seriously, this new course is our contribution to the government's plan for an extensive physical program for all those persons who have been allowed to stay in school. The obstacle course was popularized in England in the early days of the war and has proved very valuable there in the physical preparation program. Without a doubt, the chance to get in shape after many months of inactivity, will be welcomed by the student body.

Credit is due Phil Brown for a real job of planning this course. The various "obstacles" have been arranged in such a manner as to prove most beneficial to the runner.

Up and Over.

Junior Prom

After much deliberation, the Junior Prom Committee has decided to limit the size of the 1943 Junior Prom. This move had been suggested by the faculty and the decision was made final by the vote of the entire Junior class which, at the same time, expressed a desire for a "small, good" band. The decision was made after a thorough discussion during which several points for and against a large prom were discussed.

The chief objection to having a small orchestra was that a smaller ticket sale would naturally have to be expected since the number of couples staying away because of a cheap orchestra would be out of proportion to the number of couples drawn because of the lower admission price. Then too, with gasoline rationing, the general public opinion would not be too favorable if the junior class of Rose maintained a "Prom as usual" attitude.

With all this information, the heads of the various committees got together to see what could be worked out. They decided that a big majority of the students want a Prom this year and that no Prom at all would be a bitter disappointment. The final decision was to cut down expenses for the Prom but also to still try to make a big affair of it. The orchestra fee was lowered and the various committees cut down on their expenses. The choice of band offered the greatest difficulty because satisfaction for everyone was almost impossible. After many last minute changes, Maury Mahns and his orchestra was signed for the Prom. The Prom is scheduled for the twenty-second of January.

WHICH would you vote "most likely to succeed?"

"The Aircraft Warning System gives a single plane on ground alert the equivalent striking power of 16 planes on air patrol." This startling statement comes from England.

Our country's Aircraft Warning Service — quite similar to England's—keeps a constant check on the flight of all aircraft. Should the need arise, it is prepared to send fighter planes aloft, to mobilize and direct ground defense forces, to warn endangered areas. Every step in its operation requires the fast, accurate communication of the telephone.

This is just one of the many wartime jobs that are keeping telephone lines busier than ever before. To help us keep lines clear for vital military and industrial calls, please avoid using Long Distance to war activity centers unless the call is urgent. And please keep all your telephone calls as brief as you can. Thank you.

WAR CALLS COME FIRST!

AMERICAN TELEPHONE & TELEGRAPH CO. BELL SYSTEM AND ASSOCIATED COMPANIES

Fraternity Notes

Theta Xi

The Kappa chapter of Theta Xi announces the initiation of 15 new men into the fraternity. The initiation ceremony was Dec. 12 for the new initiates. They are: Carl Kottler, Kenosha, Wisconsin; James Stieff, Indianapolis; Bob Brandenburg, Charleston, West Virginia; Merrill Strong, Evanston, Illinois; Walt Vander Veer, Westfield, New Jersey; John Wargo, Garfield, New Jersey; Ed Booth, Indianapolis; Bob Penno, Indianapolis; Tom Keogh, Pittsburgh Pennsylvania; George Staples, Glencoe, Illinois; Bob Weinhardt, East Liverpool, Ohio; Ed Mabley, Terre Haute; Jim Hurt, Terre Hatue; Casper Haupt, Highland Park, Illinois; Bob Kays, Clay City.

Kappa chapter wishes to announce that Michael Percopo was initiated into Tau Beta Pi last month. Percopo from Brooklyn, New York, is a senior chemical and a member of the Tau Nu Tau military fraternity.

Kappa's semi-annual award of a gold scholarship key was won by Wally Nellis, junior civil, who raised his scholastic average 1.53 points. We also wish William Fischer lots of luck, who is soon to leave for service in the army.

Lambda Chi Alpha

The Theta Kappa Zeta of Lambda Chi Alpha is pleased to announce the addition of four new active members: William Mitchell, Terre Haute; Willis E. Rose, Connersville, Indiana; Lowell L. Smith, Harrison, Ohio; of the sophomore class, and Robert A. Greger, Terre Haute; of the freshman class.

On the nineteenth of December the chapter held a Christmas party at the chapter house. The house was decked out in Christmas colors and spirit, there being no absence of the traditional Christmas misteltoe. The evening was highlighted by a grab bag; the gifts ranging from teething rings to toy automobiles. Dancing, ping pong, and refreshments were enjoyed by all. The party was chaperoned by Mr. and Mrs. Bresett and Mr. and Mrs. Ratcliffe.

Happening again for the third time in the last four months, the new year brought with it cigars passed out by Brother Morisseau; another girl wears the badge of Lambda Chi Alpha.

Brother Mitchell brought back a new member for the Fraternity, a litle collie pup named Loch. He has already become an active member in the chapter house.

The chapter wishes to extend a very happy and prosperous New Year to everybody.

Alpha Tau Omega

At a meeting held Sunday afternoon, December 13, following the customary hell-week, the following men were initiated into the active Gamma Gamma chapter of Alpha Tau Omega: Joseph Dede, Cedar Rapids, Iowa; William Plenge, Terre Haute; Robert Gillum, Terre Haute; William Jarret, Indianapolis; Don Tyler, New Albany; John White, Terre Haute; Warren Pugh, Terre Haute; Robert Wright, Terre Haute; William Marietta, Clinton.

That morning the chapter attended the First Baptist Church in a body and enjoyed services conducted by Reverend Esperson.

The members of A. T. O. have organized a basketball team which is now competing in a Y. M. C. A. league. This team has been extremely successful, standing undefeated in their first four starts and thereby leading the league.

A dinner meeting was held at the chapter house, January 11, and a

99.98% pure

isn't pure enough!

APPROXIMATELY 30 billion kilowatt-hours of electricity will be consumed to produce all of the aluminum and magnesium we shall need for warplanes and other uses during 1943.

And every kilowatt of this vast amount of power must be *converted from A.C. to D.C.* before it can be used in the production of these metals.

Most of this conversion will be done by the Ignitron . . . *a new and more efficient mercury rectifier* that is a direct result of Westinghouse "know how" in electronics research.

The vital factor in the efficiency of the Westinghouse Ignitron is the *extreme purity* of its electrodes. The graphite anode must be 99.99% free of certain impurities . . . the mercury cathode, 99.999% free of other impurities!

If certain impurities in the mercury increase 1/1000th of one per cent . . . or in the graphite, 1/100th of one per cent . . . the proper operation of Ignitron will be affected.

Few chemists have the skill, knowledge, and special equipment to solve such a problem of almost absolute chemical purity. For this reason, Dr. E. Bruce Ashcraft . . . micro-chemistry expert of the Westinghouse Research Laboratories . . . was assigned to the job.

Dr. Ashcraft lives in a Lilliputian world of chemical analysis. Tiny test tubes, doll's-size beakers and retorts, polarizing microscopes, spectrographs, a balance that measures the weight of a *millionth of a gram* . . . these are the keys he employs to unlock the invisible world of matter.

With the help of micro-chemistry, Dr. Ashcraft has made possible the control of the extraordinary purity of all graphite and mercury used as electrodes in Ignitrons.

And now, *electronics at work* are bringing victory closer every day . . . for Ignitrons with a rated capacity of more than 3,000,000 kw are turning out the thousands of tons of aluminum and magnesium upon which our Arsenal of Democracy depends!

* * *

WE SALUTE DR. ASHCRAFT and the other thousands of scientists who are working for victory in research laboratories all over America.

We also salute the scientists of tomorrow . . . the engineering students now in college who will be called upon to rebuild a war-torn world.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pennsylvania.

TOM THUMB CHEMISTRY . . . Dr. E. Bruce Ashcraft examines a specimen weighing less than a microgram . . . approximately 1/50th the size of a grain of ordinary table salt. Dr. Ashcraft received his B.S. at Texas A&M, and his Ph.D. at Cornell University in 1937.

Westinghouse

PLANTS IN 25 CITIES—OFFICES EVERYWHERE

fine meal was prepared by the Mother's Club.

Several members of the chapter attended the marriage of Brother John Newlin to Miss Marjorie McCandless, December 27. After a short honeymoon in Indianapolis, the couple returned to make their home at 244 North 14th Street.

Sigma Nu

Beta Upsilon of Sigma Nu held its yearly initiation on Sunday, December 20. The following men were presented with the White Star: Francis McDonald, Ben Richardson, Bob Bruck, Dick Dill, Elmer Cooke, Emil Oprisu, Bill Johnson, Bill Hunt, Ellsworth Staver, Perry Ray, Paul Benning, James Conover, Bill Phillips, and C. V. Hinton.

The chapter enjoyed the Christmas vacation but is again holding its nose to the grindstone. The chapter was honored by a serenade by the Alpha sorority of Indiana State on Wednesday, December 16. After the singing, the vocalists and their very appreciative audience enjoyed dancing and refreshments at the chapter house. The chapter held an open house on Saturday, January 9. Among the entertainments of the evening were dancing and singing.

Beta Upsilon is proud of its members who are in the various armed services. The following men are in the Enlisted Reserve Corps: Robert W. Stark, T. Jack Warrick, Robert W. Leathers, James Francis Pfrank, William G. Cornell, and Allen P. Smith. Francis McDonald is a member of the Marine Corps Reserve, while Elmer Cooke, Paul Jewell, and John Martin are in the Army Air Corps Reserve. Warren Theising enlisted in the Navy V-7 program and Bob Bruck and Bill Woolsey enlisted in the V-5 program.

WELDING ALUMINUM

(*Continued from Page 7*)

of the molten metal. This permits the flux to rise quickly to the surface of the molten metal and remove the aluminum oxide.

It is very desirable to use some type of jig in arc welding to hold the work in line and form a backing strip. This helps prevent buckling caused by the very high temperature of the electric-arc. The backing strip is placed directly under the seam and a clearance of 1/16 inch should be allowed to permit free flow of the metal on the under side. If it is necessary to place the work directly on the backing strip for support, a shallow groove should be cut in the plate directly below the seam.

The length of arc is a very important factor in producing a sound weld. A very short arc is essential, and its length should never exceed ¼ inch. Too long an arc will cause small globules of metal to form which results in a very porous weld. The electric-arc process has the advantage of greater speed and less distortion of the part as compared with torch welding; also the effect on the structure and temper of the parent metal extends a smaller distance from the joints.

Carbon-arc welding is a very recent development in the field of aluminum welding, and it has not yet been placed on a production basis. Its use is confined chiefly to butt joints, either straight or corner, and few of the simpler types of lap joints.

The field of application of the electric-arc welding process is similar to that of torch welding. Electric-arc welding is used extensively in the construction of aluminum tanks and stills varying in thickness from ¼ inch to ⅝ inch. Duraluminum is more easily welded by the electric-arc process than by the torch process. Railway-rolling stock is welded by the electric-arc process because of the small amount of distortion produced. There are undoubtedly many additional applications of the electric-arc welding process being discovered because this process has only come into commercial use within the last twelve years.

Arc Welding as Compared with Torch Welding

Arc welds generally have a higher tensile strength than torch welds, but arc welds are very apt to be porous. Arc welds have less bend ductility than torch welds. Arc welding is considerably faster than torch welding, and residual flux may be removed more easily from arc welds.

Resistance Welding

Within the last few years a new type of fabricating process has come into importance in the aluminum industry. The process is resistance welding; it is employed in the form of spot, seam, and butt welds. The chief advantages of resistance welding are reduced cost, high rate of production, and an improved product.

Spot Welding

Spot welding was developed primarily to take the place of riveting. It consists of the following operations:

(1) the discharge of a large current, at fairly low voltage, through two or more pieces of sheet metal or bar stock; (2) following up the discharge of current with sufficient mechanical pressure on the two or more pieces of metal so as to untie them; (3) cutting off the current before the mechanical pressure is released to prevent burning at the die plates.

The size and shape of the spot-welding electrodes is important. The contact surface diameter should be between ¼ and ⅜ inches. The electrodes, moreover, should be of the highest practical electrical conductivity because of the high electrical conductivity of aluminum alloys.

The magnitude of the current has a marked effect on the strength of the weld. If the time period is short, less than one second, the weld is apt to be porous and crack. As the time period is increased, the strength of the weld rapidly increases; an excessive amount of time, however, imparts a coarse structure to the weld and causes segregation and increases distortion.

Surface cleaning is a necessary requirement for spot welding. This may either be done by mechanical means, such as with an abrasive cloth, or by dipping in a etching solution.

The weld is accomplished by a high rate of heating with an electric current. This causes a molten zone to be formed between the two sheets directly opposite the electrodes. Pneumatic, hydraulic, or mechanical pressure closes the electrodes completing the weld. It is very necessary to open the electrical circuit immediately on applying pressure to prevent burning of the metal and deposit of the copper electrode on the work.

The chief advantages of spot welding are its tensile and compressive strength efficiency. The following results were obtained with spot welding on 16-gauge annealed commercially pure aluminum:

1 spot 250 pounds, or a strength efficiency of 30%

2 spots 420 pounds, or a

strength efficiency of 63%
3 spots 560 pounds, or a
strength efficiency of 84%

Other Types of Welding

There are, in addition to the methods already described above, several other types of welding processes. All of these, however, are special applications of fusion or resistance welding, and their use is confined to special types of work. The additional types of welding processes are the atomic-hydrogen process, the carbon-resistor process, and the hammer welding process. None of these methods of welding is used to any extent at the present time.

Welding Compared With Riveting

The fabrication of aluminum by welding is a much more recent development than the fabrication of aluminum by riveting. In fact aluminum welding has only been on a true production basis for the last five years. The success of an aluminum weld depends largely on the skill of the operator. If the weld is completed in the proper manner, it will prove to be as satisfactory as aluminum riveting. Aluminum welding has a distinct advantage over aluminum riveting in the construction of liquid and gas-tight tanks. Welded joints exhibit better corrosion resistance than riveted joints. If appearance is a necessary requirement, a finished aluminum weld is far superior to a riveted joint. Welded joints have not proved to be as efficient as riveted joints in construction work where strength is the important factor.

OUR SECOND FRONT

(*Continued from Page 8*)

when he said, "When Hitler put this war on wheels he ran it straight down our alley. When he hitched his wagon to an internal combustion engine he opened up a new front, commonly called Detroit. When he took this war into the skies he rose into our own element."

Such a complete changeover called for drastic changes in our industries. Plants which formerly produced automobiles now make tanks, typewriter companies now make machine guns, and commercial airplane plants had to be altered to produce deadly warbirds. For example, General Motors Corporation, which up to the declaration of war was turning out automobiles has accepted a new extensive war job. The cumulative value of the contracts and annual deliveries of war supplies by the General Motors Corporation as of December 31, 1941 were as follows: for tanks, $69,000,000; for guns, mounts, controls, machine guns and rifles $271,000,000; for aircraft and parts, $827,000,000; for ammunition, $78,000,000; for trucks, $137,000,000; for electrical equipment, $7,000,000; and for other defense products, $13,000,000, or a total of $1,619,-000,000. Likewise, the Ford Motor Company closed the year holding more than a billion dollars in orders for war materials.

All the huge plants must be ready for changes on a moments notice. The number, size, and complexity of machine tools to be used depends upon the quantity of output. More

factories must be torn apart and done over, as well as expanded, to meet changing demands. Workers must continually be changing their particular jobs. Little difficulty will be encountered, however, if their adjustments to their new occupations is as rapid as it has been thus far. When a workman in a former automobile factory was asked how the change to producing tanks had affected his job, he merely answered that it seemed to him that he had been building tanks all his life and the finished products verified this statement.

The large industries are not the only important producers of war materials. Small plants serve as important producers of small parts. World War II had been called a war of spare parts. For every 60,000 airplanes that take to the air there must be an amount of spare parts equal to those used in the production of 80,000 planes. There are 6000 small firms that make tank parts in Great Britain and many are springing up in all parts of the United States.

The old saying "An army travels on its stomach" could easily be altered to fit modern mechanized warfare so it would read "An army travels on those products produced in home industries". The axis will be defeated in the United Nation's workshops.

E. HAROLD STANFIELD

(*Continued from Page* 12)

college degree. Because Stan had worked with Rose graduates who had shown their exceptional ability and because he had forgotten most of his high school math and realized he would need the individual attention that he could obtain at a small school, he chose Rose Polytechnic Institute as the school for his study.

Stan entered Rose in 1940 and since that time has distinguished himself among his classmates. He is a member of Blue Key, an honorary fraternity, Alpha Tau Omega, a social fraternity, and is financial secretary of the stundent council, secretary-treasurer of the A. S. C. E., and is assistant editor of the Modulus. Harold has paid part of his way through school by working in the book store.

After graduating from Rose, Stanfield would like to continue his studies for a M. A. in highway engineering at the University of Illinois. Then Stan wants to work for a period of ten years as a highway engineer for the State Highway Commission or the Federal Bureau of Public roads. After spending these years getting additional practical experience, Stan would like to become a private road contractor.

JOE VALENTINE

(*Continued from Page* 12)

E. E., and Tau Nu Tau; this year he has taken on additional responsibilities as the general chairman of the Junior Prom. Since he is in the advanced R. O. T. C., Joe's future is planned for him already, at least for the duration, after which he hopes to practice as an electrical engineer.

THE GRADS ADVANCE

(*Continued from Page* 13)

'41 John F. Carroll is working in the Bureau of Ships, Washington, D. C. Mr. Carroll plans to study law at night. He was formerly a student engineer with General Electric Company, Lynn, Massachusetts.

'42 William M. Hochstetler has been promoted to 1st Lieutenant. Lieutenant Hochstetler is in the Chemical Warfare Service.

New Arrivals

Arthur G. Butler, Rose '10, announces that he has become a grandfather. David Butler Stewart was born December 7, 1942.

Ensign (Rose '35) and Mrs. E. J. Welsh, 53 Stocker Drive, Windemere, Charlestown, South Carolina, announce the birth of a daughter December 13, 1942.

Hubert H. Wittenberg, Rose '37, has a son. Terry Lee was born November 26, 1942.

Why Can't You Be Superman?

by E. JAMES HEGARTY, c.e., '42

That's what it says, why can't you be Superman? Just because you don't look like Clark Kent when you're out of character don't give up. Don't worry if you can't fill out your union suit like Superman would. His suits probably aren't made by the same union anyway. The main reason you are not Superman himself is because you are holding yourself back. Honest and truthfully, have you ever tried walking through a brick wall? Why not? Just say to yourself if Superman can, I can and you will be surprised at the results. I've tried it and I was surprised. Surprised,—I didn't have a nose to blow or enough teeth left to brush. Don't overdo it at first. Walk through thin walls then work your way up to concrete pillars and small dams. You will be a sensation.

Superman flys, birds fly and so can you—tell yourself. You don't have to have big ears to fly. I do and I haven't been able to fly as yet. I started by jumping out of a first story window but the ground never gave my arms and ears time to warm up. I then, after jumping out of the second story window into the hospital, tried the fourth story. I did not fly as I hadn't the two other times but I was embedded in the ground a foot and a half deeper than before. My folks told the man who came to dig me out the petunia patch in the front yard that he could save them quite a bit of time and money if he would just dig four feet deeper and say a prayer. He dug me up, though, and I spent some more time in the hospital telling people how I had jumped through a screen and strained myself. You can become stronger each day. Just try lifting anything you think you might have trouble lifting. No, don't refrain from taking baths. I have an uncle that carried out this policy. He had more trouble than you might imagine.

If you have been unfortunate enough to live in Pittsburgh, Terre Haute or some other very smoky city, take a few minutes off each day to run twenty miles out into the country and take a deep breath of fresh air. Always be looking for ways to build yourself up. I tried to build myself up to the place where I could stop a cannonball with my chest. I withstood the pea-blower and the slingshot but my brother shot the twenty-two right through me which was not as fatal as it sounds. Your diet will become an important factor if you expect to become a Superman. Eat that extra flake of Wheaties each morning. Eat grass, worms, caterpilars and the other stuff birds eat to help you with your flying. Remember don't peel caterpillars before you eat them because if you do they taste just like worms which isn't bad but would be better if they tasted like caterpillars. Arrange it with your ration board so you can drink a quart of hi-octane gas with each meal to give you speed in the air. If you live near the seashore eat mussels, there isn't much sense in growing them when they are so handy.

I'm telling you all my knowledge on this subject because my days of trying to become Superman have passed. My insurance company keeps sending me threatening letters, and I have given up on account of this. Just practice, Supermen of the future, just practice. Practice makes perfect and perfect is Superman and Superman can be you.

Who am I fooling?

CUTTING TOOLS THAT NEVER DULL

FASTER than ever before—and with fewer delays—man shapes steel with the Airco oxyacetylene flame. There's no time out for sharpening or regrinding when this modern cutting tool is on the job. Here the Radiagraph—an Airco achievement—is depicted utilizing the oxyacetylene flame to perform a highly specialized cutting operation. So versatile is the standard machine that it does the job speedily, accurately without the aid of special attachments.

New, faster, better ways of making machines, engines, ships, tanks and guns result directly from using this "never dull" production tool. So varied is its application that, in addition to cutting steel swiftly and accurately, the oxyacetylene flame hardens steel to an easily controllable depth, cleans metal surfaces for longer lasting paint jobs, welds metal into a strong, lasting structure. To better acquaint you with the many things that this modern production tool does better we have published "Airco in the News", a pictorial review in book form. Write for a copy.

AIR REDUCTION

AIRCO

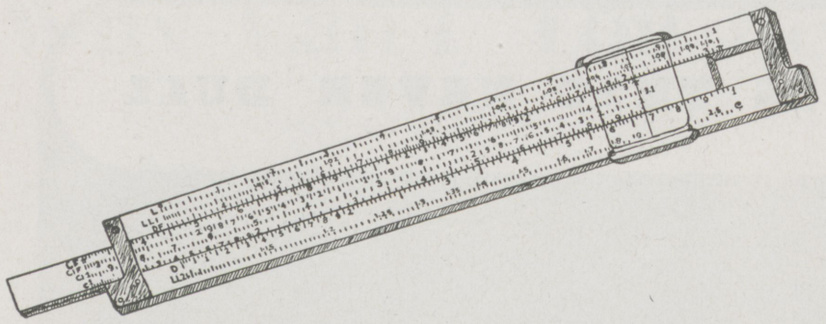
General Offices:

60 EAST 42nd STREET, NEW YORK, N. Y.

In Texas:

Magnolia-Airco Gas Products Co.
General Offices: HOUSTON, TEXAS
OFFICES IN ALL PRINCIPAL CITIES

ANYTHING AND EVERYTHING FOR GAS WELDING OR CUTTING AND ARC WELDING



Sly Droolings

Edited by ROBERT K. DRAKE, junior, e.e.

The census taker was questioning an Ag graduate of a few years ago who was once more in his rustic surrounding.

"And how many children do you have?"

"Four," was the answer, "an' I tell you that's all I'm going to have."

"How come?" the census taker inquired.

"Why," said the hillbilly, "I just read in this here almanac that every fifth child born in the world is a Chinaman. I'm just smart enough not to let some thing like that happen in my family."

"Where does this shady lane lead to?" asked the motorist.

"Well stranger," drawled the farmer thoughtfully, "Its led mor'n half the young folks around these parts into a right smart heap o' trouble."

A drunk was watching a revolving door and saw a man walk in. As the door swung around a pretty girl stepped out.

"Darned good trick," he muttered, "but I still don't shee how that guy changed hish clothes so fast."

"Are you positive that the defendant was drunk?" asked the judge.

"No doubt," growled the officer.

"Why are you so certain?"

"Well," replied the officer, "I saw him put a penny in the patrol box on Fourth Street, then look up at the clock on the Presbyterian Church and shout: 'Gawd, I've lost fourteen pounds!' "

Hegarty wants to know—"If all horses say Nay, where do little horses come from?"

The foreman reported the jury was unable to agree upon a verdict. The judge said the case was a clear one and added: "If you do not reach a verdict before evening, I'll have twelve suppers sent in."

"May it please your Honor," spoke up the foreman, leering at one of the jurors, "Make it eleven suppers and a bale of hay."

A society member approached Henry, "We are having a raffle for a poor widow," she said. "Will you buy a ticket?"

"Nope," said Henry, "My wife wouldn't let me keep her if I won."

Alan: "You have the second nicest pair of lips in the world, dear."

Cutie (indignantly): "And who has the nicest?"

Alan: "I'd put mine up against yours any time."

MODERN GIRL

Legs ..... By Steinway
Body ..... By Fisher
Necks ..... By the hour

She was only a grave digger's daughter, but you ought to see her lower the bier.

There's the wonderful love of a beautiful maid,
And the love of a staunch, true man.
And the love of a baby that's unafraid,
All have existed since time began.
But the most wonderful love—the love of loves,
Even greater than that of a mother,
Is the tenderest infinite, passionate love
Of one dead drunk for another.

There is an engineer on the campus who never takes a drink. You gotta hand it to him.

The sergeant strode into the squad room. "All you blankety blank lazy apes get outside!" he exclaimed.

The soldiers grabbed their hats and swarmed out . . . all but one, who continued to lie on his bunk blowing smoke rings.

"Well," roared the sarge.

"Well," remarked the rookie, "there sure were a lot of them, weren't there?"

"Tell me, papa," asked Johnie, "what is a consulting physician?"

"He is a doctor who is called in at the last minute to share the blame."

A backwoods mountaineer found a mirror which a tourist had lost.

"Well, if it ain't my old dad," he said as he looked in the mirror. "I never knowed he had his pitcher took."

He took it home. That night while he slept, his wife found the mirror.

"Hah," she said, looking into it, "so that's the old hag he's been chasin' lately!"

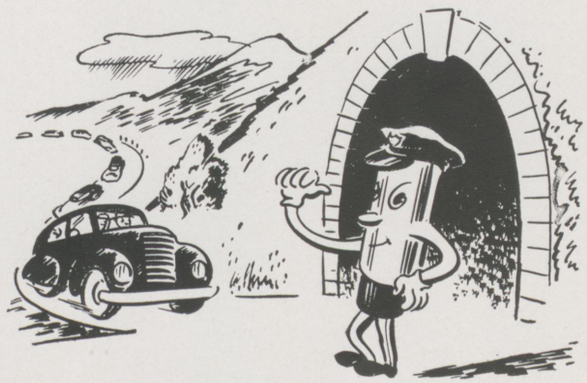
The one who thinks our jokes are poor
Would straight-way change his views,
Could he compare the jokes we print
With those we could not use!

"Here is a letter from your wife saying you are the father of a ten pound baby."

"Does she say anything else?"

"That's all, except at the end of the letter she says, 'Truly yours'."

G-E Campus News



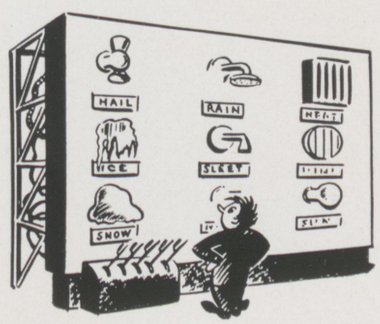
COAST IS CLEAR

FOR three years an automatic traffic control (essentially an electronic device) has been directing motorists through a one-way tunnel that serves as a direct route through a mountain on a Salt Lake County highway in Utah.

The traffic control counts vehicles as they enter and leave the tunnel. If the outgoing count is less than the ingoing, a bell warns a patrolman to go in after the missing car. Thus traffic is kept moving through the tunnel—in one direction at a time.

When the carbon-monoxide content of the air in the tunnel reaches a critical point, another electronic watchman stops traffic and turns on a ventilating fan.

Approximately 600 cars go through the tunnel every 24 hours, but the electronic cop isn't tired yet.



TAKE YOUR CHOICE

THE U.S. Army Air Force can test airplane engines at altitudes of 40,000 feet, where it's 67 below, or at low altitudes over deserts where the temperature soars to 120 F—without taking the ships from the ground.

Testing is done in a laboratory where refrigeration equipment, electric heaters, and air evacuating equipment take over for the elements.

One such lab, for which G.E. is building electrical equipment, will house several test chambers, in each of which engines will be tested under different conditions.

To accomplish this, air will be partly conditioned and then delivered to the various test chambers. At each test chamber the air will be further conditioned to obtain the exact humidity, temperature, and pressure for the particular condition desired. Then the air will be delivered to the engine carburetors.

PIPE DREAM

THE War Emergency Pipeline, largest oil trunk of its kind in the world, will go into operation in January. Extending 531 miles from Longview, Texas to Norris City, Illinois, the "Big-Inch" pipeline (so called because it is 24 inches in diameter) will help alleviate the oil shortage in the East.

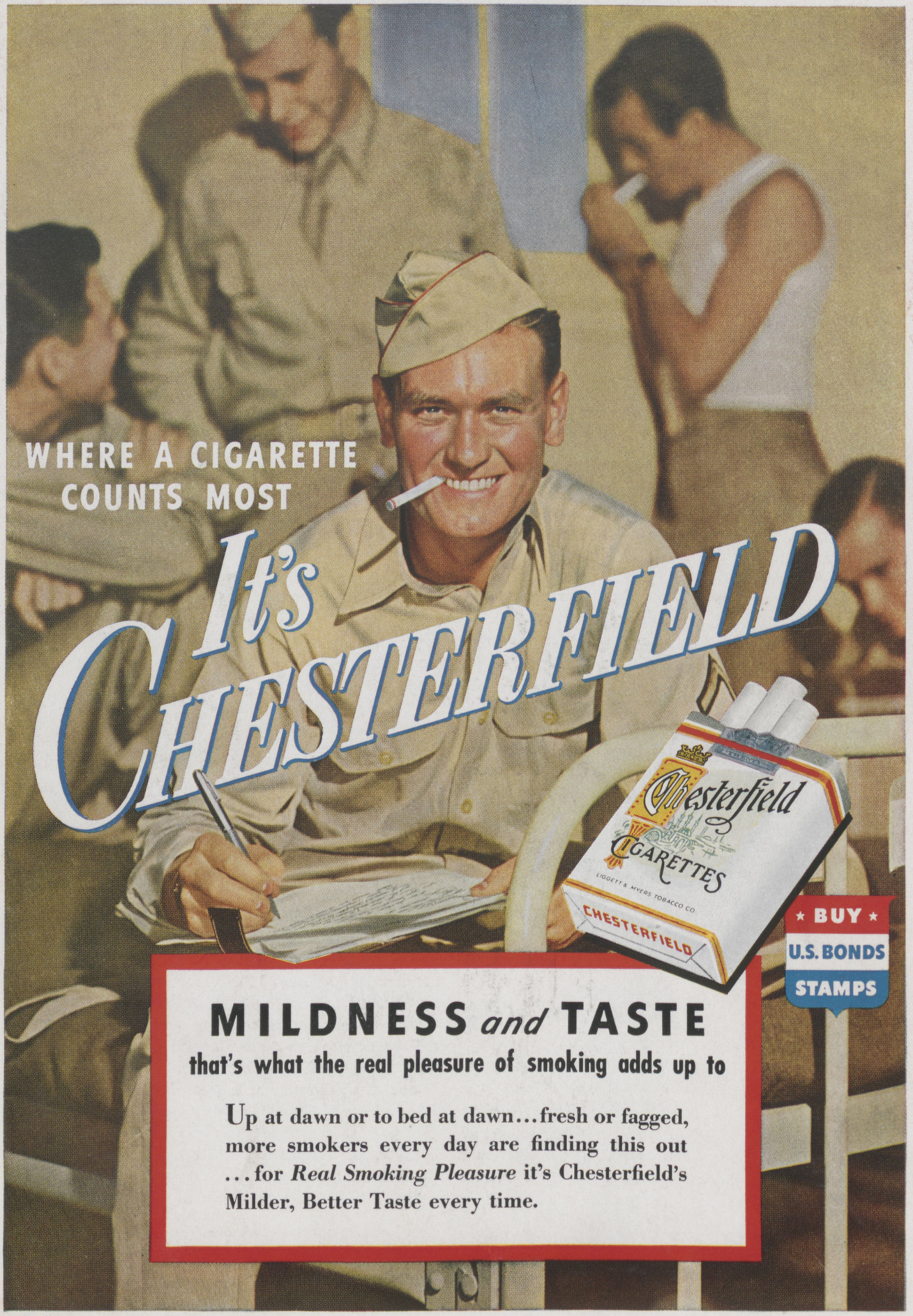
G.E. recently shipped, five weeks ahead of schedule, the first two of fifteen 1500-hp motors it is building for the line.

Built of cast iron to conserve steel plate, the motors will be used to drive centrifugal pumps in booster stations along the line. These pumps will keep 1,330,000 barrels of oil flowing at a rate of 4 miles per hour—a delivery rate of 300,000 barrels a day at Norris City.

By June it is expected that the remaining section of the line, 857 miles long, will connect Norris City and the Atlantic seaboard.

GENERAL ELECTRIC

963-62-211



Make-up Quiz
D69 Machine Design

I. This is a straight-forward problem. If your answer looks right, it's wrong—do the problem over.

(a) Design a ball-bearing for 77.2% floating axle on a meat ball grinder, shaft rotates 1900 r.p.m. clockwise and outer race rotates 1600 r.p.m. counter-clockwise, balls slip .06% on outer race and .04% on inner race. Balls are out of round, (almost flat on two sides) shaft is octagonal (octane rating 77) inner and outer race elliptical and same major and minor axis dimensions, (6"x7"). 100 balls in bearing and 3" in diameter. There is a hole in outer race, 3½" diameter, for cooling purposes.

(b) Find the average number of balls lost through the hole per minute. Also calculate the number of balls left at 6:00 a. m. if the bearing is started at 5:00 a. m. (4% of balls lost through side of building.) Lubrication—sand in colloidal suspension with peanut butter.

(c) At what rate could a pig be backed into the grinder to yield 10 meat balls per min. without fracturing more than half the balls remaining in the bearing?

(d) If the room temp. is 70° F. and temp. of bearing is -6° F., how can the condition be changed to make the bearing run cooler? Fig. 240, curve II, applies. Would it help if the meat balls contained a lubricant? Explain.

(e) Assume a 3½" hole drilled in the inner race. (1) At what angle would a baffle plate be placed so that 75% of the balls would bounce back into the bearing, if each ball weighs 30.2 lbs.?

(II.) How many balls would a man have to toss in hole to keep 110 balls in bearing?

Federal Government Needs Draftsmen for War Work

Over a hundred draftsmen are being sought by the U. S. Civil Service Commission for work in Federal agencies that is necessary to the prosecution of the war. Entrance salaries range from $1,752 to $3,163 a year, including pay for the 8 hours of overtime incorporated in the 48-hour Federal workweek.

Draftsmen of all types are needed, particularly ship, electrical, and mechanical draftsmen, as well as topographic draftsmen. Agencies needing these types of personnel in the greatest numbers are the several bureaus of the Navy Department, the Coast and Geodetic Survey of the Department of Commerce, and the Geological Survey of the Department of the Interior. The Treasury Department and the War Production Board utilize statistical draftsmen.

Qualified engineering draftsmen in any field are urged to apply. However, persons without previous experience in the fields where needs exist may be appointed and trained in the subject. Women are especially desired. Applicants having training or experience primarily in commercial art, interior decorating, etc., which include any drafting training or experience will be considered.

For positions paying $1,752 a year, requirements are at a minimum. Persons may quality with 6 months of practical elementary full-time paid drafting experience, or with completion of one of the following types of study: at least 3 semesters of training in drafting in high school; or a thorough course of drafting requiring actual classroom work in a school specializing in drafting; or a U. S.-approved ESMWT course in engineering drafting; or a course in drafting in a college or university.

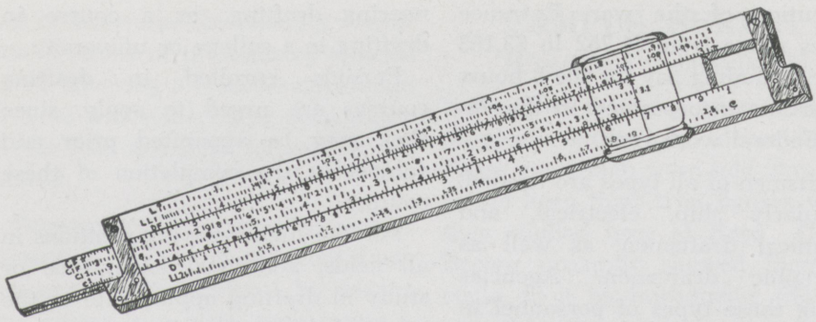
Persons enrolled in drafting courses are urged to apply, since they may be appointed prior and subject to the completion of these courses.

For the higher-paying positions in all fields, additional experience or study in drafting appropriate to the grade of the position is necessary.

The need for draftsmen is greatest in Washington, D. C. However, draftsmen are also needed in all parts of the United States as well as its territories and possessions.

Persons now using their highest skills in war work should not apply. Federal appointments are made in accordance with War Manpower Commission policies and employment stabilization plans.

Interested persons may secure Announcement 283 and application forms from first- and second-class post offices; from Civil Service regional offices in regional headquarters' cities; or from the U. S. Civil Service sent to the U. S. Civil Service Com-Commission. Applications should be mission, Washington 25, D. C.



Sly Droolings

Edited by RAYMOND FRANCE, senior, ch.e.

The doctor and his wife were walking down the street one afternoon when an attractive young blond nodded to him. Suspecting an earlier love affair, the wife asked: "Who is that woman, Dear?"

The doctor replied: "Oh! only a woman I met once or twice professionally."

The wife asked: "Who's profession?"

A man had two dogs which he was putting through some paces for a vaudeville producer in trying out for his show. After the producer, thoroughly bored, had seen the act, the little dog turned to the producer and said: "Well, how about it? Do we get the job?"

"What!" exclaimed the producer, "Does that little dog really talk!"

The man wearily replied, "No, the big dog is a ventriloquist."

Moe: "Do you know that a single fly can have a thousand little ones?"

Joe: "No kidding! How many can a married one have?"

Toastmaster (introducing the speaker): "I am sure that Mr. Jones of the Soils and Fertilizer Department will give you a pleasant half-hour, he is just full of his subject."

"Oh, Mrs. Flatbottom, I have never seen a child as badly spoiled as that son of yours."

"Why, Mrs. Murphy, I don't believe you."

"Oh, yeah? Well just come out and look what the fire engine done to him."

The hen is immortal; her son will never set.

WHAT TO DO IN CASE OF AN AIR RAID

1. As soon as bombs start dropping, run like hell. It doesn't matter where, just as long as you run. (If convenient, wear track shoes so that you can run faster. If anyone gets in your way it is easier to climb over.)

2. Take advantage of opportunities afforded when the alarm sounds, for example:

a. If in a bakery, grab a cake.

b. If in a tavern, grab a short beer.

c. If in a movie, grab a blond or whatever is handy.

3. If you find an unexploded bomb, pick it up and shake it; the firing pin may be stuck.

4. If this doesn't work, throw it in the furnace (the fire dept. will clean up later).

5. If an incendiary bomb is found burning in a building, throw some gasoline on it (you can't put it out so why not have some fun).

6. Always get excited and holler bloody murder. It adds to the confusion and scares hell out of the little kids.

7. Drink heavily, eat onions, limburger cheese, etc., before entering an air raid shelter. This will make you unpopular with the crowd in your immediate vicinity, eliminating unnecessary discomfort from people crowding too close.

8. If you should be the victim of a direct hit, don't go to pieces, this is important; just lie still and you won't be noticed.

9. Knock the air raid wardens down if they start telling you what to do. They always save the best seats for themselves and their friends anyway.

A young man stood before the board to register for his sugar ration.

"My wife doesn't have a grain of sugar in the house," he firmly stated.

"Be careful, young man, you must tell the truth, or you may be charged with perjury."

"Gosh! Is that a fact? Well—in that case, she's really not my wife."

A married couple along with their maid, were seen at church, in the same pew, every Sunday for fifteen years. The man and the maid slept through the sermons regularly without fail. One day the man's wife died. Sometime later, a lady sitting behind the man and the maid, who still came to church as usual, remarked to her husband that the two were going to be married.

"Well it's about time," replied the husband, "they've been sleeping together for the last fifteen years."

Many a rural romance has started on a little corn and ended with a full crib.

Fan: "What happened to the halfback? I saw them carry him on a stretcher to an ambulance."

Manager: "The trainer was rubbing his back with rubbing alcohol and he broke his neck trying to lick it off."

A sparrow sat in a tree in Berlin. His beak was held high in the air, and his feathers were puffed up proudly.

"What makes you so pleased with yourself?" asked his mate.

"I got Hitler today," proclaimed the bird.

Campus News

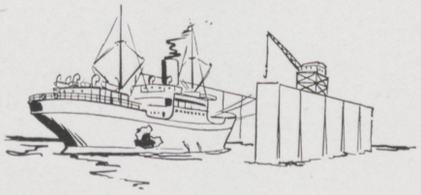
RESEARCH AND ENGINEERING KEEP GENERAL ELECTRIC YEARS AHEAD

BOMBS AWAY

SNATCHED from lowly KP duty, plastics handles for kitchen knives are flying high in American bombers. They form part of the bomb-indicator lamps, which were tailor-made by General Electric for the Army.

Less than thimble-size, of a distinguishing amber color, the model lamp was a G-E engineer's home work. Pondering its problem in his attic workshop, he noticed the translucent plastics handle of a kitchen paring knife on a bench. He cut off the handle's tip, fashioned on his lathe a dome-shaped colored cap which he fitted over the tiny grain-of-wheat bulb G.E. had developed for surgical instruments. After intensive experiment in Company laboratories, this lamp served as the model for the bomb-indicator lamps now on the instrument panel of our planes.

Now at one glance the pilot can tell how many bombs have been dropped and how many still remain. The lamp's latest use is on transport planes, signaling paratroopers when to jump.

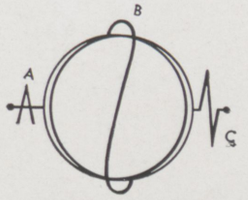


OVER THE BOUNDING MAIN

THE newest version of Mohammed and the Mountain is the floating drydock that goes to crippled ships at sea. Repairing these ships has been difficult in this war that is sometimes fought thousands of miles from the nearest friendly base.

With the new drydocks, however, the ships can be repaired almost while they wait. Made up of identical sections, each one a self-contained ship hull in itself, the drydocks are towed by a cargo ship to their destination.

Once there, submersion machinery "sinks" the docks beneath the surface. The crippled ship floats in, the water is pumped out of the docks' ballast chambers, and the resulting buoyancy of the sections raises the ship out of the water. Electric equipment made by General Electric is being used in the docks.



IT MOVES MOUNTAINS

CHINESE puzzle? Nothing so simple!

This is the symbol of the amplidyne, the ingenious d-c generator developed by General Electric engineers. Through the unique use of a short circuit and compensating winding a precise electrical balance is created. Thus the smallest electrical signals release kilowatts of output that are capable of controlling the most powerful machinery—helping to speed production, improve product quality, and conserve manpower and materials.

The symbol represents the amplidyne as two full-sized generators "compressed" into one. The minute control field (A) and the short circuit (B) represent the first stage. The compensating field (C) and the other circle connected to the load represent the second. For a booklet explaining the application of amplidyne, write to Campus News, *General Electric Co., Schenectady, N. Y.*

Hear the General Electric radio programs: The "Hour of Charm" Sunday 10 p.m. EWT, NBC—"The World Today" news, every weekday 6:45 p.m. EVT, CBS.

GENERAL ELECTRIC

953-68-211

The best investment in the world is in this country's future—BUY WAR BONDS.

AMERICA NEEDS NURSES · · · ENLIST NOW