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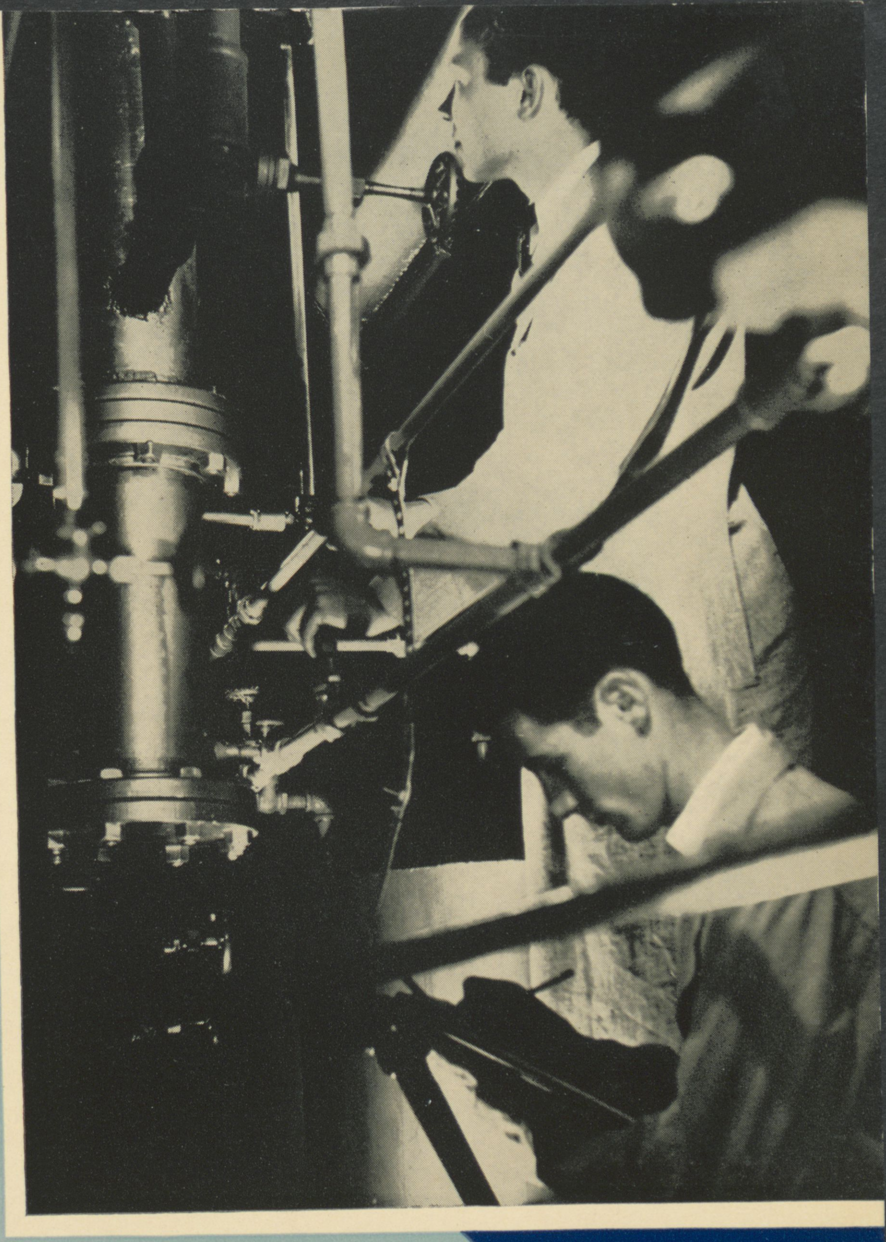

ROSE TECHNIC

JANUARY

MEMBER OF E C M A

1942

The United States is in a war in which technological superiority must be maintained. The engineering colleges recognize their responsibilities and have already taken steps to cooperate with the government. Needless to say Rose Polytechnic Institute will carry its share of whatever program is adopted.

ROSE POLYTECHNIC INSTITUTE

TERRE HAUTE, INDIANA

ROSE TECHNIC

VOLUME LI JANUARY, 1942 NUMBER 4

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THE COVER

Ah, yes! The Chemicals' lab again.—Loto by Pheedy.

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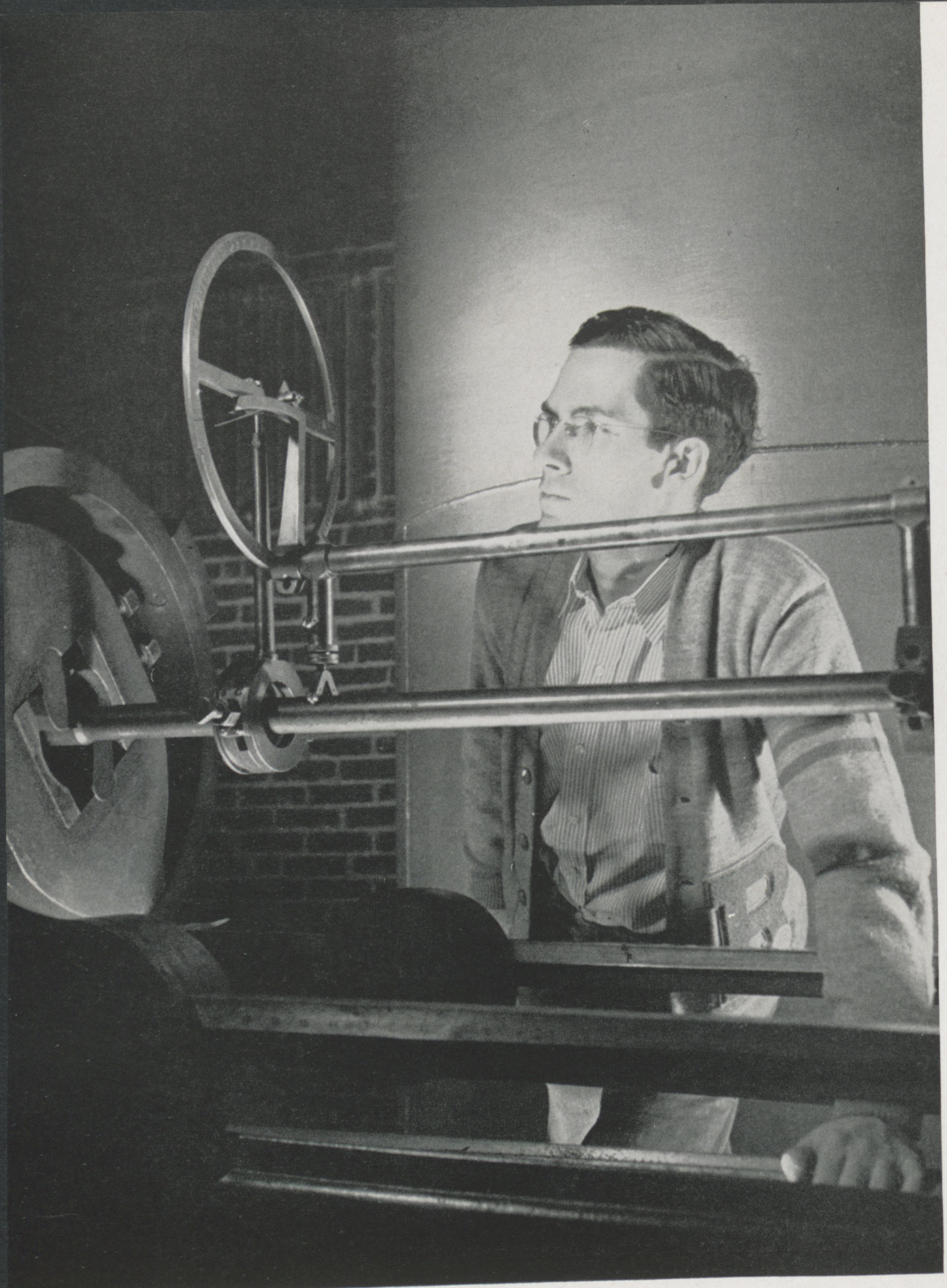


Photo by Leedy

A CHALLENGE

The prospective future of the college graduate of 1942 has done a complete about-face as compared with the prospects confronting the graduate of ten years ago. Especially in the case of the engineering graduate of today it is not a case of where to find a position, as it was ten years ago, but rather which one of several positions should be accepted.

The most powerful factor in producing this change of conditions has been the change in world affairs, more specifically the change in economic affairs as influenced by the political turmoil of the world. The resulting impetus given to the engineering profession has never before been equaled, and it should cause every engineer to stop and ponder over the ultimate outcome. The embryo engineer is a very essential part of the scheme of things and is looked up to, not only for his knowledge of things technical, but also because of the sound thinking and reasoning powers which he has developed during the acquisition of that knowledge.

It is with this thought of the future that the graduates of the class of 1942 should view their prospective positions, which fall into rather distinct classifications.

With the continued expansion of the war program, there will be numerous opportunities for actual military service, especially for those graduates who have had R. O. T. C. training. Life in the army offers a career in itself, but if the technically trained graduate will be of more use while engaged in some position other than the army, he should not feel that he is lacking in patriotism by not serving in the armed forces.

When the time for demobilization arrives, however, those who make a career of the army will have to procure other employment. At this time jobs may be rather scarce, and the men who went directly from school into the armed forces will lack connections with industry, which will be a handicap and a disadvantage.

By far the largest number of opportunities will be in the field of employment in private industry actively engaged in war production. The young engineer, while not an expert, can readily adapt himself to the production methods of modern industry. Under the guidance of the older, more experienced engineers, he will not only gain invaluable information, training, and experience, but will release qualified men for the more important administrative and managerial positions. When the present emergency situation has passed, however, there will not be the vast need for the younger men, and many of them must necessarily turn to some other field of endeavor. Their experiences in industry will stand them in good stead.

The third possibility for employment is in the several industries which are non-essential to the present army and navy program. The young engineer will not be able to make such high salaries in this type of employment, nor will he advance so rapidly as he might while engaged in defense projects, but his position will be somewhat more settled when economic and political situations return to more normal conditions.

How serious and far reaching the aftermath of the present world situation will be, no one can hope to predict with any degree of accuracy. Nevertheless, it should be with an eye toward the future that the college graduate selects his position. For some, military service will be compulsory, and they may not have much choice in the matter of their immediate employment. Each individual will have his own problems and no hard and fast criteria may be established which will suffice in all cases. It behooves every individual to keep well informed and to continue to study after graduation. If each graduate will follow a policy of self education and let his actions be governed by sound, logical thinking, he need have no fear of the unknown path which lies ahead.

by R. King Chalfant, c. e., '42

SOIL-CEMENT ROADS

by John T. Newlin, c.e., '43

Soil-cement roads are a new development in low cost road surfacing. Indiana's first soil-cement highway, just completed, has attracted interest from all over the midwest. This article is written by a Rose civil engineering student who worked as an inspector on the highway, and it describes the history and technique of building soil-cement roads.

IF cement can bind together sand and gravel so well that the resulting concrete finds as many and varied uses as it does, why not use cement to bind common soil into a stabilized mass which could be used for inexpensive road surfacing? This challenging question was asked by a few thoughtful men only ten years ago. They were answered immediately by a chorus of concrete contractors who quoted an old axiom: "Concrete must be made from clean sand and clean gravel." If concrete must be clean, how can dirt make a successful aggregate material for a cement binder?

The thoughtful men were undaunted. With their question unanswered the challenge was still there; so they began research and today, as proof that their work was successful, roads made from soil stabilized with cement are being built or are already completed all over the United States. These new soil-cement roads make good low cost highways for light traffic use.

This fall, contractors for the State Highway Commission of Indiana have completed Indiana's first soil-cement road, Indiana Route 267. It is slightly more than nine miles in length and runs north and south from Brownsburg to U. S. 52. Between the original idea and the completion of Indiana's highway is an interesting history of research and development which shows that ideas when properly promoted give fruitful results.

The pioneer work in the development of soil-cement mixtures was done by the South Carolina State Highway Department in 1932. This was laboratory work of the type that is carried on in highway laboratories all over the country. Various types of soils were tested with different combinations of water and cement. Samples were mixed, compacted, and allowed to harden. The samples were tested for strength, reaction to freezing and thawing, resistance to wear, and density. A full study was made so that when actual construction began, proportioning of cement and water to the soil would not be a hit-and-miss process. Soil physics, soil mechanics, and soil chemistry all applied to the original investigation.

The South Carolina highway department was not the only group to study the plan. Their work was supplemented with exploratory tests by the United States Bureau of Public Roads. The tests showed that if a soil had the correct water content and particle size proportion for maximum density, with cement added to impart additional stability, a good road material could be obtained.

Accordingly, late in 1935, a one and one-half mile cooperative field project was begun near Johnsonville, South Carolina, by the state highway department of that state, the U. S. Bureau of Public Roads, and the Portland Cement Association. The principles established from laboratory experimentation were applied throughout construction of the road, and gratifying results were obtained. After three years the road was still in fine condition; thus it was established that soil-cement roads were worth-while.

The growth of soil-cement construction is shown by the following table:

Year	*States*	*Projects*	*Miles*
1935	1	1	1.5
1936	5	5	7.7
1937	11	18	35.1
1938	17	43	101.5
1939	20	78	135.6
1940	28	82	260.8

Soil-cement is certainly not limited to highways. During the present rush to build military air bases, it has been found that soil-cement can be used very effectively as paving material for runways and aprons.

Cut Courtesy Aviation

These men are demonstrating one method of compacting soil-cement roads and runways.

However widely used soil-cement roads may become, they cannot replace other road materials in cases where heavy, continuous traffic is handled. Soil-cement does not have the strength of brick or concrete or the pliability of bituminous material. It is limited to use where light traffic is expected or, in many cases, as a base for a higher type surface. Soil-cement can be used to build a solid, lasting subgrade for a concrete slab or, as in the case of the Indiana highway, a light bituminous seal coat may be placed over the soil-cement base to protect it from weathering.

What is the status of the soil-cement road today? In brief, during the six years since the pioneer road was built in South Carolina, 240 projects have been built in 35 states totaling 584 miles. The first eight months in 1941 saw a great increase in the use of soil-cement. Seventy-five miles of highway were awarded to contractors or set up for construction. Other kindred uses in the first eight months amounted to the equivalent of 650 miles of 20-foot wide highway. These uses included runways, aprons, and parking areas for army and navy air bases, civilian airport work, municipal streets, parking lots, alleys, and walkways. Soil-cement has arrived. The thoughtful men who visualized the possibilities of mixing ordinary soil with cement have seen their work bloom into maturity.

The Indiana soil-cement highway was begun last spring on the road between Brownsburg and U. S. 52. Brownsburg is twelve miles northeast of Indianapolis. The old road running north from Brownsburg to U. S. 52 was gravel with many sharp turns in it. A new line was laid out which followed the old road generally but cut down the steep grades and eliminated square corners.

The gravel which was on the old road was scraped up and piled in salvage piles at intervals along the road by scrapers which pick up and carry the material to the pile and then spread it.

New culverts and one new bridge were built and the road was brought to the new grade by use of modern earth moving equipment. Big, powerful Diesel-driven graders and scrapers operated by men who could handle the machines with delicate control soon had the rough work done. According to Indiana highway specifications, the earth in fills was spread in layers of about six inches and rolled by ten-ton rollers to insure a compact base.

The subgrade was cut by a Diesel-driven blade grader to form a cross section with a crown of two inches. This crown was checked with a template which was run over the subgrade on forms placed at the proper elevations according to grade stakes set by the assistant project engineer.

After the subgrade was completed and rolled, the salvaged road gravel was spread over the grade to a depth of six or seven inches. This salvage road material contained some gravel but also a great deal of sand, clay, and loam. The presence of the finer material in the salvage increased the density so that the mixture more nearly approached a maximum density than clean gravel would have. Of course, the greater the density of an aggregate, the more stable a road material it makes. It was also found that the salvaged road material required only 9% cement by volume as compared to 14% cement required in the subgrade soil. In preparing the estimate, it was found to be cheaper to handle the salvaged road material twice, rather than to attempt to harden the subgrade soil. For these reasons the salvaged material was used as the soil in the soil-cement road which was constructed.

Four steps are necessary in building a soil-cement surface:

1. Scarify the soil to the depth which will be treated.

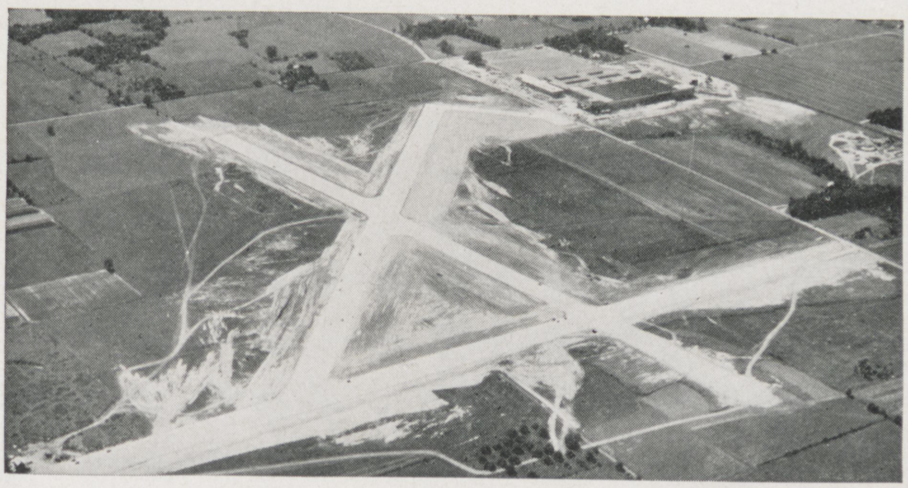
2. Thoroughly mix cement and water with the scarified soil.

3. Compact the soil-cement mixture.

4. Cure for seven days under moist straw.

On the Indiana job steps one and two were handled in one operation by use of a mixing machine which scarified the aggregate and added the water as the machine traveled slowly down the road. The cement was first spread by hand evenly over the surface of the ground. This operation might economically have been handled by a spreader box but in this case the bags of cement were spotted over the surface by hand, emptied by hand, and spread by hand. The mixing machine then thoroughly mixed the earth and cement to a depth of six inches. As it was mixed, the machine shot a spray of water over the width of the section being mixed. A row of valves made possible control of the quantity and the distribution of the water. The mixing machine was self-pro-

(*Continued on Page* 12)



Cut Courtesy Aviation

A timely application of soil-cement construction is pictured.

CHEMISTRY - - IN THE FOREFRONT OF DEFENSE

by Michael W. Percopo, ch.e., '43

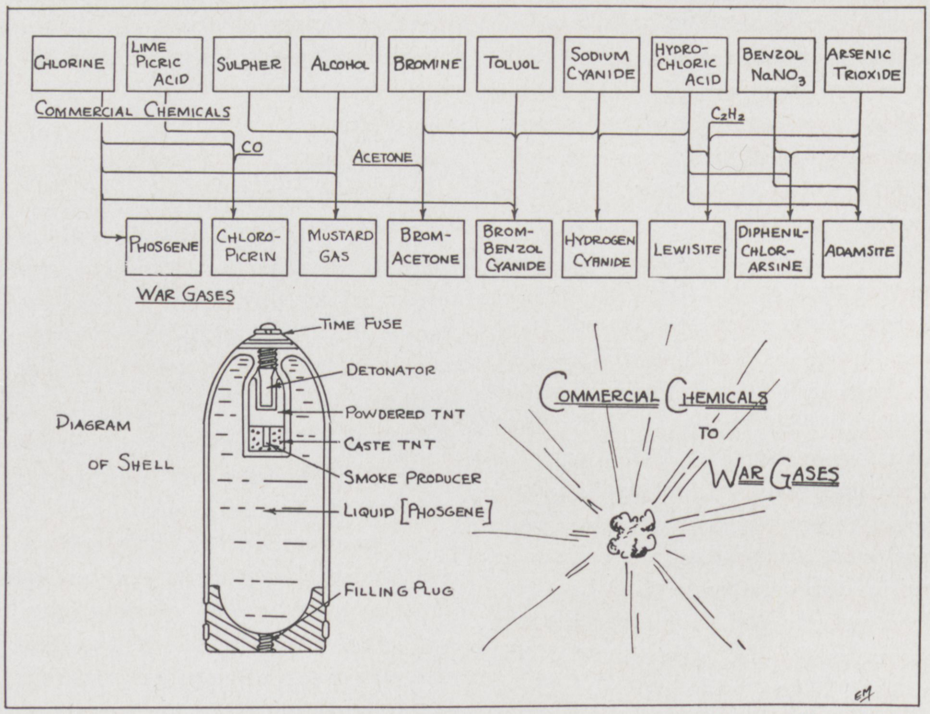
Chemistry, Explosives, and Warfare

THE three words above are inseparable—the last two cannot exist without the first. As in many other phases of living, chemistry is the science which bridges the gap. Warfare cannot exist in the modern concept without explosives, and explosives cannot exist without chemistry.

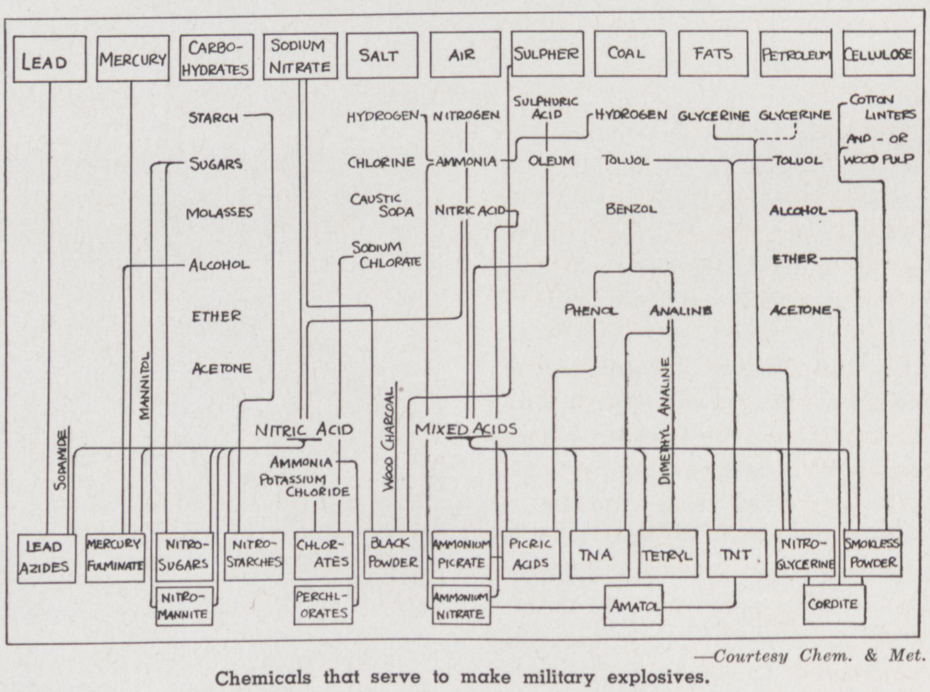
Ever since the birth of modern chemistry, dating back to the days of Antoine Lavoisier in the 18th century, men practicing the new science of chemistry have controlled the manufacture of explosives. An explosive is a chemical substance or a mixture of substances which upon being struck with a hammer or touched by a flame or electric spark is suddenly rearranged with the formation of gases and the development of heat.

Military explosives may be divided into three general classes: detonators and fuses, propellants, and high explosives. These are used in a combination known as an explosive train, which is merely a chain of explosions each one larger than the one before. The propellants fill the cartridges and serve to force out the shell with a high velocity, forcing it to take the rifling of the gun bore, and continuing in effective pressure until the shell is free from the gun. In order to fire the propelling charge, a hammer blow ignites a small fulminate cap (detonator) forming part of the primer which contains a sizable amount of black powder, this explodes in turn and flashes into the propellant.

Explosives used as primary detonators include lead azide, fulminate of mercury, and nitromannite. Black powder is the principal fuse powder; smokeless powder and cordite are the only important propellants. Intermediate detonators or boosters are tetryl (tetranitromethylaniline), picric acid, TNA (tetranitroaniline) and hexyl (hexanitrodiphenylamine).



—Courtesy Chem. & Met.



—Courtesy Chem. & Met.

Chemicals that serve to make military explosives.

Fulminate of Mercury will detonate completely and with great violence if hammered or subjected to an electric spark, an electrically heated wire, etc. It is used commonly in commercial caps for all explosives except TNT for which tetryl caps are used.

Tetryl is very powerful, having a velocity of detonation of over 22,960 feet per second. It is an excellent initiator of detonation and is the basis for the service tetryl caps which are necessary for positive detonation of TNT.

Among the high explosives or bursting charges the following are the most important: TNT (trinitrotoluene), DNT (dinitrotoluene), amatol (mixture of ammonium nitrate with TNT), picric acid mixed with ammonium picrate, trinitroanisol, and penthrite (pentaerythrite tetranitrate). The last named is the most important of the newer explosives. It can be made from acetaldehyde and formaldehyde in large quantities. Nitro-starch is used principally in trench warfare as a filler for hand grenades and mortar shells.

Shrapnel, named after Lt. Shrapnel, the inventor, contains lead balls packed in a sulphur, rosin, or black powder matrix. The shell casing has a weak point near the nose and when exploded opens at that point ejecting the balls fanwise.

Demolition bombs have a similar explosive train to that of shells but they contain much more explosive—usually about 60 per cent of their weight in TNT.

Incendiary bombs are filled with thermit (a mixture of powdered aluminum and iron oxide), an incendiary charge such as kerosene or oil emulsion, and explosives.

To manufacture these explosives requires vast amounts of material. The diagram showing the different explosives with the constituent chemicals needed in their manufacture will readily convey to the reader the part that the chemical industry of this country plays in the defense of the nation. In a previous issue there was an article written on chemical warfare. There, as the name indicates, chemistry plays an importnat role.

Following is a table which appeared in the November, 1940, issue of the *Chemical and Metallurgical Engineering Magazine*, showing the production figures of 1914, 1918, and 1940. The editors of the magazine estimated the amount of each chemical which must be produced to have complete defense. In making the estimates required for explosives, they figured on the assumption of one pound per day of explosives and one pound per day of propellant powder for each man in uniform in the army. The army was assumed to be 4,000,000 strong.

Now that we are actually engaged in the war, plans call for an army of 10,000,000 men. This will increase the amount of explosives needed over the amount previously estimated, but already plants are being erected for the synthetic production of such essential chemicals as toluol (needed in the manufacture of TNT), phenol, and synthetic ammonia. Certainly if this is to be a war of material strength, our chemical industry will not let us down.

1914 U.S. Pre War Production	**1918 Peak of War Capacity**	**1940 Present Peace Time Output**	**Needs Total Defense**
Sulfur 400,000 tons	Sulfur 1,500,000 tons	Sulfur 2,500,000 tons	Sulfur 3,000,000 tons
Sulfuric Acid 3,800,000 tons	Sulfuric Acid 9,500,000 tons	Sulfuric Acid 9,400,000 tons	Sulfuric Acid 12,000,000 tons
Synthetic Ammonia None	Synthetic Ammonia None	Synthetic Ammonia 260,000 tons	Synthetic Ammonia 550,000 tons
Other Ammonia 21,000 tons	Other Ammonia 73,000 tons	Other Ammonia 135,000 tons	Other Ammonia 150,000 tons
Nitric Acid 80,000 tons	Nitric Acid 500,000 tons	Nitric Acid 200,000 tons	Nitric Acid 1,000,000 tons
Caustic Soda 215,000 tons	Caustic Soda 330,000 tons	Caustic Soda 1,000,000 tons	Caustic Soda 1,250,000 tons
Soda Ash 935,000 tons	Soda Ash 1,507,000 tons	Soda Ash 3,000,000 tons	Soda Ash 3,500,000 tons
Toluol 1,500,000 gal.	Toluol 14,100,000 gal.	Toluol 25,000,000 gal.	Toluol 65,000,000 gal.
Phenol 8,000,000 lb.	Phenol 145,000,000 lb.	Phenol 70,000,000 lb.	Phenol 85,000,000 lb.
Amm. Nitrate 58,000,000 lb.	Amm. Nitrate 240,000,000 lb.	Amm. Nitrate 100,000,000 lb.	Amm. Nitrate 250,000,000 lb.
TNT 7,200,000 lb.	TNT 192,000,000 lb.	TNT 10,000,000 lb.	TNT 600,000,000 lb.
Picric Acid 7,200,000 lb.	Picric Acid 140,000,000 lb.	Picric Acid	Picric Acid 25,000,000 lb.
Smokeless Powder 1,800,000 lb.	Smokeless Powder 513,000,000 lb.	Smokeless Powder 30,000,000 lb.	Smokeless Powder 800,000,000 lb.
Black Gun Powder 8,000,000 lb.	Black Gun Powder 10,000,000 lb.	Black Gun Powder 3,000,000 lb.	Black Gun Powder 15,000,000 lb.
Tetryl 104,000 lb.	Tetryl 1,920,000 lb.	Tetryl	Tetryl 2,500,000 lb.
Mercury Fulminate	Mercury Fulminate 600,000 lb.	Mercury Fulminate	Mercury Fulminate 350,000 lb.
Chlorine 6,000 tons	Chlorine 45,000 tons	Chlorine 485,000 tons	Chlorine 700,000 tons
Potash (as KO) None	Potash (as KO) 54,805 tons	Potash (as KO) 350,000 tons	Potash (as KO) 375,000 tons
Coal Tar Dyes 7,000,000 lb.	Coal Tar Dyes 66,000,000 lb.	Coal Tar Dyes 140,000,000 lb.	Coal Tar Dyes 145,000,000 lb.
Bromine 50,000 lb.	Bromine 210,000 lb.	Bromine 38,000,000 lb.	Bromine 50,000,000 lb.
Iodine None	Iodine None	Iodine 300,000 lb.	Iodine 500,000 lb.

PRODUCTION -- ENGINEERS FIRST

The students of Rose attended a very serious meeting on January 8—a general assembly at which Dr. Prentice revealed tentative plans for the Institute's contribution to our war effort. As a reminder to those in attendance and for the benefit of Rose alumni, a summary of Dr. Prentice's remarks follows.

Representatives of the army, navy, and civil service commission addressed a recent Baltimore meeting of educators. The present R. O. T. C. program is to be continued but not expanded. Present seniors who have taken four years of military training will be ordered to active duty immediately after graduation. General Hershey, in a speech to the group, said there will be no change in the pattern for deferment of men training for essential purposes, and as Director of Selective Service, he is opposed to voluntary enlistments of engineering students. General Hershey said all additions to the armed forces should come through selective service channels. Otherwise the whole program of placing trained men where they are most needed will be upset.

The faculty of Rose has voted to recommend the following steps to the Board of Managers. The examination period at the end of the current semester is to be shortened. Registration for the second semester is to take place January 31, and classes are to be resumed February 2. Easter vacation is to be omitted with commencement for the class of '42 being held on May 9. The second semester is to close May 29 for the rest of the students, and adoption of three 16-week terms a year will necessitate the resumption of school soon thereafter, probably on June 15. Concentrated examination periods are highly probable in this speed-up program which enables a person to acquire a full four-year engineering course in two and two-thirds years.

Dr. Prentice expressed his appreciation of the attitude of Rose students in maintaining a level-headed outlook in this emergency. None of the semi-hysterical conditions present on some college campuses December 8 were in evidence here. He went ahead to emphasize, however, that many students are going to have to assume a more serious attitude toward a life which holds no more of the complacent "business as usual" element.

Rose Polytechnic Institute is not going to be a shelter for anyone wishing to escape military training or service. Many Rose alumni are already serving their country in the army, navy, and air force, and more will follow. Engineering students are being give a great privilege by the American people in being permitted to finish their training, and they in turn must realize their tremendous obligation to our nation. A vast amount of engineering work will be needed to meet the gigantic production totals outlined by Mr. Roosevelt in his speech to Congress on January 5. If the engineer working in an essential industry is serving his country better there than he could in the armed forces, it is his patriotic duty to remain on the job.

There has been a popular idea prevalent that in engaging the Japanese, we are locking horns with a group of midget-sized poorly-equipped fighters who can be put in their proper place very shortly. The fallacy of this should be readily apparent from the initial successes scored by them in the South Pacific Ocean.

The challenge has been issued to the men of Rose and other engineering schools. As in times past, the country can count on them to rise to meet the task. It is the duty of each of us to work harder, devote ourselves fully to the job at hand, and justify America's faith in her engineering skill.—G. F. M.

THE ROSE TECHNIC

Member Engineering College Magazines Associated

RESEARCH AND DEVELOPMENT

edited by John E. Metz, m.e., '43

Color Coils

Plastic coils have been developed which color fluorescent lights, control their brilliance, and correct color distortion. Made of tenite, a shatter-proof plastic, the diffusing coils fit tightly over the fluorescent tubes and can be used for their decorative effect alone.

The diffusers consist of thin, transparent and translucent strands of tenite wound into tight spring-like coils. Since the plastic has an unlimited color range, any shade or combination of shades is possible.

Color correction for white and daylight fluorescent light—both inherently lacking in red rays—can best be obtained with coils made of red and clear strands of tenite wound together. An insufficient amount of red rays in light can give a "cold" effect and make red and other colors containing red, such as brown, appear unnaturally dark. Pink coils not only serve as diffusers, transmitting more than 70 per cent of the tube's light, but they also aid in correcting color distortion.

Illumination engineers and interior decorators can now obtain entirely new effects in lighting. These virtually indestructible coils are molded by extrusion. In this process, continuous lengths of the heated plastic are forced from a die much as toothpaste is squeezed from a tube. The plastic hardens when cool and is coiled in the desired lengths and diameters.

Although the size and wattage of fluorescent bulbs may be changed in order to vary the amount of light available, the brightness of any single tube once installed is constant. Tenite coils are a step towards solving the problem of varying intensity. Since the plastic is manufactured in forms ranging from clear transparency to opacity, the amount of light shed by a tube sheathed in tenite depends upon the translucency of the coil.

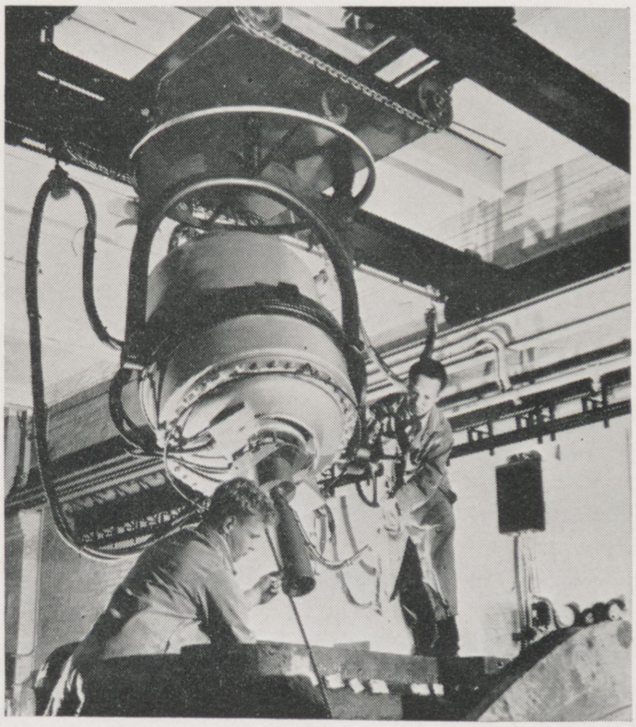
The most outstanding result of tests made is the ability of a solid pink plastic coil to transmit a great amount of light. This ability, together with its high spectral transmission of red rays and its cutting down of transmission of yellow rays, makes it an even better diffusion shield than the clear type because a degree of color correction can be obtained.

Million-Volt Industrial X-Ray

The Million-volt X-ray machines, developed by General Electric, are available to industry in portable units and are being used to speed defense efforts at several large plants. The two final stages in the development of a portable 1,000-kv X-ray apparatus for industrial use are shown in the illustrations. An earlier 800-kv X-ray machine required a multi-story building for its housing, the X-ray tube itself being some 14 feet in length and about a foot in diameter. The two-ton laboratory model shown at the right in the illustration represents an intermediate step, and is an adaptation of 1,000-kv equipment developed for medical purposes. The completely sealed and self-contained portable 1,000-kv unit shown is today's version of that early equipment.

The outfit will photograph through 5 inches of steel in 2 minutes, as compared to 3½ hours required by a 400,000-volt tube, which is the next smaller size. It is being used regularly in several plants for inspection of large castings, boiler drums, and pressure vessels. The tank weighs 1500 pounds, is three feet in diameter, and has an over-all height of seven feet. Extensive industrial use is made possible by the compactness of the design.

Three novel developments—the use of Feren gas under pressure in place of oil as an insulating medium, the use of a resonance transformer without an iron core, and the installation of the sealed-off multisection X-ray tube—make possible the small size and low weight.



Million-Volt Industrial X-Ray.

Electrons to produce the rays emanate from a heated filament at the top of the tube. As they pass through each section, a potential of about 84,000 volts is applied, giving them an added push. By the time they reach the bottom, they have been boosted by a total of a million volts. They then hit a tungsten target, in an extension of the tube which projects from the bottom of the tank, and X-rays result.

Unlike the small tube, where the X-rays come off at right angles to the electron beam, most of the million-volt rays pass through the target and emerge in the direction in which the tube is pointed.

Consequently, in most industrial uses, the tube and the tank with it, is aimed like a gun at the casting to be examined, and the X-ray film is fastened to the other side. When it is more convenient, however, pictures may be made with the rays that come off to the side.

The power required to operate this machine is about four kilowatts at a frequency of 180 cycles per second. The effective radiation is the equivalent of that from about 100 grams of radium which would represent a cost of some $2,500,000.

Oceans of Magnesium

The United States and England, formerly far behind in the production of magnesium, are now making this strategic metal from sea water. New American plants are producing magnesium in such quantities that these two countries will soon surpass Germany in magnesium output. This was the only one of the common engineering metals in which Germany was self-sufficient, and up to three years ago, Germany produced about three-fourths of the world's consumption.

Present production in the United States points to a yield of 30 million pounds for 1941 and nearly 90 million pounds in 1942, while in 1939 only six million pounds were produced.

This remarkable expansion is being made possible by new plants using sea water as a source. In spite of the low concentration of magnesium in sea water, there are about four and one-half million tons of magnesium in a cubic mile of ocean. This amount of water will furnish 90 million pounds of magnesium metal each year for 100 years.

All other necessary metals for magnesium base alloys are readily available in this country. The largest single use of this metal, which is only two-thirds as heavy as aluminum, is as an alloying element in aluminum base alloys. Many of these are used in airplanes. Magnesium and its alloys are used not only for reduction in dead weight but also for less inertia because of light weight, lower bearing pressures, easier rotating balance, reduced centrifugal forces in rotating parts, resistance to vibration failure, and certain advantages in high production fabricating methods, such as die casting.

Some of the general applications are as follows: crank cases and covers, breather caps, supercharger parts, carburetor parts, manifolds, body parts for coal drills, portable polishing tools and drills, vacuum cleaner parts, lightweight bearings of low load carrying capacity, oil pumps, airplane wheels, reciprocating parts in printing presses, rotating parts in fans and blowers, panels, cases and fittings for portable instruments, bus doors, frames for fish nets, parts for grinders and sanders, light structural framework, fuel tanks, housing, furniture, trimmings, and small die cast parts such as door handles.

Plastic Airplane

At the Langley Aviation Corp., Long Island, N. Y., a new molded plastic plywood plane with sleek mirror-like mahogany finish has been built. The Langley plane is a low wing, four-place, cabin model powered with two 65 hp Franklin engines which give it a top speed of 142 mph fully loaded with four passengers and 40 gallons of fuel. Only 200 feet of runway is needed for a take-off, and with full load the climbing rate is 644 feet per minute. Other performance figures are cruising speed, 125 mph; service ceiling, 15,000 feet; landing speed, 46 mph; and range, 600 miles. The gross and empty weights are 2300 and 1410 pounds with a wing span of 35 feet and length of 20 feet, six inches.

Being very versatile, this unique airplane may be used for military training, light bombing, and private or commercial flying. Because of the low cost of materials and the less expensive labor factor it is expected to be very moderate in price.

The Vidal process of plywood aircraft production, with some modifications, is used in the building of the plane. The veneer used is Honduras mahogany which is molded and bonded with vinyl resins. These strong thermoplastics will not support fungus or bacterial growth, are impervious to corrosion by acids, alkalis, gasoline, and salt water within the range of -40° to 160° F., and will resist fire.

All parts were molded rather than bent, to prevent warping and splitting from internal stresses. Nothing was flat pressed. To obtain equal pressure in all directions fluid pressure was used.

In building the first Langley plane approximately 5000 feet of mahogany veneer and 60 gallons of plastic were used. The laminations of wood are built up to the desired thickness for the part and held in place with clips, each layer receiving a coating of resin. The part is then "cooked" at a certain temperature and pressure, the resin fusing and bonding the wood together so strongly that only complete destruction of the part will separate them.

As skin and internal structure are molded into one piece, no rivets, nails, or screws are needed except where the part is purposely made detachable, such as the wing tips, engine cowling, and nacelles.

Aerodynamic advantages are claimed by virture of the integral skin structure retaining its true airfoil section in flight with corresponding increases in the performance of the plane.

The new molded, plastic-bonded plywood may also be used for seaplane floats, flying boat hulls, gasoline tanks, gliders, and large commercial planes.

Non-Magnetic Instrument Plant

In order to give greater speed and accuracy in the assembly and calibration of aviation compasses by eliminating any outside magnetic fields, an entirely non-magnetic building has recently been added to the Kollsman Aircraft Instrument plant.

The substitution of non-ferrous materials for common materials usually employed was necessary in obtaining the desired characteristic. Bricks, tested to make sure they contained no ferrous materials, formed the walls, while wooden beams replaced the usual steel girders. Copper was used for all plumbing, heating, and sprinkler systems, and terra cotta pipe made a good substitute for the cast iron drain pipe.

Steps were built instead of ramps at the entrances to eliminate the possibility of metal delivery trays being pushed into the building. For moving stock, a dumbwaiter built of non-ferrous non-magnetic material was installed.

Equipment also had to be non-magnetic. Special benches, chairs, and other items were constructed of wood and composition board with copper screws and bolts.

In this building not only the standard aviation compasses, but the new direction indicators, as well, are quickly assembled and calibrated.

Magnetic Oil Filter

Contamination of lubricating oils and cutting fluids by small fragments of iron and steel, produced by wear from the sliding parts, has been found to be one of the chief causes of wear on bearings and other working surfaces in production machinery. Therefore it is most important that these ferrous particles be extracted, perferably without hindering the free circulation of the oil. A simple and efficient method of achieving this separation has recently been devised in the form of Philips magnetic filters.

The filter consists of a cylindrically shaped permanent magnet having pole pieces at each end. Between the pole pieces are five two-sectioned iron rings interconnected by brass strips in such a way that an air gap is left between the rings. The magnetic flux from the magnet passes from the pole pieces across the rings and therefore traverses the six air gaps. A non-magnetic sleeve fits over the magnet and the whole device is mounted in a non-magnetic outer casing.

The liquid to be cleansed is allowed to flow between the inner wall of the housing and the outer and inner side of the rings, so that the field on both sides of the air gap is used. As the liquid passes these gaps the iron and steel particles in suspension will be drawn in between the gaps. Naturally, the first air gap fills first, and when full further particles pass to the second gap and so on until all gaps are filled. As the iron rings are in halves the parts are easily removed to facilitate cleaning which becomes necessary when all the gaps are filled.

Experiments show that the speed of extraction depends on several factors, chief of which are the viscosity of the oil, the quantity of iron passing through the filter per hour, the size and nature of the iron particles, and the amount of iron already contained in the filer. Tests revealed that a good filtering action is obtained when 110 gallons of oil flow through the filter per hour, and that in many cases the filtering action is more than sufficient at a flow of 130 gallons per hour.

The magnetic filter, originally intended for the purification of lubricating oils, has also been useful as a means of removing fine ferrous swarf from cutting oils. Another extremely valuable application of the magnetic separator is its use on hydraulically operated machine tools.

SOIL-CEMENT ROADS

(*Continued from Page* 5)

pelled and moved very slowly down the road, mixing half the road at a time.

The large mixing machine was followed by a smaller mixer which scarified the upper part of the material so that there could be no lumps or earth clots which were not broken up.

Then the work of compacting began. First heavy sheep's foot rollers were used on the mixture. These peculiar rollers pack the loose material from the bottom up. This progressive compaction insured a six-inch maximum uniform density. This was followed by pneumatic tired rollers and smooth wheel rollers. To obtain a strong soil-cement road, compaction must be high so that a maximum density will be approached. The material was shaped to a crown conforming to the two-inch crown in the subgrade and further rolled until a smooth surface was obtained.

The road was then sprinkled with water, covered with straw, and allowed to cure for seven days. During this period the straw was kept damp so that the surface of the road would not dry out. About 1000 feet of 20-foot roadway could be build in one 10-hour working day.

The highway department plans to keep the road open to traffic until next spring. At that time a light bituminous seal coat will be placed over the soil-cement base to seal it and protect it from weather and traffic.

At all times during the construction of the soil-cement surface a state highway engineer from the soil division checked the material. He determined the proper water-cement mixture to use. About nine percent cement by volume was found necessary. Robert M. Ripple, (Rose c. e., '40) was the soil division engineer in charge of testing on the job. James E. Sheldon (Rose c. e., '15) was the state highway district engineer in charge of road construction. Karl Zinkan was project engineer.

AROUND THE CAMPUS

by Frederick L. Kolb, m.e., '43

Interviews

During the past few months the upperclassmen of Rose have had the opportunity to look into the possibilities of future jobs through the method of personal interviews with representatives of various companies. Each year the larger manufacturing concerns send men around to interview seniors at all the engineering schools in the country, with the idea of giving the students jobs upon graduation. The companies are making their tours of the technical schools earlier than usual this year because of the present national emergency and the urgent need for engineers in many defense industries.

The American Can Company's representatives visited Rose last month and presented the story of their company's vast layout. They urged the juniors to apply for summer jobs, for as one of the men, Mr. Gorby, put it, that gives the company a chance to look the prospective employee over while giving the student the chance to see if he will like this type of work.

Representatives of the Texas Oil Company also visited Rose last month and interviewed the seniors in the mechanical, electrical, and chemical engineering departments. Mr. Manglesdorf was in charge of the interviews for the Texas Company.

Glee Club

The Rose Glee Club has made two appearances in the past month and has been extremely popular with both audiences. Their first appearance was made on Friday, December 12, at the Otter Creek High School in North Terre Haute. The students of Otter Creek especially liked the solos by Winston Cundiff and the selections by the newly formed double quartette. The club's second appearance was made at a general assembly held at Rose on Thursday, December 18. A completely new assortment of songs, both heavy and light, was sung in a splendid manner by the club which boasts a membership of 28 active members. Mr. J. O. Hawkins directed the group and Mrs. Edris Bennett was the accompanist.

A. S. C. E.

On the afternoon of November 28 a delegation representing the Rose chapter of the American Society of Civil Engineers attended the meeting of the Indiana Society of Professional Engineers and the Indiana Engineering Council which was held at the Claypool Hotel in Indianapolis.

At 2:00 p. m. the group heard a talk by the army engineer in charge of army engineering work in this district. He told of the great amount of work, concerning the expansion of the nation's armed forces, which had to be handled through the army engineer's office, and indicated that even the army sometimes had trouble with priorities. Outlying bases and coastal defenses have priority over inland army bases when defense materials are allotted, bringing about occasions when even the army must wait on priorities.

A dinner was held at the hotel in the evening for those who desired to attend. Those men who went to Indianapolis for the meeting were: Professor E. A. MacLean, Professor R. E. Hutchins, James Brown, Arthur Johnson, Frederick Nahm, Robert Rockwood, Gene Coltrin, Robert Mitchell, John Newlin, and Harmon Rose.

Plans are being made for the A. S. C. E. to obtain a speaker for a general assembly in the near future.

A. I. E. E.

The Rose branch of the American Institute of Electrical Engineers met on Thursday, December 4. A very interesting talk entitled "Operation of a Telephone System" was given by Mr. Earl Michaels, senior in electrical engineering. The talk dealt with the operation of the Bell Telephone System around Chicago, Illinois. Mr. Michaels was employed with this company during the past summer, and much of his explanation was from his own personal experiences. First, the installation of a telephone was described, and the use of party lines was explained. The speaker finally showed by means of a very elaborate circuit diagram how both local and long distance calls are placed and carried through.

Arrangements have been completed with the Underwriters' Laboratories to show a sound motion picture before the local branch on January 12. This picture, entitled "Approved by the Underwriters," will explain and discuss the importance of electrical safety.

Rifle Club

The Rose Tech Rifle Club has been trying to build up a strong, high-scoring team in the past few months and feels that the team is coming around to a point where it will be ready for a number of shoulder to shoulder matches very soon. Although the team did not do so well in its first match—against St. John's Military Academy — the group is confident that from the large number of men who have tried out for the team this semester, a truly strong aggregation will be picked.

CAMPUS SPORTS

by William Kniptash, ch.e. '44

Rose vs. Joliet

Rose Tech rolled up a 45 to 34 triumph over Joliet College in their opening game of the season on Rose's floor, Saturday, November 29. The Engineers made their debut with eight lettermen returning in uniform and were able to command the lead throughout the game. Charley Meurer, veteran Rose forward, led the attack with a total of eighteen points, and Bill Kniptash gave support from the other side of the basket by sinking six field goals. Joe Blum, tall center for the Joliet Wolves, led the opponents scoring with four baskets and one free throw.

The Engineer's drive in the first half was started by Meurer with a push shot from the free throw circle, and Keeler added two more points by sinking two chairty tosses soon after. Joliet retaliated when Bob Spangler, lanky forward, sank a long shot. Dick Pearson and Bob Shepley combined their efforts for the visitors, but the Joliet five had to be content with long shots as the Rose defensive play gave them plenty of trouble under the basket. Kniptash tallied two more points with a looper in front of the basket, and Meurer followed with a distance shot a minute later. The half ended as Kniptash pushed two short ones in succession through the hoop and Rose led 20 to 12.

Joliet led off in the second period with a distance shot by Joe Blum, but Ellsworth countered with a long looper from the middle of the floor. Bill Rumbley fouled Pearson of Joliet twice in succession but no damage was done as both shots were missed, and then Big Bill followed with a push shot from center for his only bucket of the evening. Meurer added to his high scoring total with a short shot and a leaping toss directly in front of the basket. Harold Bowsher sank a beautiful long shot from way back, and Meurer added a gift shot and another two pointer to the Engineer's total. Blum hit a set shot from the center and Meurer countered with a tip in for his fifth field goal of the second half. Fahrner, forward for the Wolves, made his first goal, but the basket amounted to no net gain as Ellsworth and Kniptash hit a long and a short respectively.

In the final minutes Kniptash made a right-handed swish shot and Spangler added two more for Joliet with a long shot just as the game ended. The Tech players totaled a fine percentage of their free throws by dropping nine out of ten through the hoop.

Rose vs. DePauw

Rose's hitless Engineers suffered their first defeat of the season by a score of 38 to 32 in a rough and tumble game at DePauw University, Tuesday, December 2. Both teams used a fast break offense, and as a result the game was played at top speed during the forty minutes of play.

Dick Ellsworth and Harold Bowsher, stellar guards, played every second of the ball game and added a total of 12 points to the Engineers' cause.

Wally Etcheson, DePauw sophomore forward, sparked the Tiger's attack by collecting 12 points from all parts of the floor. Dean Dooley played a brilliant game at guard besides totaling eight points.

After a rough beginning and field goals by Jones and Etcheson, Bowsher connected on a long toss from the middle of the floor. Etcheson and Jones again pushed DePauw ahead by adding two more field goals. After Crane hit from the side, Meurer added an under the basket shot to decrease DePauw's lead. Midway in the first half the Engineers fell behind eleven points but proceeded to cut this advantage away by field goals delivered from the hands of Hershey and Meurer. Additional baskets by Kniptash and Ellsworth a few minutes before the gun went off made the score 23 to 15 in DePauw's favor.

In the second half the battle seesawed back and forth with DePauw unable to increase their eight point lead which they held at the intermission. Dooley and Heber counted three times from the field but Kniptash and Meurer struck back to nullify their gains. Twice Bowsher made spectacular drives through the DePauw defense but missed the short push shots in front of the basket.

At all stages during the game the Engineers were within striking distance of a victory, but the well timed field goals of the DePauw men kept Rose on the trailing end of the score throughout the contest.

Rose vs. Earlham

Bill Kniptash led the Engineers to a 46 to 31 triumph over Earlham's Quaker basketeers, Friday, December 5 at Richmond, Indiana. The Rose team was back in hitting form after their defeat at the hands of DePauw the preceding Tuesday.

The starting lineup found Bowsher and Smith at guards, Keeler at center, and Meurer and Hershey at the forward positions. Anderson and Dehoney led off for Earlham with two quick field goals to give the Huntsmen an opening advantage. The Rose defense looked weak the first few minutes of play and the Engineers trailed by a score of 14 to 7 at the outset. Kniptash and Ellsworth took their place on the floor and the Terre Haute lads' offense began to click. Kniptash found the range to sink four quick baskets and Rose went out in front. Ellsworth was thrown to the floor twice on at-

tempts to shoot as he broke under the basket but he collected three points on foul shots. Rumbley took Keeler's place at the center position in the closing minutes of the half and gave added height and strength to Tech's defense. The half ended as Dehoney missed a wild fling at the basket and Rose was in the lead 27 to 22.

Earlham found the going tough in the second half and was only able to collect nine points during the entire period. Meurer with three fouls against him was kept on the bench most of the second half while Claude Hershey filled his position on the floor. Rumbley saw lots of action the second half using his long arms to greatest advantage in taking the ball off Earlham's backboard as well as his own.

Rose vs. Concordia

The Engineer's went on a scoring spree to trounce Concordia College 66 to 29 at Fort Wayne, Ind., on December 6. This was the second victory in as many nights for the local boys who scored an easy triumph over Earlham on the previous night.

Meurer, Rumbley, and Kniptash combined their efforts and paced the Rose offensive by putting the ball through the hoop seventeen times for a total of 34 points. Busch connected for five goals and six free throws to take high point honors for the Cadets.

The Rose Tech five spent the first half adjusting their sights on the basket and tightening their defense. Concordia held Coach Brown's team down to a few well scattered shots the first half but came out at the short end of a 21 to 12 score after the first twenty minutes of play.

In the second period the Engineer's turned on the power and scored 45 points while Concordia struggled to gather seventeen points.

Rose vs. Joliet

In spite of Charley Meurer's 21 points Joliet Junior College nosed out Rose Poly 38 to 37 in an exciting basketball contest at Joliet, Ill., on December 13.

Joliet was out in front the entire first half. In the second period both teams fought hard for the lead which exchanged hands four times and stood at a tie on three occasions.

Bowsher sank the first basket for Rose after the Joliet cagers had counted for seven points. Fahrner countered for Joliet with a push shot and Meurer dropped two in a row. Late in the half Meurer scored again for the Engineers and brought them within one point of a tie score but Blum and Vercelotti made a field goal each to push Joliet to a 18 to 15 advantage at half time.

Spangler opened the second half with two points for the Wolves, but soon afterwards a basket by Meurer and a basket and a free throw by Rumbley tied the score at 20 all. It was Meurer again at the basket that put the Engineers ahead, but Pearson made two in succession to knot up the score 29 to 29 with seven minutes of play remaining. In the closing minutes both teams matched basket for basket but Vercelotti scored the fatal shot 45 seconds before the gun went off.

Rose vs. Anderson

The Engineers won their fourth victory of the season by trimming Anderson College 67 to 41 at the Rose gym on Dec. 18. Meurer and Kniptash made 38 points at the basket to lead the barrage against the visitors.

Rose led off on the offensive by making nine baskets before Anderson realized the game had started. Newberry, Anderson's forward, collected two baskets and a free throw to make the score 18 to 5 after the first four minutes of play. Meurer batted a rebound for a basket and Newberry and Kinion retaliated for Anderson with two field goals. The Rose score soared upwards from the consistent bombardment of the basket by Meurer and Keeler and half time found Tech way out in front with a 33 to 12 advantage.

During the intermission Rose Poly's football team was honored for their victorious season. Sterling Pittman of the alumni association presented letters and sweaters to the team members and Vice President Homer Winn of the Terre Haute Chamber of Commerce awarded all-sports certificates to each member of the squad.

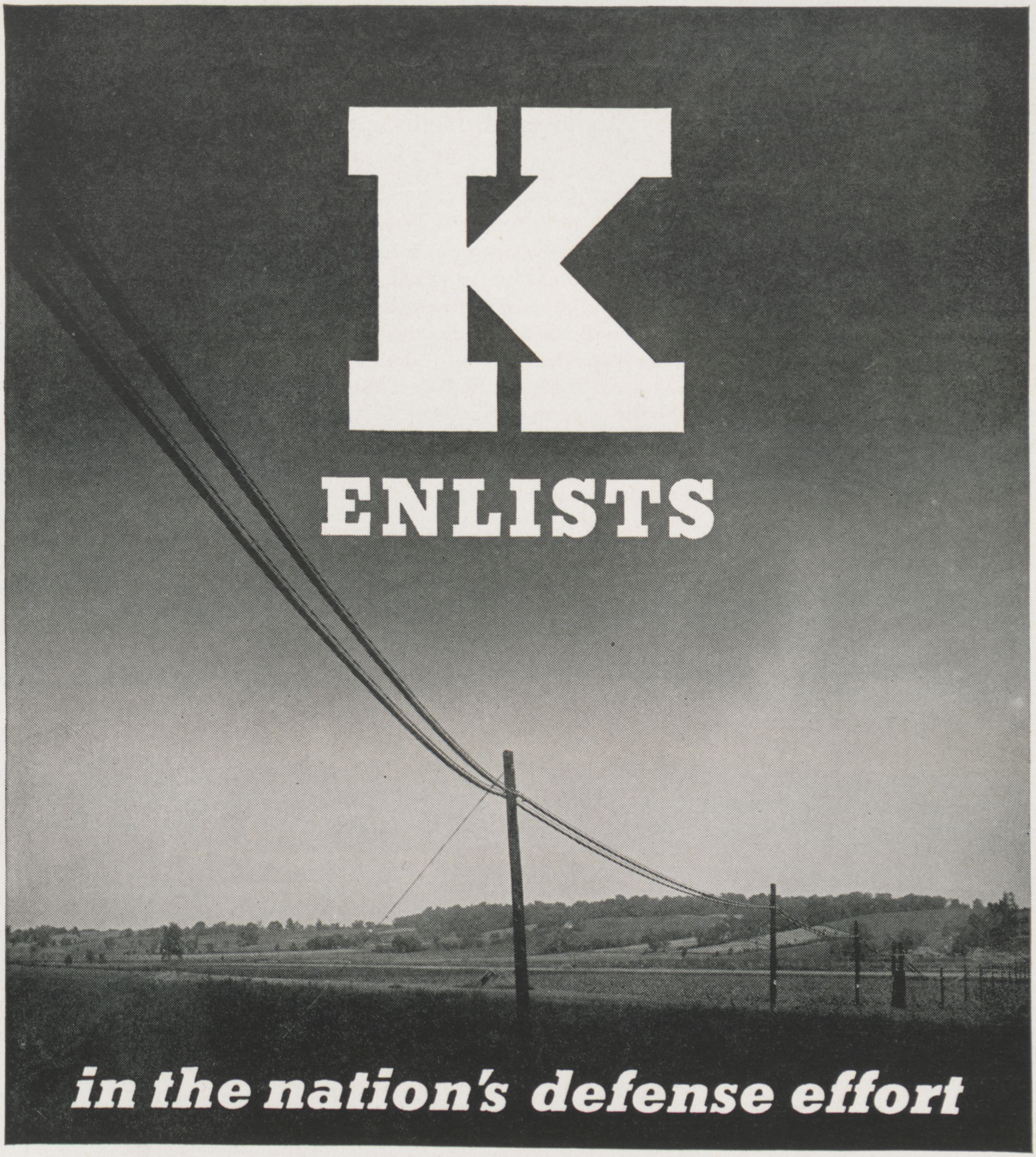
Kniptash starred for the home team in the second half by putting the ball through the hoop six times. Anderson kept apace of their opponents as they found their mark at the basket and summed up 29 points for the period. Richardson, high scoring guard from Anderson, collected thirteen points after making only two free throws the first twenty minutes of play. Rose led 50 to 20 midway in the half as Ellsworth took a short pass from Meurer for a basket. Soon afterwards Jack Loser executed a beautiful fake, pivoted and shot from under the net for a goal. Newberry made two more but Kniptash countered for the same number of points as the game ended.

Box Score—

Rose Poly (67)	F.G.	F.T.	P.F.
Meurer, f.	9	5	1
Hershey, f.	2	0	1
Kniptash, f.	7	1	1
Hillebrandt, f.	0	0	0
Mehagan, f.	0	0	2
Kadel, f.	0	1	1
Keeler, c.	4	4	1
Loser, c.	1	0	3
Bowsher, g.	0	0	3
Tingley, g.	0	0	0
Ellsworth, g.	3	2	1
Price, g.	1	0	1
Smith, g.	0	0	0
Kennedy, g.	0	0	0
	—	—	—
Totals	27	13	15

Anderson (41)	F.G.	F.T.	P.F.
Fortner, f.	1	1	1
Woods, f.	0	0	0
Newberry, f.	8	1	3
Kinion, c.	1	0	3
Richardson, g.	6	3	3
Lindenmuth, g.	0	0	0
Baxter, g.	2	0	3
Meyer, g.	0	0	1
	—	—	—
Totals	18	5	14

Half Score—Rose Poly, 33; Anderson, 12.



K—a type of carrier telephone circuit—is now being built into many miles of Long Distance cable lines to increase their capacity.

Engineers at Bell Telephone Laboratories developed this circuit which enables two pairs of wires in parallel cables to carry as many as twelve separate conversations at the same time. K carrier is one of the ways we have found of adding a lot of long circuits in a hurry to meet defense communication needs.

Such problems constantly challenge Bell System men with pioneering minds.

AMERICAN TELEPHONE & TELEGRAPH CO. BELL SYSTEM AND ASSOCIATED COMPANIES

GRADE A GRADS

edited by Wallover H. Nellis, c.e., '44

Rose Grad Heads Tau Beta Pi Alumni Chapter

At a recent meeting of the Chicago alumni chapter of Tau Beta Pi, William G. Arn, '97, was re-elected president of this club for the year 1942. Mr. Arn was graduated from Rose with the class of 1897 receiving his B.S. degree in civil engineering. In 1932, he received his C.E. degree and is now employed by the Illinois Central Railroad Company as assistant engineer.

Departed

William Henry Webster, 51 South Lincoln Street, Hinsdale, Ill., passed away at his home on November 25. Mr. Webster was graduated from Rose with the class of 1910, receiving his B. S. degree in electrical engineering. At the time of his death he was secretary-treasurer of the Kennedy-Webster Electric Company, Chicago, Ill.

Newly Weds

Mr. and Mrs. Harry A. Staley, of 27 Rose Avenue, Terre Haute, Ind., have announced the marriage of their daughter, Betty Rose, to Mr. John E. Tracy, son of Mr. and Mrs. Charles Tracy, of Danville, Ind. Miss Staley is a graduate of Girl's Central High School, Terre Haute, Ind. Mr. Tracy was graduated from Rose Polytechnic Institute with the class of 1941.

'11 Milford G. Welsh of Wilmington, N. C., has gone to Newport News, Va., where he is resident engineer for Newsom & Aldrich, engineer consultants, New York.

'28 George J. Mason, Terre Haute, Ind., captain in the Quartermaster Corps, is assistant constructing quartermaster at Camp Lee, Petersburg, Va.

'34 Jack Newsom, formerly employed with Link Belt Co., is chief metallurgist with the Schwitzer Cummins Co., Indianapolis, Ind.

'35 Frederick W. Wiles, formly employed by Talon, Inc., has taken a position as engineer with the Columbus McKinnon Chair Corp'n., at Tonawauda, N. Y.

Joseph B. Weaver has taken a position in the engineering department of the R. C. A. Manufacturing Co., Indianapolis, Ind.

'36 Arthur F. Wood, formerly with Link Belt Co., Indiapolis, Ind., has accepted a position with the W. H. Edwards Engineering Company, Inc., in the same city.

'38 Merton B. Scharenberg, with the American Can Company, has been transferred to Austin, Ind.

'39 Gaylord L. Barrick of Brazil, Ind., is employed by the Devoe-Raynolds Paint Co., Louisville, Ky.

Rose Men Called To the Colors

Editor's Note—

During the past months Miss Gilbert, the registrar, has been collecting little by little the names and addresses of the alumni of Rose who are now in the service of the United States. We regret that this list is by no means complete, and therefore, leave it up to you to complete and keep up to date this tabulation.

Capt. J. Rex Adams, '28, Chemical Warfare Service, Edgewood, Maryland.

Lt. John G. Appel, '41, Co. D., 1st Chemical Warfare Service Trg. Bn., Edgewood, Maryland.

Robert F. Alexander, '28, Assistant Chief Safety Secretary, Office G. M. C., Arlington, Virginia.

Lt. Robert B. Asbury, '35, U. S. Air Corps Reserve, Gardner Field, Taft, California.

Capt. Ralph C. Bailey, '29, Hq. Fifth Engrg. Trg. Bn., Ft. Belvoir, Virginia.

Major John H. Becque, '12, Hq. Hawaiian Dept., Ft. Shafter, Honolulu, Hawaii.

Lt. Paul D. Bennett, '36, Assistant P. M. S. & T., Rose Polytechnic Institute, Terre Haute, Indiana.

Lt. Willis S. Biggs, '34, 108th Engineers, Camp Forrest, Tennessee.

Richard E. Biller, '31, Test Engineer, War Department, Washington, D. C.

Capt. Frederick J. Bogardus, '32, Engineer Planning Board, Ft. Belvoir, Virginia.

Lt. Earle B. Butler, '35, Asst. Project Engineer, Airport Construction, Tyndall Field, Panama City, Florida.

Lt. Lawrence B. Carroll, '37, Camp Hunter Liggett, Jolon, California.

Lt. Robert H. Colwell, '40, 77th Engineers, Ft. Custer, Michigan.

Lt. John L. Combs, '41, 30th Engineers, Ft. Belvoir, Virginia.

B. Franklin Cook, '41, U. S. Naval Reserve, Cadet Barracks, Jacksonville, Florida.

Lt. William R. Creal, '36, 27th Engineers, Pine Camp, New York.

Lt. John C. Dalrymple, '33, 24th Engineers, Pine Camp, New York.

Lt. J. Harold Dicks, '30, Hq. Armored Forces, Asst. Engineer, Engineering Office, Ft. Knox, Kentucky.

Lt. Franklin D. Doenges, '39, 29th Engineers, Ft. Leonard Wood, Missouri.

Lt. Henry H. Douglas, '34, 107th Engineers, Camp Livingston, Louisiana.

Lt. Louis Duenweg, '36, Adjutant General's Dept., G. H. Q. Army War College, Washington, D. C.

Lawrence J. Giacoletto, '38, Signal Corps Laboratories, Ft. Monmouth, New Jersey.

Capt. James E. Goddard, '28, Army War College, Washington, D. C.

Richard I. Graul, '24, Prin. Engr. Draftsman, U. S. Navy Yard, Brooklyn, New York.

Lt. Charles E. Grogan, '33, 50th Pursuit Group, Key Field, Meridian, Mississippi.

Lt. James F. Guymon, '33, 36th Engineers, Plattsburgh Barracks, New York.

Lt. Harry J. Halberstadt, '37, Army Air Corps, Gunter Field, Alabama.

Alonzo J. Hammond, '89, Construction Advisory Committee, War Department, Washington, D. C.

Lt. George C. Harper, Jr., '41, 16th Engineers, Ft. Knox, Kentucky.

Lt. James A. Hughes, '37, 86th Engineers, Ft. Knox, Kentucky.

Lt. Lee C. Kelsey, Jr., '32, Post of San Juan, San Juan, Porto Rico.

Lt. Norman W. Liston, '33, Signal Corps School, Ft. Monmouth, New Jersey.

Lt. Harry J. Loving, '31, 86th Engineers, Ft. Knox, Kentucky.

Lt. Clemens Lundgren, '38, Army Air Corps Advanced Flying School, Dothan, Alabama.

Erich A. Mees, '11, Asst. Chief Engr., Federal Power Commission, Washington, D. C.

Capt. George J. Mason, '28, Asst. Constructing Quartermaster, Camp Lee, Petersburg, Virginia.

Capt. Guy S. Mahan, '28, Holabird Q. M. Depot, Baltimore, Maryland.

Lt. James I. Mason, '34, 26th Engineers, Ft. Leonard Wood, Missouri.

Capt. Frederick L. Matteson, '25, 5th Engineers, Ft. Belvoir, Virginia.

Sgt. Francis A. Marasco, '39, U. S. Signal Corps, Instructor, R. A. F. Radio School, Clinton, Ontario, Canada.

Capt. Andrew J. Nehf, '28, Hq. Second Army, Memphis, Tennessee.

Commander George F. Nicholson, '06, U. S. N. R., San Diego, California.

William M. Noel, '40, Keesler Field, Biloxi, Mississippi.

Capt. Clifton A. Pratt, '32, 37th Engineers, Camp Bowie, Texas.

Lt. William S. Pratt, '35, 46th Enigneers, Camp Bowie, Texas.

Capt. Wayne Plimmer, '32, 35th Engineers, Camp J. T. Robinson, Arkansas.

Robert D. Prewett, '38, Material Div., Army Air Corps, Chicago, Illinois.

Major Alvin C. Rasmussen, '12, Ordnance Reserve, Cincinnati, Ohio.

Lt. Francis H. Richardson, '35, 21st Engineers, Langley Field, Virginia.

Lt. John R. Roberts, '41, 42nd Engineers, Camp Shelby, Mississippi.

Claude E. Robertson, '05, U. S. Navy, Enigneering Materials Div., Chicago, Illinois.

Alan Sebree, '33, 58th Engineers, Camp Shelby, Mississippi.

Lt. Comm. Jerry H. Service, '12, Instructor in Navigation, Naval Reserve Midshipmen's School, Northwestern Univ., Chicago, Illinois.

Lt. Gilbert L. Shew, '30, 77th Engineers, Ft. Custer, Michigan.

Lt. James C. Skinner, '33, Air Corps Technical School, Chanute Field, Rantoul, Illinois.

Lt. George W. Smith, '39, 113th Engineers, Camp Shelby, Mississippi.

Lt. Col. Richard L. Smith, '09, Hq. Fifth Corps Area, Fort Hayes, Columbus, Ohio.

Lt. Walter R. Snedeker, '37, 16th Engineers, Fort Knox, Kentucky.

Lt. Jonathan E. Sonnefield, '37, 20th Engineers, Ft. Benning, Georgia.

Malcolm A. Steele, '39, Army Air Corps, Dearborn, Michigan.

Lt. Earl O. Swickard, '40, 31st Engineers, Ft. Leonard Wood, Missouri.

Lt. Roy E. Warren, '39, Ft. Leonard Wood, Missouri.

Lt. Thomas N. Wells, '37, Army Air Corps, Keesler Field, Biloxi, Mississippi.

John A. Wells, '32, Ft. Leonard Wood, Missouri.

Lt. John H. Welsh, '35, Ft. Belvoir, Virginia.

Baird F. West, '27, Munitions Building, Washington, D. C.

Lt. Vernon E. Whitehouse, '40, 35th Engineers, Camp J. T. Robinson, Arkansas.

Lt. Allen T. Wilson, '40, Aberdeen Proving Grounds, Maryland.

Capt. Edwin J. Withers, '33, Member of Engineering School Faculty, Ft. Belvoir, Virginia.

Lt. Robert W. Underwood, '39, Erie Proving Grounds, Lacarne, Ohio.

Lt. Luther L. Yaeger, '39, 113th Engineers, Medical Detach., Ft. Leonard Wood, Missouri.

Pvt. Robert Young, ex-'43, 150th Field Artillery, Camp Shelby, Mississippi.

FRATERNITY FRAGMENTS

Alpha Tau Omega

Gamma Gamma chapter is sorry to have to announce the loss through death of one of the chapter's most important alumni. Henry Webster, '10, vice-president of the Kennedy-Webster Electric Company of Chicago, Illinois, died suddenly last November 25. Brother Webster is considered to be the "second founder" of the Rose chapter because it was through his efforts about 1908, that the chapter continued to function and started to come back again after a crisis which left only two actives and one pledge in school. He was a past president of the Chicago alumni association and served as toastmaster two years ago at the Province XVII annual banquet and dance. The chapter is indeed sorry to lose such a devoted brother and good friend, as Brother Webster was during his entire career.

This year as in many other years, A. T. O. is well represented on the basketball court. Such men as John Mehagan, Harold Bowsher, Bill Kniptash, Dick Ellsworth, and Claude Hershey are all returning lettermen and are doing their utmost to make the Rose basketball team as successful as the football team was this school year.

The chapter is busily preparing for rush week which will be held about the first week of February. The fraternity has elected John Newlin to be rush chairman this year.

Lambda Chi Alpha

The Theta Kappa Chapter of Lambda Chi Alpha has enjoyed a very eventful fall season so far and is looking forward to an even more eventful and successful winter season. The actives, pledges, and guests joined together on Saturday, December 13, in making the pre-Christmas party at the Cafe Roma one of the most enjoyable and entertaining of the entire fall season. Needless to say, a good time was had by all who attended.

Sigma Nu

At this time Beta Upsilon would like to welcome its new house mother, Mrs. Lousia Brown. Mrs. Brown was officially dubbed "Mom" at our pre-Christmas dinner when all the fellows had a chance to sample her cooking. She passed the test with flying colors.

The Friday before the Sigma Nus left for Christmas vacation it was decided that we should all be together for that evening. The place was Antonini's in Clinton and the food varied from spaghetti to chicken while the entertainment consisted of

the latest recordings on the record player and an occasional Sigma Nu song.

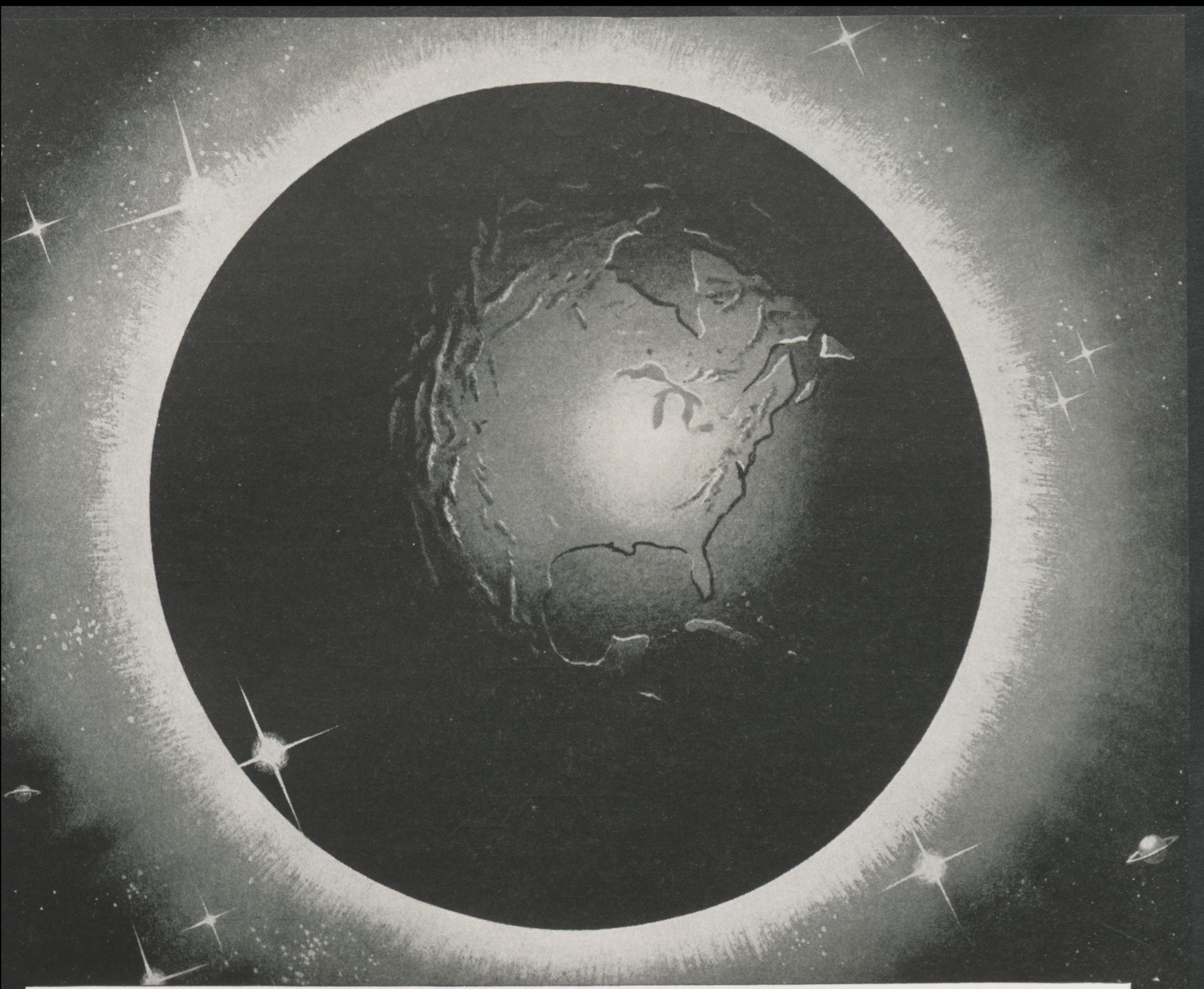
Plans are now under way for Beta Upsilon's St. Valentine's Day formal dance. In previous years our dance of the year was usually held at the close of the school year; however, this arrangement had to be missed by those seniors leaving earlier for their jobs. The affair will be held at the Deming Hotel.

Theta Xi

Celebrating a final get-together before leaving for home and the Christmas vacation, Kappa men gathered at the fraternity house, Saturday, December 13, to enjoy a very successful stag affair. John Taylor, social chairman, arranged the shin-dig and provided a party with never a dull moment.

With Japan declaring war on the United States of America, Kappa chapter is anxiously scanning the newspapers each day for some news of her alumni now serving with the armed forces of the nation. Second Lt. Fred Wehle was stationed at Hawaii when the first waves of bombers blasted their way over American soil. Lt. Richard C. Kadel was performing his duties in the Philippines when Japan decided to commit suicide by attacking America and her possessions. Although no news has been received from either of these two alumni, Kappa chapter sincerely hopes that "no news is good news."

Deciding to formally declare war on the Mikado and to aid the nation by all possible means, Kappa of Theta Xi has armed herself with two defense bonds. It is firmly hoped by all members that with the money obtained from the sale of such bonds, America can repay with interest part of the damage created by the Japanese.



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In America, science is discovering a vast new world—a stupendous world that Columbus never dreamed of. This new America is boundless. Its riches are infinite, thanks in large measure to the magic of *synthetic organic chemistry*.

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In one form or another, these astounding materials appear in such diverse essentials as food-can linings . . . and tank-car linings; as airplane cockpit covers . . . and non-flammable insulation for vital electrical wiring; as corrosion-resistant wrappings for cross-continental pipe lines . . . and welders' goggles; as the thin film on paper which is put inside bottle caps . . . and as the invisible interlayer in the sandwich of safety glass.

"Vinylite" resins can be formed, drawn, laminated, and bonded. In basic form, they are odorless, tasteless, and non-toxic, and range from non-flammable to slow-burning. They can be made stiff or flexible . . . hard or soft . . . colorless or almost any color under the sun . . . transparent, translucent, or opaque. And the result is resistant to oxidation . . . waterproof . . . alcohol-, alkali-, and acid-resistant.

These unusual properties have created a heavy demand for "Vinylite" resins, particularly to meet defense needs. This is why it is not possible, at present, to supply all manufacturers of articles for personal and home use with all the "Vinylite" resins needed. Against the return of more normal times, when larger quantities for normal uses will again be available, manufacturers are invited to test these new plastics . . . to develop new and improved things to be made from them . . . so that all can benefit from the discovery of "Vinylite" resins.

• • •

"Vinylite" resins and plastics are supplemented by the well-known products of Bakelite Corporation. The resins themselves are produced by Carbide and Carbon Chemicals Corporation. Certain elastic sheetings and films are made from these resins and marketed by National Carbon Company, Inc., under the trade-mark "Krene," while other compounded forms useful in electrical insulation are marketed by Halowax Corporation. The manufacture of all these products has been greatly facilitated by the metallurgical experience of Electro Metallurgical Company and Haynes Stellite Company and by the metal-fabricating knowledge of The Linde Air Products Company. All of these companies are Units of Union Carbide and Carbon Corporation.

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BITS OF WIT

edited by W. Alan Winslow, ch.e., '44

Father: "Who broke that chair in the parlor last evening?"

Daughter: "It just collapsed, all of a sudden, father, but neither of us was hurt."

Tourist: "And how is your good wife, Sultan?"

Sultan: "Oh, she's all right, but the other forty-nine are more fun."

A preacher walked into a saloon, ordered milk and by mistake was served a milk punch. After drinking it, the holy man lifted his eyes to heaven and was heard to say: "O Lord, what a cow!"

There were two men waiting in the railroad station for the train. Since neither had anything to do, one decided he would see what he could do about the situation, and asked the second "Say, how about a game of poker while we're waiting?"

"No thanks, tried it once and didn't like it."

"Well, how about a game of pool?"

"No thanks, tried it once and didn't like it."

"Well, how about a game of bridge, there's a couple of fellas over there that would probably play?"

"No thanks, tried it once and didn't like it."

"Well, how about having a drink with me at the bar across the street?"

"No thanks, tried it once and didn't like it."

"Well, how about a cigarette?"

"No thanks, tried it once and didn't like it."

"Well, how about a show?"

"No thanks, tried it once and didn't like it. But I'll tell you what, my son is coming along any minute now, and maybe he'd go with you."

"You have just one son, I presume."

"This dress doesn't quite come up to my expectations."

"But, madam, they are wearing them a little longer these days."

And there was the girl who was so lazy that she wouldn't even exercise discretion.

Feudal Lord: "I hear that you misbehaved while I was away, son."

Knight: "In what manor, sir?"

Voice from the rear seat: "Pardon me for slapping your face, but I thought you were trying to steal my sorority pin."

How is the bride to know who was the best man at her wedding when only her husband goes on the honeymoon with her?

Once upon a time, a long long time ago, even before Roosevelt was president, the following incident occurred at a downtown speak-easy. It was late in the night, and two stude's had proceeded to get plastered to the ears. Before long they were engaged in a heated verbal combat at one end of the bar. The bartender, attempting to quiet the pair, sauntered over and asked what the trouble was.

"Well," said one of the drunks, "see that bug on the bar? He says that it is a cockroach and I say that it is a beetle, and we are both sure that we are right."

The bartender took a long close look at the insect and declared, "Boys, you're both wrong. That is a ladybug."

Which brought forth the exclamation, "God, what eyesight!"

Itches is something that when a recruit is standing at attention his nose always.

A true lover of music is the man who, upon hearing a soprano voice in the bathroom, puts his ear to the keyhole.

Willy: "Does your girl smoke?"

Smooth: "Not quite."

Co-ed (answering the door bell): "Time for the dance?"

Frosh (beholding an evening gown for the first time): "Yes, put on your dress and come on."

He (putting his hands over her eyes): "Guess who it is or I'll kiss you."

She (quickly): "Charlie McCarthy, Robert Taylor, Eddie Cantor."

It isn't official yet, but rumors persist to the effect that in place of the 1942 Rose Show, the electrical engineering department will open to the public for a few days their closely guarded exhibit of rare archeological specimens.

From Fort Knox comes word that a dreamy R.O.T.C. gunner confused his girl friend's telephone number with the range elevation. Last week the Army received a bill for a barn and three cows.

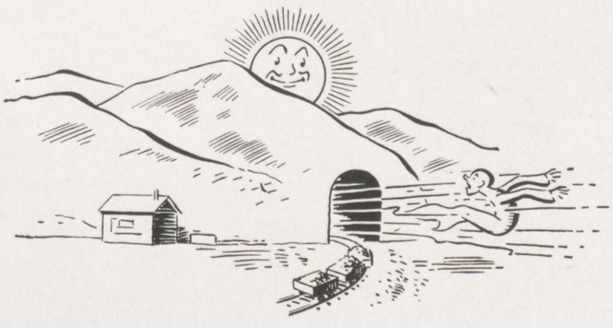
A GO-GETTER?

Young Brown got a job in a shipyard. The first morning, the foreman gave him a two-foot rule and told him to go measure a large steel plate. Brown returned in twenty minutes.

"Well," inquired the foreman, "what's the size?"

The youth displayed a satisfied grin. "It's just the length of this rule!" he said, "and two thumbs over, with this brick, and the breadth of my hand, and my arm from here to here, bar the finger nails!"

G-E Campus News



STEP ON THE GAS!

STEPPING on the gas to produce a speed increase of six feet per day along a highway wouldn't break any speed laws. But six feet extra per day makes engineers hang on their hats when the traveling is through solid rock. And that's the added progress being made by the company excavating the eastern portal of the new 13-mile Continental Divide tunnel by the installation of a new ventilating system utilizing G-E motors and control.

The system saves 20 minutes in the time between shooting each blast in the tunnel and getting back to drilling again. Fans spaced along the tunnel start up immediately after the blast, suck out the gas and smoke, and then reverse and blow fresh air into the tunnel. The fans start in sequence, with an interval of 20 seconds between each, so as to prevent building up large differences of pressure.

The tunnel is being excavated by the S. S. Magoffin Company, under the direction of the U. S. Bureau of Reclamation, to bring water for irrigation and power from Grand Lake, on the western slope of the Continental Divide, to the eastern slope.

CREEPY BUSINESS

STEEL, or any other solid material for that matter, deforms and creeps when subjected to heat and stress. But how much a given piece of steel in, say, a steam turbine, is going to creep during its life of 10 or 20 years is something a designing engineer can't wait 10 or 20 years to find out.

That's why all sorts of accelerated creep tests have been tried—ways to get a hurry-up prediction of the behavior of metal in service. Dr. Saul Dushman (U. of Toronto '04), assistant director of the G-E Research Laboratory, has thrown some new light on this problem by devising a method that produces extensions in length of as much as half a per cent an hour. By it he can get information in a day or two that would have required months by older methods.

The method consists of loading a thin wire of the metal with a weight, heating it with an electric current to a bright red heat in an atmosphere of nitrogen, and measuring the extension. The results seem also to suggest that creep does not occur atom by atom along the length, but rather in the movement of groups of atoms numbering from 50 to 1000.

95% PERFECT

MILADY will find her reflected charms brighter if her mirror is coated with silver, but that reflection will wear better if the coating is aluminum. That's what Frank Benford (U. of Michigan '10) and W. A. Ruggles, of the G-E Research Laboratory, found when they tested 37 kinds of mirror surfaces.

Silver evaporated onto the front surface of the mirror from an electric filament reflected 95 per cent of the incident light. The initial score for aluminum was only 88 per cent. But six months later the aluminum mirror was just as good as ever, while the silver one had deteriorated considerably.

Gold, incidentally, scored third among the pure metals, reflecting 82 per cent of the light. But while all the other metals gave their best results when evaporated on the front surface of the mirror, gold worked best when deposited on the back, as is the practice with ordinary looking glasses.

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