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ROSE TECHNIC

NOVEMBER, 1946

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THE ROSE TECHNIC

VOLUME LVII, NO. 4 NOVEMBER, 1946

MEMBER OF ENGINEERING COLLEGE MAGAZINES ASSOCIATED

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IN THIS ISSUE

COVER

Oil-well Derrick.

—Courtesy **Electronic Industries**

FRONTISPIECE

A 196,000-volt, oil-filled bushing being installed in a large power transformer.

—Courtesy General Electric Co.

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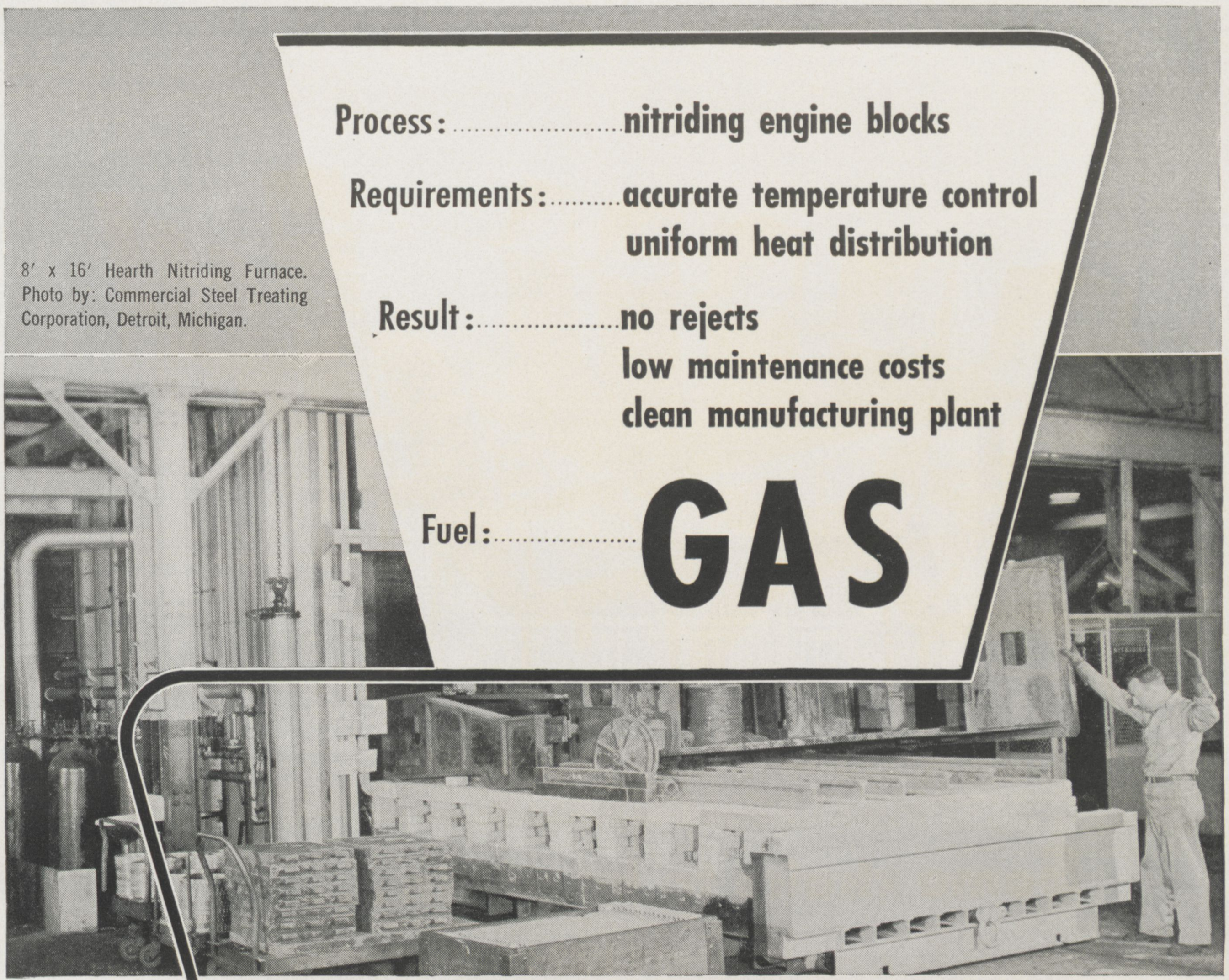

8′ x 16′ Hearth Nitriding Furnace. Photo by: Commercial Steel Treating Corporation, Detroit, Michigan.

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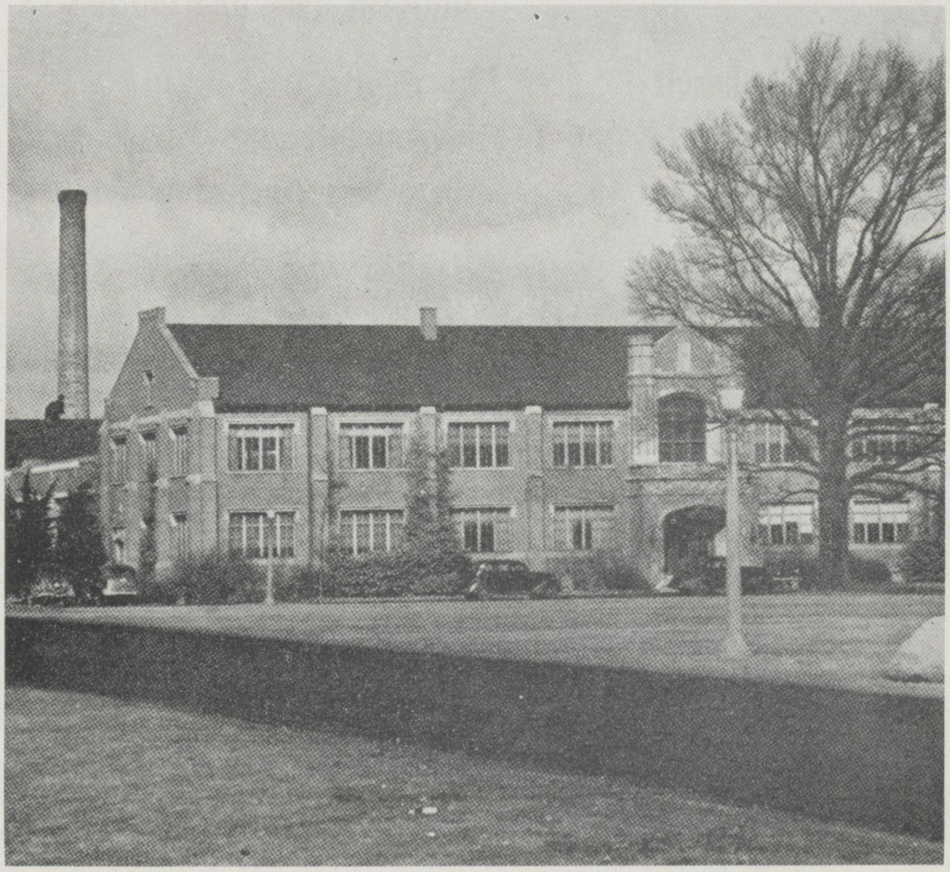


To the Graduates, Students, and
Prospective Students of

Rose Polytechnic Institute

Best Wishes for the Holidays
and the New Year

Culture and The Engineer

WHAT IS MISSING from the education of the average engineering college graduate of today? This question has been the subject of a great deal of recent discussion among teachers in engineering colleges and universities, as well as among men whose job it is to select intelligent and versatile engineers for responsible positions. The industrial personnel managers have stated clearly enough and often enough the things that should, in their opinion, be added to the technical education of the engineer; among them are a good background in literature, history, and philosophy, as well as training which will lead to a much, much better command of the English language. It is now up to the colleges to reorganize their curricula in accordance with these demands.

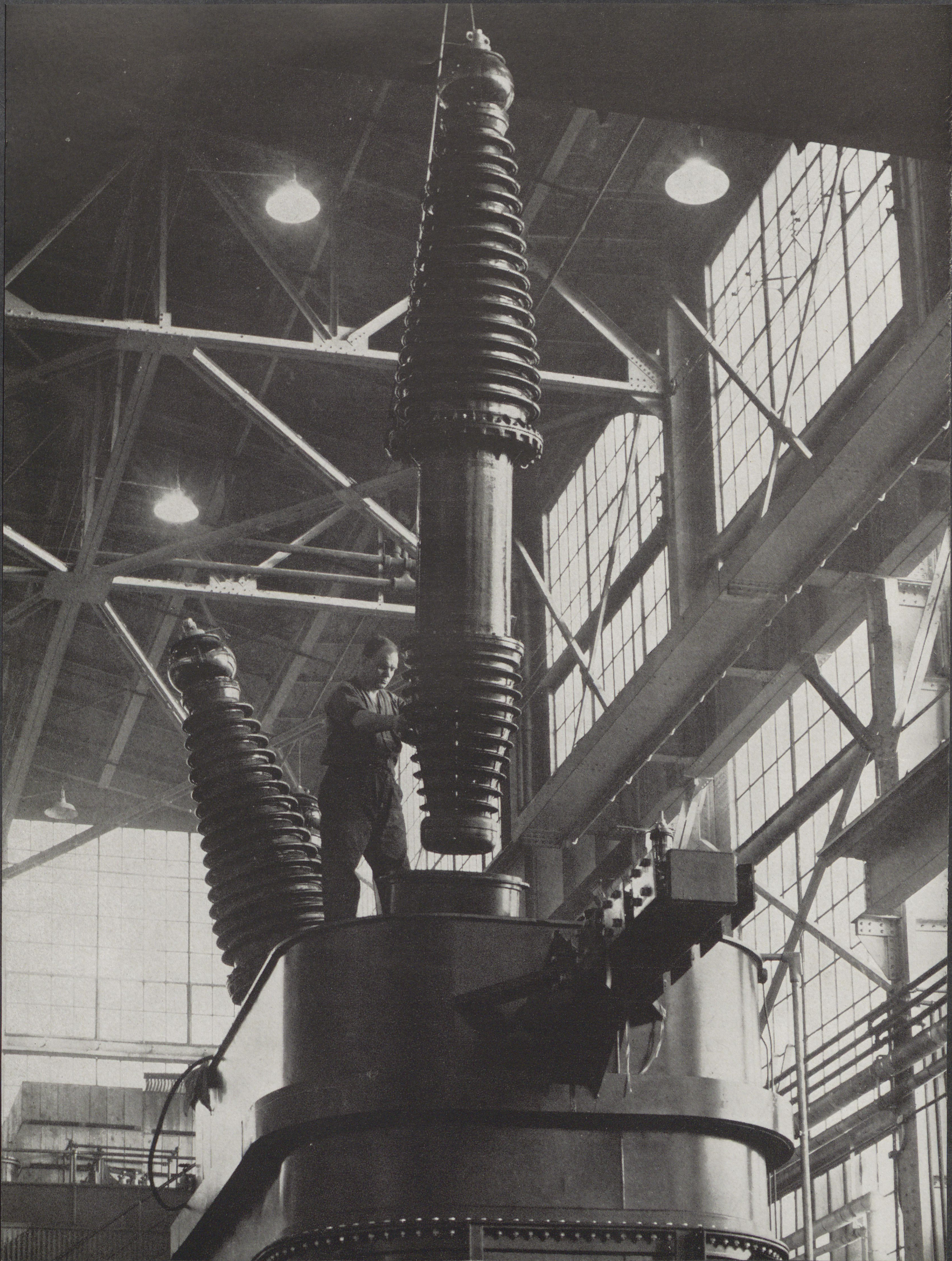
It is not difficult to understand the crying need of the engineer for a good foundation in the liberal arts. For the success of an engineer today depends as much upon his personality and ability to impress favorably those whom he meets socially as upon his technical skill; in fact a great number of engineers, particularly those who attain the highest positions, never have occasion to use the faithful old slide rule or tables after graduating from college. Especially is this true of men in managerial or executive positions. They find themselves working with human beings rather than with materials, and their equipment can be only their knowledge of human nature.

Upon investigation one finds that the greatest objection to the introduction of the so-called humanities into the engineering course comes, not from the faculty, but from the students. This objection is easily understandable; first, because the average engineering student has little inherent liking for liberal arts subjects; second, because those subjects have been pushed aside and so nearly squeezed out of his college curriculum that he has had very little chance to discover how interesting they can be. History, for example, is presented to him as a boring succession of names and dates to be committed to memory, whereas it could have been taught as a series of civilizations, each having a tremendous influence upon its successors.

Unfortunately, the colleges have failed most noticeably in teaching engineers the correct and effective use of their own language. As far as the industry for which he is working is concerned, a research engineer who can carry out to perfection a complete chain of experiments in a new field of investigation but cannot express in writing clearly and accurately what he has done is only half an engineer. Yet most engineering colleges graduate a large number of such men every year.

It is rather generally agreed that other subjects, such as foreign languages and philosophy, also deserve more emphasis than they are now getting. It is to be hoped that now, while most colleges are in the process of changing back from the accelerated wartime program, an attempt will be made to offer the engineering student a better-balanced education.

—C. J. B.



The Story of Petroleum

Part I: History and Early Development

By Paul M. Miller, soph.

HAVE you ever considered *Petroleum* as one of the most able assistants in your life? . . . That without this aid your life would be left without many of its comforts and pleasures? Just glance around—notice the wax-paper on your lunch, the insect spray that kills insects for you, the paraffin on the home-made jellies on the pantry shelf, some of the medicines on your shelf—look anywhere, and even without naming the ordinary oils of which we always think, such as gasoline, motor oils, and greases, you still have the opportunity of listing more than 2500 products of petroleum.

Petroleum is an essential link in the chain of modern conveniences and necessities; without it the world would lose the benefit of many of its machines, the pride of its automobiles, and the help of such useful commodities as medical supplies and household aids.

The story of this remarkable natural resource is closely associated with the thrilling development of our country. Oil hasn't always been brought to the surface and taken to the refinery and distributed as a matter of course. Many a man who had staked all his hopes, as well as his fortune, on the drilling of a well that would produce oil, has awakened one morning to sadly discover that he was the owner of a common salt water well. After men learned how to find oil, it became necessary for them to send the "crude" to refineries. Pioneers in oil transportation staked everything they owned to build pipe-lines across many miles of desolate, perilous terrain. These men found that they must fight to see their dreams become realities.

The history of oil carries with it a background of uncertain ventures; of courage and common sense; of stealth and theft; of fist fights and gun battles; of service and adventure; of determination and of human skill.

Today, out of it all, we have the pavements over which we travel, the fuel we burn, and the greatest of all, the power for the machines in which we ride. These and the rest of the more than two thousand products are benefits for which we must thank the man who discovered oil.

History of Petroleum

It has been only a short while since man began drilling for oil and refining it into more and more useful products. In 1859 Colonel Drake and his driller, "Uncle" Billy Smith, drilled the first oil well in the world at Titusville, Pennsylvania.

From the time of the early Greeks, and in some instances, even earlier than that, petroleum was used in its natural forms—pitch or tar. In these forms it was found to be running from springs in the rocks or bubbling lazily in black, gummy pits. It was used on altars for the sacred flames of worship and sacrifice. Legends relate how the ancient Greeks utilized the "rock oil" in warfare. It was common practice for the armies to seize as many available swine as possible, pour "rock oil" over them, then set the swine afire. The flaming swine were then driven into the enemy bivouac areas.

One of the most interesting of the early uses of petroleum was its use in the wrapping of mummies. Strips of wrapping cloth were soaked in petroleum before being used, the petroleum serving as a preserving agent. It has been related that hundreds of years after some of these preserved bodies were entombed their descendants and the new inhabitants of the land came along and broke into the tombs for the valuables they contained. Soon it was discovered that the mummies themselves burned well and made a very hot fire. There soon grew up a thriving business among the more money-seeking tradesmen—the busi-

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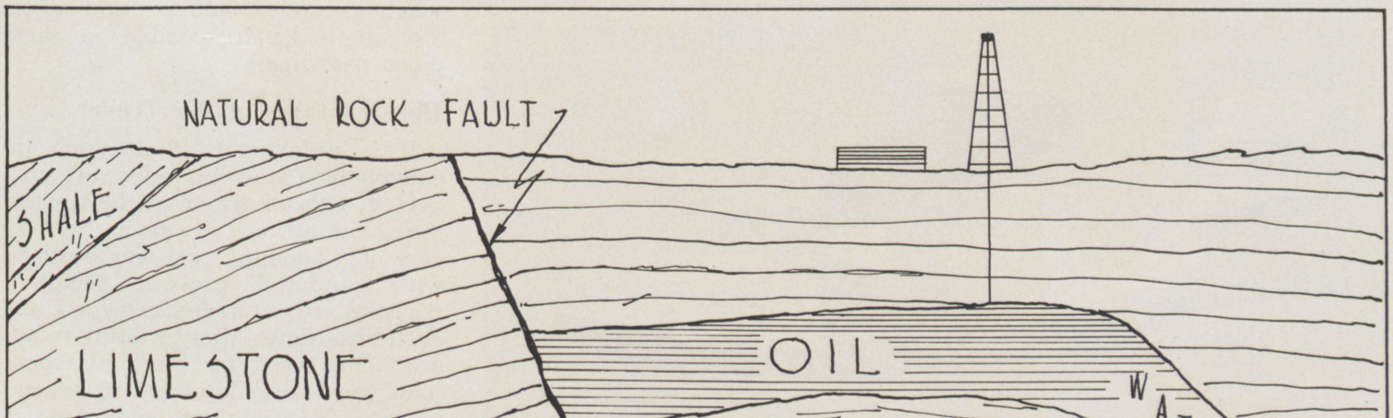


Cross-Section of Strata in a Petroleum Field.

Post-War Aviation

By Orville Stone, soph., e.e.

A HELICOPTER in every garage, the family air-car, only 60 hours from any spot on earth—these phrases and many similar ones were presented over and over again to the public by optimistic air enthusiasts as the war began to bring about amazing advancements and improvements in flying. Now that the war is over and war-time achievements are becoming available to private and commercial aviation, there is evidence that in some instances the air prophets may have been wearing rose-colored glasses. The plain facts about present-day flying and the possibilities foreseen in the near-future aviation are exciting enough without trying to project ourselves into a "Buck Rogers" era.

Private aviation must overcome obstacles which may take years to surmount before the airplane competes with the automobile, but commercial aviation, in spite of the difficulty nations are having in arriving at air agreements, may yet develop into the fullfilment of all that has been promised.

Needs of Private Aviation

The greatest need in private aviation is for a family-size plane which would sell in the neighborhood of automobile prices. It is generally conceded that if an airplane is to sell in anything approximating mass proportions these features are essential: It must carry at least four people, have a cruising speed of around 120 miles per hour, have a range of 350-500 miles, and sell for around $2000. The cost stipulation is at present the chief drawback to the whole scheme. The engine alone for such a plane now costs about $2000. Planes meeting these requirements now sell for around $7500, and even if planes were turned out in mass production the cost still would not come down to the $2000 level. Some people feel that the solution lies in the development of new materials, such as plastics, to bring down the raw material and production labor costs. One ray of hope is the available market of at least a million people who are ready to pay $2000 for such an airplane, and where there is such a potential market to be tapped some enterprising person is likely to find the answer.

There have been so many stories about the helicopter that it is difficult to separate truth from fiction. At the present time the helicopter holds little promise for private flying. There are only two models now licensed by the C.A.A. for production—one by Bell Aircraft Corporation, and the other by Sikorsky, with prices ranging from $10,000 to $50,000. Some very important commercial uses for the helicopter have been developed, however. Pipeline control, forest ranging, insect and pest control, postal express, airport shuttle, and suburban airmail are a few of the uses advertised by Bell Aircraft.

The new "Seabee" four-passenger amphibian, designed to sell at low cost for family use. —*Republic Aviation Corp.*

Commercial Aviation

Though the prospects for extensive air travel by private means seem dim, the opposite is true of commercial flying. Below are several examples of present-day airline rates and times en route:

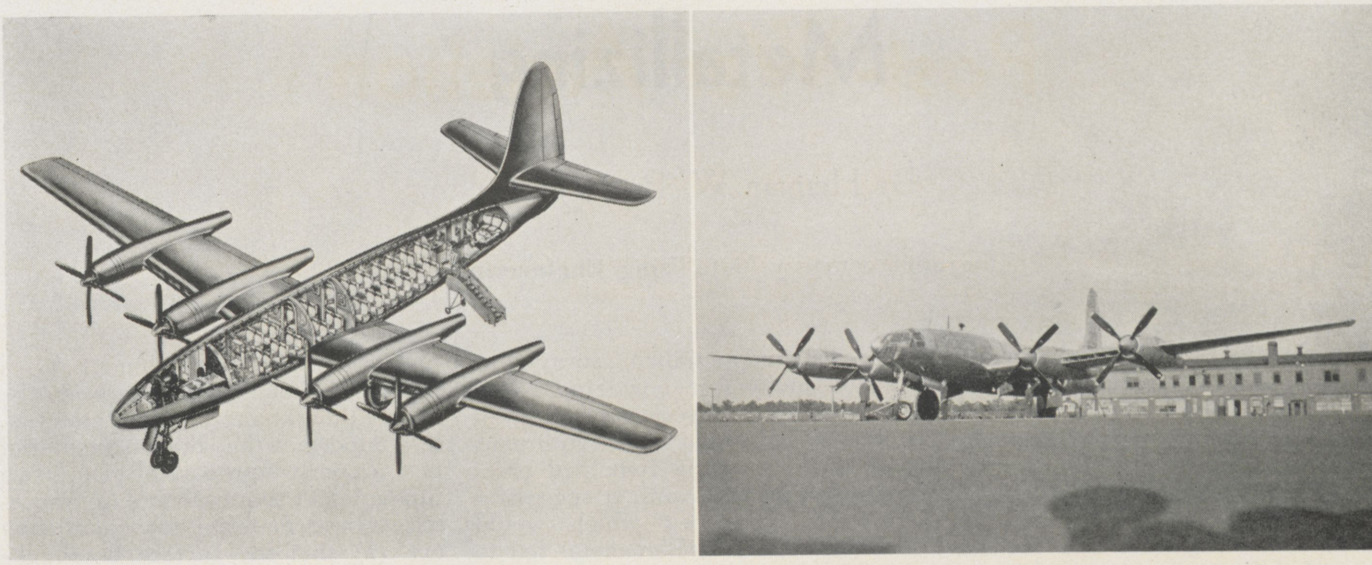
New York to Chicago	3:12	$32.85
St. Louis to New York	4:35	41.40
Louisville to Washington	2:43	21.75
New York to Los Angeles	14:20	118.30

For almost any trip exceeding 400 miles the airline fare is about the same as, or slightly less than, first-class fare and Pullman berth by rail. Besides, the airline fare includes meals and gratuities which on a long trip add considerably more to the cost of rail travel. The greatest inducement to travel by air is the fact that the time en route by airline is one-fourth to one-tenth the time by rail. For instance, the New York to Los Angeles time is listed as approximately fourteen hours, a trip that takes days by rail.

Since the fares are almost the same, the airline is becoming more and more preferred by all except those unenlightened few who stiil look askance at the safety of flying. Airline officials feel that the time is not far off when airline fares will be comparable to coach and bus fares, when expanded facilities and larger aircraft make it possible to carry more passengers.

Disadvantages of Air Travel

It is unfortunate that much inconvenience and discomfort are connected with air travel at the present time. The airlines are trying to take care of a booming post-war business with outdated pre-war facilities. Airports are outmoded, crowded, and even hazardous. Many waiting rooms are being used by hundreds more than they were intended to accommodate. Many flying fields are far from downtown areas with inadequate connecting transportation facilities. The helicopter is being considered as a shuttle bus between urban areas and airports, and may



The "Rainbow", a 46-passenger, 400-m.p.h. luxury airliner designed for long-distance transcontinental or transoceanic flights.
—*Republic Aviation Corp.*

prove to be the solution to this transportation problem. Much progress will have to be made before the airlines can raise their present low standards to conform more nearly to extravagant advertising promises.

Probably the greatest handicap in air travel today is the weather. Weather still delays flights, disrupts schedules, and sometimes causes passengers to be delayed at inbetween spots. Many bad-weather devices and methods were developed during the war, such as equipment for making blind landings and for clearing fog, and new radar instruments for navigation. Experimentation is still going on, and perhaps before long the weather will have less effect upon air travel.

Some solution will certainly have to be found before airlines can be made as dependable as modern railroads. It may take a long time to live down some of the derogatory slogans now springing up, such as "Travel by air—if you've got the time to spare."

International Air Politics

The development of world-wide airlines may not take place as rapidly as domestic lines because of political reasons. The United States has been taking the lead in trying to further agreement among nations concerning commercial traffic. The most important accomplishments so far have been the agreements made at the Civil Aviation Conference held at Chicago from November 1 to December 7, 1944, at which 54 nations were represented. The United States took a stand in favor of "the five freedoms of the air." Briefly, the five freedoms are (1) the right to fly across a nation's territory without landing, (2) the right to land for non-traffic stops, (3) the right to bring passengers from the homeland of the aircraft, (4) the right to carry passengers back to the homeland, and, finally, the most controversial one of all, (5) the right to pick up passengers in a foreign country and carry them to a third country.

Many states, especially Great Britain, object to the fifth freedom because of the superior advantage held at the present time by nations more advanced in airline flying, notably the United States, the Netherlands, and Sweden. The objecting nations fear that if foreign planes are given the right to pick up passengers and carry them to a third nation, the airlines from the United States, which are in a very favorable position, might come in and take over much of the local traffic before the airlines in those countries can get started. This means that if, for instance, a United States airline scheduled a flight from New York to In-

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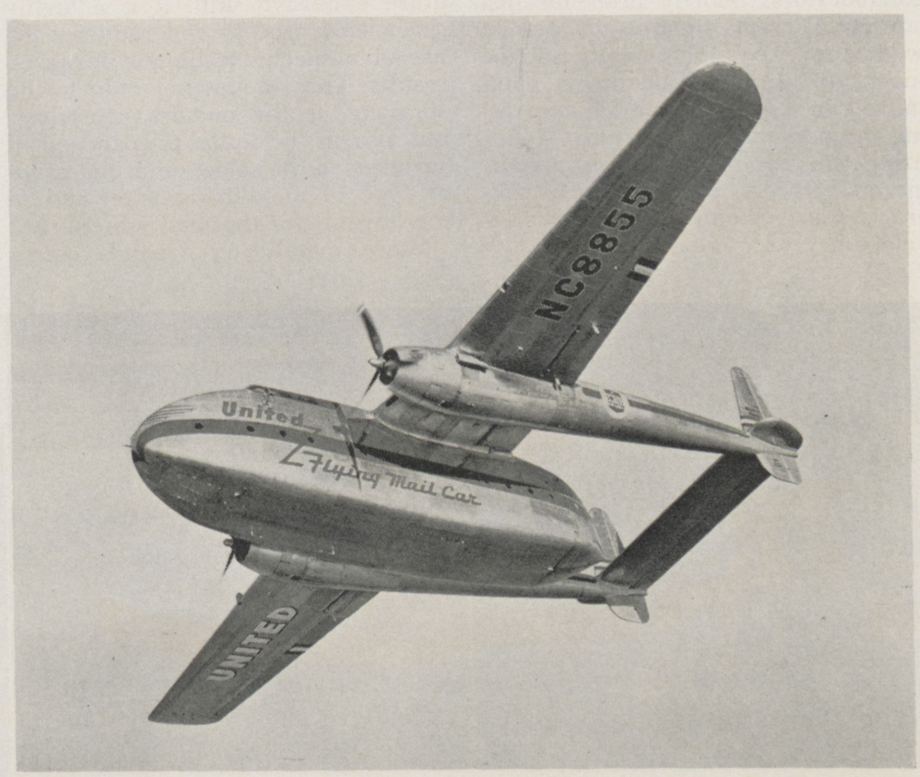


The "Flying Mail Car", designed for the U. S. Post Office Department for increased air mail loads under the new 5c rate.
—*Fairchild Aircraft*

Metallizing

By Herman W. Prust, jr., e.e.

Photographs courtesy **Metallizing Engineering Co.**

THE process of metallizing consists essentially of applying a coating of metal to a base material by means of a spray of finely-divided particles of molten metal from a special spray gun. The method is particularly suited to the restoration of worn mechanical equipment and the salvage of defective parts, to the protection of metals subject to corrosion with coating of more inert metals, and to the production of many varieties of non-metallic articles with a metallic surface film. Although metallizing is a relatively new development in the field of metalworking, it has rapidly become a valuable and versatile process for both maintenance and production, with the promise of even wider use in the future.

History

The metallizing process was originated by Dr. Max U. Schoop, a German scientist, and all early advances were made by him and his collaborators. Shortly after his discovery a great amount of interest was stirred by the novelty of the invention, and manufacturers capitalized on this interest by exaggerating the possibilities of its use. Metallizing was not practicable as a commercial process, however, until several improvements had been developed.

The original metallizing spray-guns utilized molten or powdered metal as feed, but these guns proved rather unsatisfactory for continuous use. Metal spraying remained practically a curiosity until a successful gun was developed which would melt and spray molten metal fed to it in the form of a wire. These early wire-fed spraying pistols were improved by the Germans into a production tool with few stoppages necessary and requiring relatively little skill to operate. The Germans are also credited with the development of a rotary spray nozzle suitable for spraying internal surfaces.

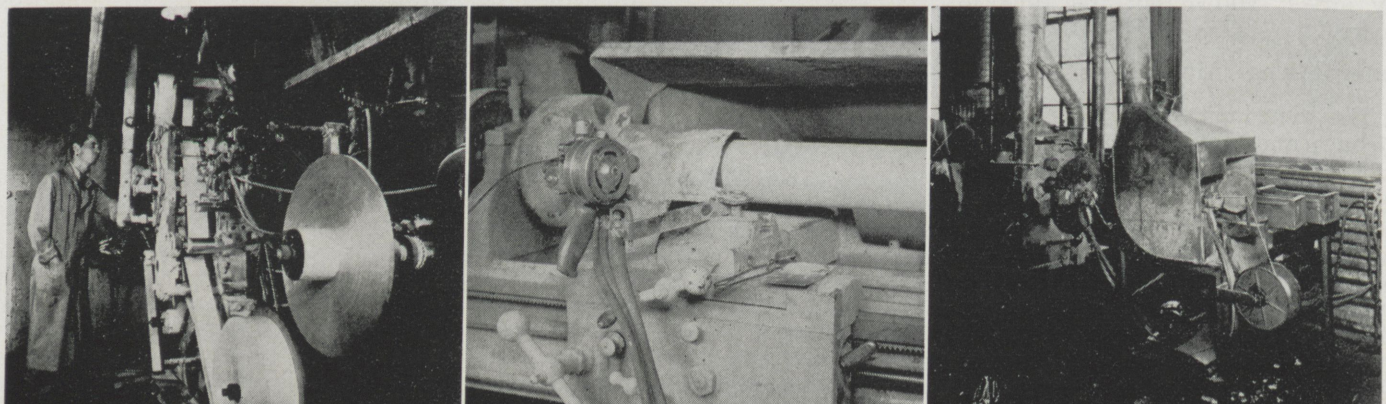
About 1920 the English investigated some of the characteristics of the metallizing process. The findings were favorable, and since then metallizing has been of ever-increasing importance as an industrial process.

Modern Metallizing

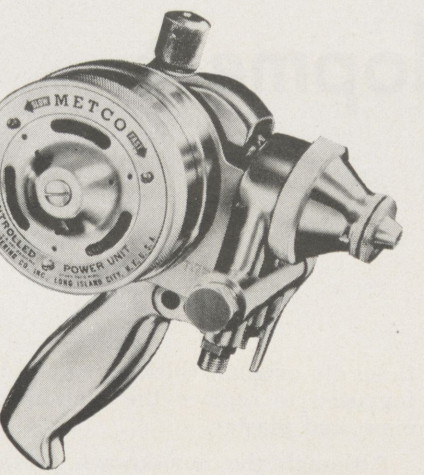
Although metallizing does not require excessive skill, it is a highly specialized process and requires the use of a special technique for good results. This applies not only to the spraying of the metals themselves, but also to the initial preparation of surfaces, to the selection of the proper type of metallizing wire, and to the finishing of the final job.

Since metallizing depends essentially on the establishment of a purely mechanical bond between the sprayed metal and the base material, it is important that the base material be properly prepared. The two fundamental requirements in preparing a base material for metallizing are (1) that the surface be roughened to provide a large number of minute keys, or openings, into which the metal may penetrate and (2) that the surface be absolutely clean and free from such foreign matter as oil, water, and metallic oxides. If these preliminary steps are not observed, the metallic coating may crack, chip, scale off, or fail in some other manner.

Several methods exist for roughening surfaces to be metallized. One of the favorite methods consists of blasting the surface with sand, steel grit, or other abrasive substances. In shaft work, where the surface must be undercut to prevent the formation of weak, tapering feather edges in the metallized coating, grooving and rough threading are often used. Where metals are too hard or too thin for machining or blasting, the *fuse-bond* process may be used, in which a thin, rough, foam-like film of metal is fused to the surface by a process somewhat resembling arc welding. When oil or grease is present, it should be thoroughly removed by any suitable



Coating non-metallic surfaces with metal by metallizing. Left, coating aluminum on cloth; center, coating paper tubes with zinc; right, spraying copper on carbon brushes.



Standard metallizing gun.

process, such as burning with a torch or degreasing in a standard degreaser. Non-metallic surfaces may be prepared by any method which leaves them rough, clean, and dry. Porous substances, such as carbon, can be sprayed without preparation, as can glass and other ceramics after heating to the proper temperature.

The metallizing gun is essentially a device for converting metallic wire into an atomized spray of molten metal suitable for coating a given surface of base material with a uniform metallic film. The wire is fed from a nearby turn-table to the nozzle of the gun by means of two knurled rolls within the gun which are driven by compressed air. At the nozzle of the gun the wire is melted in an oxy-acetylene or oxy-propane flame and blown by compressed air in the form of a fine spray upon the surface being coated. The surface of the base material is built up with the sprayed metal until it is slightly raised above the desired level and is then machined down to a smooth finish with the exact dimensions required. In some cases, of course, the final machining process is unnecessary or undesirable.

The structure of sprayed metal is quite different from that of cast, rolled, or drawn metals. As the minute droplets in the spray strike the surface of the base material, they flatten out and solidify almost instantly. As the metal builds up, the coating becomes stratified with layers of tiny, flattened particles bonded together in partial fusion, giving a granular rather than a homogeneous structure. The unique structure of the metal results in a reduction of such properties as ductility, elongation, and tensile strength; however compression, wear resistance, hardness, and conductivity of heat and electricity remain practically unchanged. Due to these characteristics, the metallized coating should not be subjected to such forces as sharp impact, continued pounding at one point, or severe edge strain. However, metallized coatings will take a full load and even considerable vibration when the force is uniformly distributed over the entire surface.

Uses of Metallizing

One of the main advantages of metallizing is its adaptability, since the kind of metal used as a spray and the kind of surface used as the base material are almost unlimited. Any commercial metal in the wire form can be used. High melting point metals may be sprayed on low combustion point materials, such as wood, paper, and fabric, without danger of charring. Low-cost metals may be given desirable qualities by coating them with more expensive metals. One portion of a piece may be sprayed wth one metal and the adjoining section with another. Alternate layers of different metals may be sprayed one over another. Non-ferrous metals may be applied to ferrous and ferrous to non-ferrous. In addition, parts of any size or location can be sprayed, and the metal may be applied before, during, or after fabrication either in the shop or field without danger of distortion.

These facts make practical a multitude of applications.

The protective coats on damaged or worn galvanized assemblies can be replaced at low cost by cleaning the bad spot, heating, and spraying with an alloy high in lead content. This eliminates the necessity of regalvanizing the whole piece.

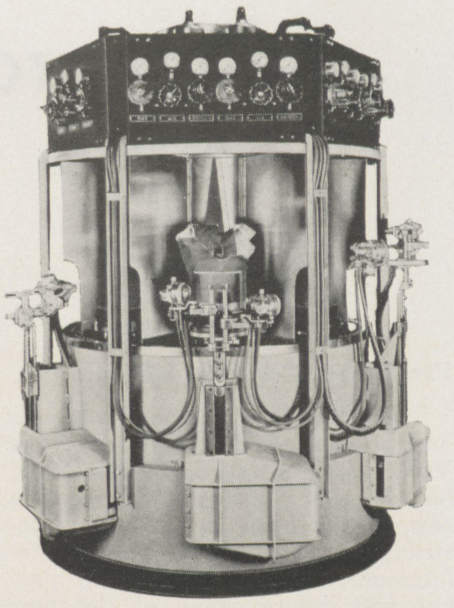
Much time and material have been saved by reconditioning pump rods, valve stems, shafts, turbine governor spindles, pump casings, crankpins, and wrist pins with sprayed alloys. These repaired parts often give better service than the original parts.

Surfaces which have deteriorated from corrosion and erosion may be replaced by spraying, and if a proper coating is applied, the problem may be permanently solved.

Small parts, which can not be sprayed by hand, are sprayed economically and efficiently in a tumbler barrel.

Carbon graphite and other nonmetallic materials which require a coat of metal may be metallized.

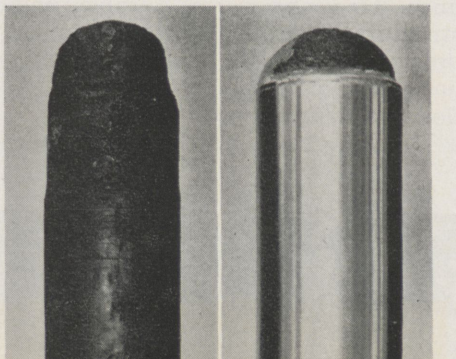
Bearings are made from sprayed metals because sprayed metals possess several qualities which make them especially suitable. They will absorb 10% of their weight in oil,



Automatic metallizing machine with six guns regulated by control panels.

and, tests indicate, that they have a coefficient of friction approximately 25% lower than cast metals. Also, as has been mentioned previously, spraying permits the combination of metals which could not be bonded conveniently by powder metallurgy or casting.

There are numerous other applications besides those mentioned, and new uses for metallizing are being found daily.



Before-and-after views of a pump reclaimed by metallizing for only 20 per cent of replacement cost.

Research and Development

By Michael Cvengros, fresh.

and

J. Max Gill, fresh.

Prefabs for Permanent Homes

The high cost of construction is one of the main reasons why the Veterans Housing Program is falling far short of expectation. This high cost results from local building restrictions, formulated before prefabricated houses were on the market and before many of the new light-weight building materials had been developed. Most of these regulations require methods of construction that the "prefab" manufacturers have replaced by better methods. The Department of Commerce is looking forward to the modernization and standardization of codes on a nation-wide basis in the conviction that this step would reduce construction costs.

Many people, seeing the box-like temporary dwellings erected near war plants, have a false idea of what modern prefabs may be. They are as permanent as the conventional house and resemble them in appearance. They are warm, durable, and structurally strong. However, much unnecessary weight has been eliminated, reducing the cost of construction and maintenance.

The National Housing Agency has tested 68 new lightweight materials and found about half of them very promising. Among the materials that the Agency endorses are panels or entire buildings made of lightweight concrete and structural panels made from plastics, aluminum, and other substitutes for lumber and plywood.

Most of the new concretes utilize forest and farm wastes, from chips and sawdust to cotton hulls. One company is making complete houses with a heat- and chemically-treated concrete which is about one-third the weight of ordinary concrete. It has high insulating properties, can be cut with an ordinary carpenter's saw, and nails can be driven into it without causing it to chip.

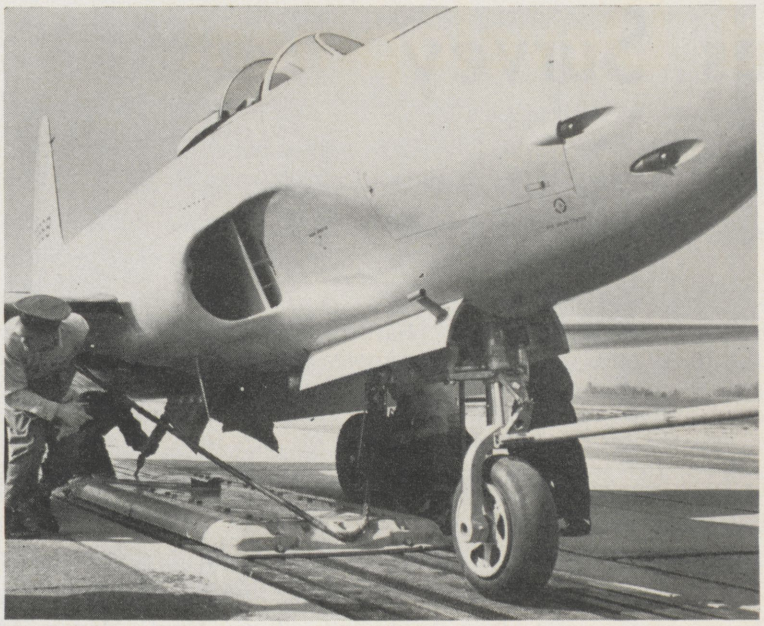
Another single-thickness panel consists of a honey-combed plastic core with aluminum faces. This honeycombed formation holds a great number of small air pockets which give the panel good insulating properties. These panels weigh about half as much as cork.

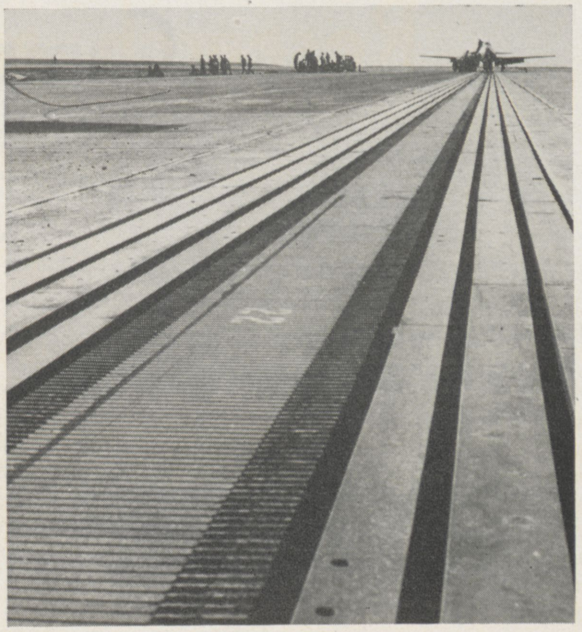
Also recommended are lightweight panels made from a widely-used nonmetallic mineral called *vermiculite* which expands when heated, giving off its water and spreading up to 16 times its original thickness. It is being used to replace the sand in cement and plaster.

Although the now-known prefabs will continue to be built for low-cost homes and temporary housing, the emphasis will be on substantial structures as durable and conventional as the custom built houses of today. A "Code for Prefabricated Construction" has been adopted by representatives of 46 companies. This code assures that the prefabs will conform with high standards of comfort, safety, and health. The manufacturers hope the code will serve as an authoritative guide to local building officials who have the job of changing the out-moded building regulations to conform with the improved, modern factory-built houses.

The majority of the new prefabs will be conventional in design with the double sloping roof of the familiar Cape Code type. However, a few of the radical designs offer some particular advantage in cost or construction and must be given some consideration. The Fuller house with its aluminum construction and novel domed roof is one of the radical designs which have a bright outlook.


Prefabs are not necessarily tiny or radical in design; like these, they may be spacious and conventional in appearance.
—*Science Service*





Left: Machanics prepare a jet plane for launching with electropult. Right: The runway of the electropult. About one-third of the track is shown.
—Westinghouse

Another worthy of mention is one designed by a member of the former War Production Board staff. This dwelling has self-strengthening arches on posts.

The Fuller house resembles a giant open umbrella with sidewalls extending down to the foundation from its outer circumference. Its major support comes from a concealed central mast, and its materials consist entirely of aluminum, plastics and stainless steel.

The house of the self-strengthening arches on posts has an arched roof extending from one end to the other. Free-standing concrete posts, properly spaced, support these arches. The posts and arches are erected first, and then the house is constructed from the roof down. This new construction system has its advantage in that windows and other openings can be placed wherever the owner desires, since the outer walls are supported by the post-roof system and bear absolutely no weight.

The American people are not too keen on radical changes in homes, just as they are not too keen on radicalism in automobiles. Just because homes have always been custom-built, they cannot see the advantages of the factory built mass-production home. However, when a home is decided upon, remember what mass-production has done for the automobile. It will do as much for the house, so look to the future —look to prefabrication.

Electrical Runway

The trend to larger and faster airplanes has heretofore threatened to end in a blank wall because of the impracticality of extending runways to greatly increased lengths. With the recent development of a unique electric catapult, however, it may soon be possible to launch the nation's largest airliners after a take-off run of only 500 feet. Many of these airliners now require almost a mile of runway to get up to take-off speed.

Designed by the Westinghouse Corporation, the "electropult" was originated during the war to make possible the launching of airplanes from small Pacific islands. The device may be said to consist essentially of a huge electric motor laid out flat. The 1380-foot runway, corresponding to the rotor of a conventional machine, is mounted flush with the ground and contains more than 300,000 sheets of electrical steel and nearly 17,000 high-resistance metal bars in its core. Corresponding to the stator of the conventional motor is the small shuttle car, which runs along the runway and tows the plane being launched. Power is supplied by a 24-ton steel flywheel, which reaches a speed of 1300 r.p.m. just before launching and supplies 12,000 kw to the electropult during the few seconds of operation. Due to the unique construction of the apparatus, power is delivered in a straight line instead of in the conventional rotational manner.

In operation, the plane is attached to the shuttle car by looping a bridle of steel cable over projections on the underside of the plane's wings. Since the car stands only five inches from the track, the plane rides along the track on its own wheels. At a given signal, the stored-up energy of the flywheel is released and the plane has attained take-off speed, the shuttle car is braked, the cable falls away, and the plane is airbound.

In recent tests of the electropult it was found possible to launch a jet-propelled plane at 116 miles an hour in four and one-tenth seconds after a run of only 340 feet. Without this aid, the plane would have required a run of 2000 feet to get into the air. The shuttle car itself, running without load, has attained speeds of 225 miles an hour in a space of less than 500 feet. As a comparison, it may be noted that the average automobile requires about 800 feet to build up a speed of 60 miles per hour when starting from standstill.

It seems very likely that the electropult will attain wide usage in the future. It has no apparent limitations in speed, except that for passenger comfort and safety airliners will probably not employ accelerations of more than one "G" (32.2 feet per second). The electropult gains in effectiveness with increasing size of aircraft, so that this method of launching may become standard with airliners. Aircraft carriers are obviously a prospective field for the development of this device. Other uses may include small mid-city airports and floating airports, or seadromes, in mid-ocean or near city waterfronts.

(*Continued on Page* 26)

Campus Survey

By Gordon Hayes, soph.

and Norman J. Pera, soph.

E.C.M.A. Convention

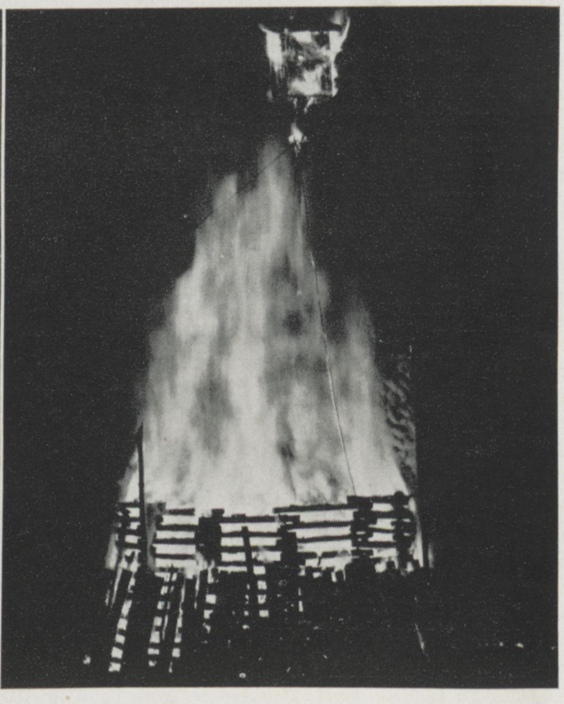
The annual convention of Engineering College Magazines Associated was held this year in Chicago on Oct. 11 and 12. The delegation representing the *Rose Technic* consisted of Robert G. Bannister, Editor; Charles J. Bashe, Assistant Editor; and Martin M. Newman, Advertising Manager. Delegates from engineering colleges all over the country were present, and several interesting discussions were held concerning common problems in getting out a college magazine. Since the association did not have an editorial critic during the past year, it was impossible to give awards for excellence in the usual number of categories of editorial work. However, certificates of merit were awarded to six magazines, including the *Rose Technic,* for over-all excellence in maintaining standards of publication during the school year 1945-46.

Home-Coming

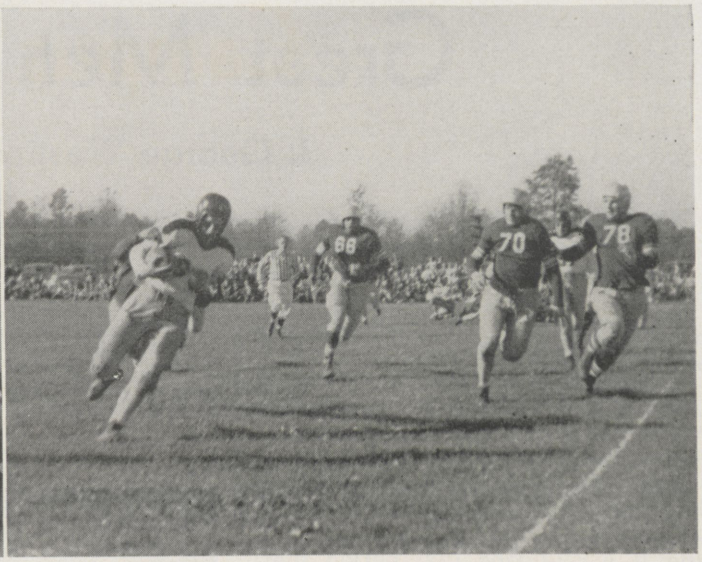
Once again in the halls of Rose echoed to the sound of her alumni. Activities were started when the freshmen brought "ROSIE" to town on Friday, the 25 of October. Traffic was tied up through the business section of town by a flying wedge of three lanes of automobiles, while the freshmen, assisted by the entire student body, gave the school yells and sang "DEAR OLD ROSE". Afterwards the crowd retired to the Rose campus, where the annual bonfire was to be burnt. The bon-fire, made out of railroad ties, brush, and telephone poles, reached up into the air about fifty-five feet and was topped by the traditional rural edifice. Because of the heavy rains the previous evening, the freshmen had considerable difficulty in getting the blaze started, but after they finally succeeded they were rewarded with a very good fire which was really a sight to behold. Cider and doughnuts were served and Coach Phil Brown introduced the members of the football team, telling a little of each man's background. Although it was a cool evening, the annual rally was attended by the largest crowd in the history of the school. After the bonfire was over the fraternities had various forms of entertainment for the returning alumni.

Saturday afternoon an impressive ceremony was held on the west bank of the lake to pay tribute to the 15 former students of Rose and one member of the faculty who gave their lives in this war. Following this was the home-coming football game, which Rose won by a margin of 13 to 7 (see below).

At six o'clock on Saturday evening a dinner for the alumni was held at the Terre Haute House. At the same time another dinner was held for the wives of the alumni, which was also at the Terre Haute House. Sterling Pittman, '22, retiring President of the Alumni Association, was the master of ceremonies at the banquet. Claude M. Gray, '21, of St. Louis, who is Vice President and General Manager of the St. Louis Public Service Company, was elected President of the Alumni Association for the forthcoming year. Walter M. Charman, '18, of Cleveland, Ohio, who is President of the Ferro Engineering Company of Cleveland, was elected vice president. John Phelps, '33, of the Rose staff, was retained as secretary-treasurer. Chesleigh Gray, '13, of Indianapolis, who is Vice



Right: Bonfire, shown as rural edifice bursts into flame. Left: Phil Brown introduces football players at bonfire rally.



Home-Coming Game: Rose vs. Indiana Central.

President of the Ready Mix Concrete Corp. of Indianapolis, was named as the alumni representative to the Rose board of managers.

The home-coming dance, which was an informal affair, was held at the armory, and the music was furnished by Fred Cizak and his orchestra. High-light of the evening was when everyone joined together in giving a school yell and in the singing of "The Rambling Wreck" and "Dear Old Rose". This finished up the largest and perhaps the best home-coming celebration in the history of Rose, and everyone returns now to their homes and back to school to talk of the fun and good times had at this home-coming and to plan for a bigger and better one next year.

Football

On October 12 the Rose Engineers traveled to Madison, Ind. to do battle with the boys from Hanover College. In a hard-fought game the Engineers ended up with a 7 to 0 defeat. Hanover took the lead in the first quarter with a touchdown and the conversion. The Rose men made several good attempts at points but could not quite do it. Their last touchdown try ended on the 30 yard line.

On October 19 the Fightin' Engineers traveled to Crawfordsville to compete with the Little Giants of Wabash College. The Engineers recovered a Wabash fumble on the second play of the game and proceeded to make a march down the field toward the goal line. After three successive first downs they were in scoring position, when they lost possession of the ball due to a fumble. After this the Little Giants took over and started their own touchdown drives. Altogether they scored five touchdowns in the game. Two were scored in the opening quarter, one was made in the third quarter and two were tallied in the last quarter of the ball game. Both teams gave almost all of the men that were dressed for the game a chance to see action, as many substitutions were made on both sides. This game marked the fiftieth year that Rose and Wabash have met and was the twenty-seventh game in the series between the two rivals.

Home-Coming Game

On Saturday, October 26, the first Rose Home-coming game to be scheduled since the beginning of the war was played with the Greyhounds of Indiana Central College of Indianapolis. The Fightin' Engineers won to the tune of 13 to 7 to win the first game of the season. Before the largest crowd ever gathered at the Rose field, the Engineers came out on the long end of the score in one of their best-played games of the season. Early in the first quarter Rose threatened when they took the ball to the 25-yard line. The Greyhounds took possession of the ball on their own 25 and tossed a pass, which Bill Smock of Rose intercepted and ran on for the first tally of the game. John Smith made the extra point and the score was 7 to 0. In the second quarter, after the ball was taken

(*Continued on Page* 24)

School mascot with freshman escort.

Great Men of Science

I: George Westinghouse 1846-1914

By Karl Hauser, fresh.

Ed. Note: *This begins a series of articles on famous engineers and scientists.*

In the half-century between the Civil War and World War I American industrial development reached its greatest height. It was during those years that the foundations of the modern industrial age were laid and it was during that period that George Westinghouse made his great practical contributions.

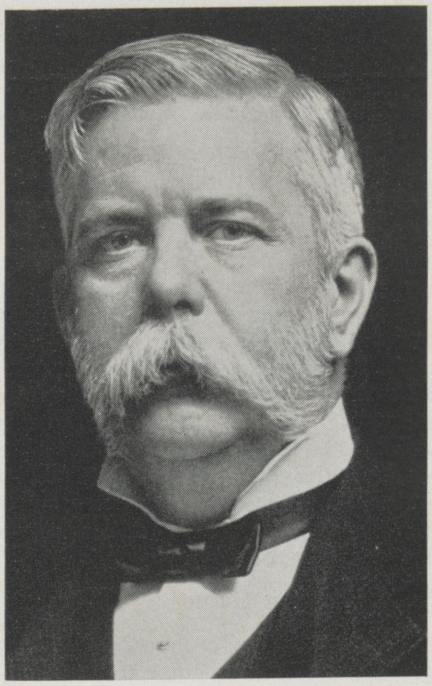
Born one hundred years ago on October 6, 1846, at Central Bridge, New York, he was reared in an environment of work, thrift and responsibility. His was an inheritance of energy, initiative, good blood, and sound tradition. He early acquired a realistic sense of tools, materials, machinery, and structures in the shops of his father's company, makers of agricultural machinery.

As a boy, during much of his spare time he worked for his father, but often left an assigned task to build a device which his own inventive ingenuity had conceived. An early indication of his varied interests was his habit of leaving a contrivance unfinished as his attention was absorbed by a newer, more intricate machine. This habit did not carry through to manhood, however, as he rarely left a field of endeavor until he had carried it through to success.

Westinghouse patented during his career 361 devices and improvements, many of them revolutionary in principle. They were the expression of a creative genius, responding to a growing America with a thorough understanding of the time, and far-reaching ideas to meet the needs of that time.

The growth and safety of railroads at a time when they were becoming the economical lifeline of the nation were hastened by his inventions. He devised the first effective means for stopping trains—the air brake; his development of railway signals and interlocking switches and his invention of the railway draft gear were far-reaching in their effect; his development of the electric locomotive and of railway electrification were significant in railway development.

To supply power for a growing American industry, Westinghouse developed a system for the transmission and use of natural gas. His greatest contribution, also in the field of power, was the alternating-current system of generating, transmitting and utilizing electricity.



George Westinghouse
—Science Service

To world commerce he gave a compact geared steam turbine adapted to marine engines, and with it poved the way for development of powerful fleets.

Today, scarcely a man lives in America whose life and activities are not constantly affected by the works of George Westinghouse. His work, and the work of his companies, is part of the very structure of the nation, its power systems, its industry, and every form of transportation.

The foundation of the fame and fortune of Westinghouse was his invention of the air brake. His mind was first directed to the need for a satisfactory railroad brake by a head-on collision of freight trains he observed in 1866, which made a great impression on him.* Braking at that time was done by an arrangement whereby each car had its separate brake, operated by a brakeman. Westinghouse's plan was to take the responsibility from the brakemen and put it in the hands of the engineer. By successively eliminating each possibility for central brake control due to impracticabilities, he found there to be no possible method with the power then in use. He found the answer to his problem in a magazine article describing a new method of tunnel drilling done by compressed air.

**Also on the freight trains—Ed.*

Sure that he had solved his problem, Westinghouse worked out the essential details of his system—an air compressor operated by steam from the locomotive boiler, a valve with which the engineer could control the braking system, a coupling for the air pipes between cars, and automatic valves which opened when the pipes were joined and closed when they were pulled apart.

Modifications of the braking system patented in subsequent years provided for applying brakes by reducing air pressure, rather than increasing it. This was done so that if a coupling broke, or cars separated the brakes would automatically set. After a long, hard struggle to make the air brake accepted as the best railway brake, the outcome of numerous tests convinced the Master Car Builders' Association and in 1888 they recommended it as the standard brake for trains.

While in England on business with his newly formed Westinghouse Air Brake Company he got the idea for his friction draft gear, a device which replaced heavy springs in the couplings between cars. The springs, used to prevent looseness and jarring in the coupling, would be compressed sufficiently as a train stopped to expand violently when the brakes were released, often with force enough to break couplings. The friction draft gear, however, expended as friction the energy of cars crowding one another as the train stopped. This meant that there was no reaction when the brakes were released, and made possible great savings in eliminating injuries, loss of time, and damage to merchandise.

(*Continued on Page 22*)

Alumni News

By James A. Milner, jr., m.e.

Of importance to all of us are the plans for the new dormitory and field house which are to be built on the campus here at Rose. With this in mind, I went to Indianapolis to meet an alumnus of Rose, Mr. Wilbur Shook, who helped draw the plans. Because this man has had an extremely interesting career starting with his first days of being a Hoosier, I would like you to meet him through the following biography.

Wilbur Shook first established his name in this world on May 11, 1889 at Versailles, Indiana, and at an early age moved with his parents to the Edgewood Stock Farm (now Edgewood Grove), across from the famous four-cornered race track where the Municipal Stadium stands today. His intrinsic value was soon made known, for upon visiting the Chicago World's Fair he was stolen by some Eskimoes and retrieved for a bag of gumdrops. Mr. Shook informed me that to this day he still lacks the taste for these gummy candies.

During his youth he was inspired by Professor Cowan, of Chicago, under whom he studied drawing, and it was at this time that his two hobbies, baseball and drawing, were in conflict as to deciding his career. When Mr. Shook graduated from Wiley in 1907, he was still undecided, so a compromise, architecture, was chosen, and he entered Rose the following fall term. Mr. Shook says, "This was certainly a fortunate decision for me, as I have always felt that what success I may have attained has in a great part been due, not only to the scholastic training at Rose, but to the fine and sincere contacts it has given me throughout my life. The prestige of being a Rose man is invaluable."

While attending Rose, Mr. Shook participated in many extra-curricular activities. He was an artist on the Modulus Staff, played four seasons of baseball with a captaincy the last two years, played football, and was a director of the Athletic Board. During this time he carried a earily morning paper route and worked during the summer for a construction company. It was with this company that he first worked after his graduation in 1911.

In the spring of the following year Mr. Shook went to Indianapolis and there attained a position as draftsman in the office of Mr. Herbert Foltz, a graduate of Rose in 1886. During his evenings he kept up his studies by attending the John Herron Art Institute. From this position Mr. Shook became head draughtsman for Charles W. Nicol, Architect, in Lafayette and Chicago, and in 1916 established his own office in partnership with William C. McGuire under the firm name and title of "McGuire and Shook." It is interesting to note that to this day the firm has the same personnel.

Mr. Wilbur Shook

After business hours Mr. Shook found time to continue with his hobby of art, and illustrated "The Indiana Medal," prepared by Janet Scudder for the Indiana Historical Commission, commemorating the completion of a Century of Statehood, 1816-1916. He also illustrated in part "A Tour Through Indiana in 1840" by Kate Milner Rabb.

During his career as an architect Mr. Shook served in many organizations. He was President of the Rose Poly Alumni Association in 1918, a member of American Institute of Architects, Indianapolis Rose Tech Club, Ind. Society of Architects, former member and secretary of the Engineers' Society, and one of the original founders and secretary of the Scientech Club, Indianapolis.

Some of Mr. Shook's best known designs are the James E. Roberts School for Crippled Children, Indianapolis; Thomas Carr Howe High School, Indianapolis; School of Education at Indiana University, Bloomington; United States Post Office and Court House, North Addition, Indianapolis; Muscatatuch State Colony at Butlerville; and Tyson Temple, Versailles.

Mr. Shook's firm has designed many high schools and grade schools throughout the state and numerous banks and commercial buildings. In addition to being associated in the planning of the proposed buildings at Rose Poly, the firm is now serving as Architects for building programs at Evansville College, Indiana University, Butler University, DePauw University, and Hanover College.

Other buildings which the firm has designed in the past include the multi-story Hulman Office Building in Evansville, many state institutions, the Indianapolis Municipal Airport, and St. Paul's Episcopal Church now under construction in Indianapolis.

Mr. Shook actively participated in planning troop housing and hospitalization during the war and was associated with the development of Billings General Hospital, Fort Benjamin Harrison; Stout Field Barracks and Hospital; Mars Hill First Troop Carrier Command; and the Freeman Airbase Housing, Seymore, Indiana. During this time he also served as Rose Polytechnic Supervisor, Indianapolis District, in war training classes in Engineering, sciences, and management, graduating several hundred students in intensified short courses under the instruction of Rose Poly graduates.

If ever you are in Indianapolis, go to 1400 Fletcher Trust Building, have a chair, and a blonde secretary will answer most questions until Mr. Shook can meet you and show you

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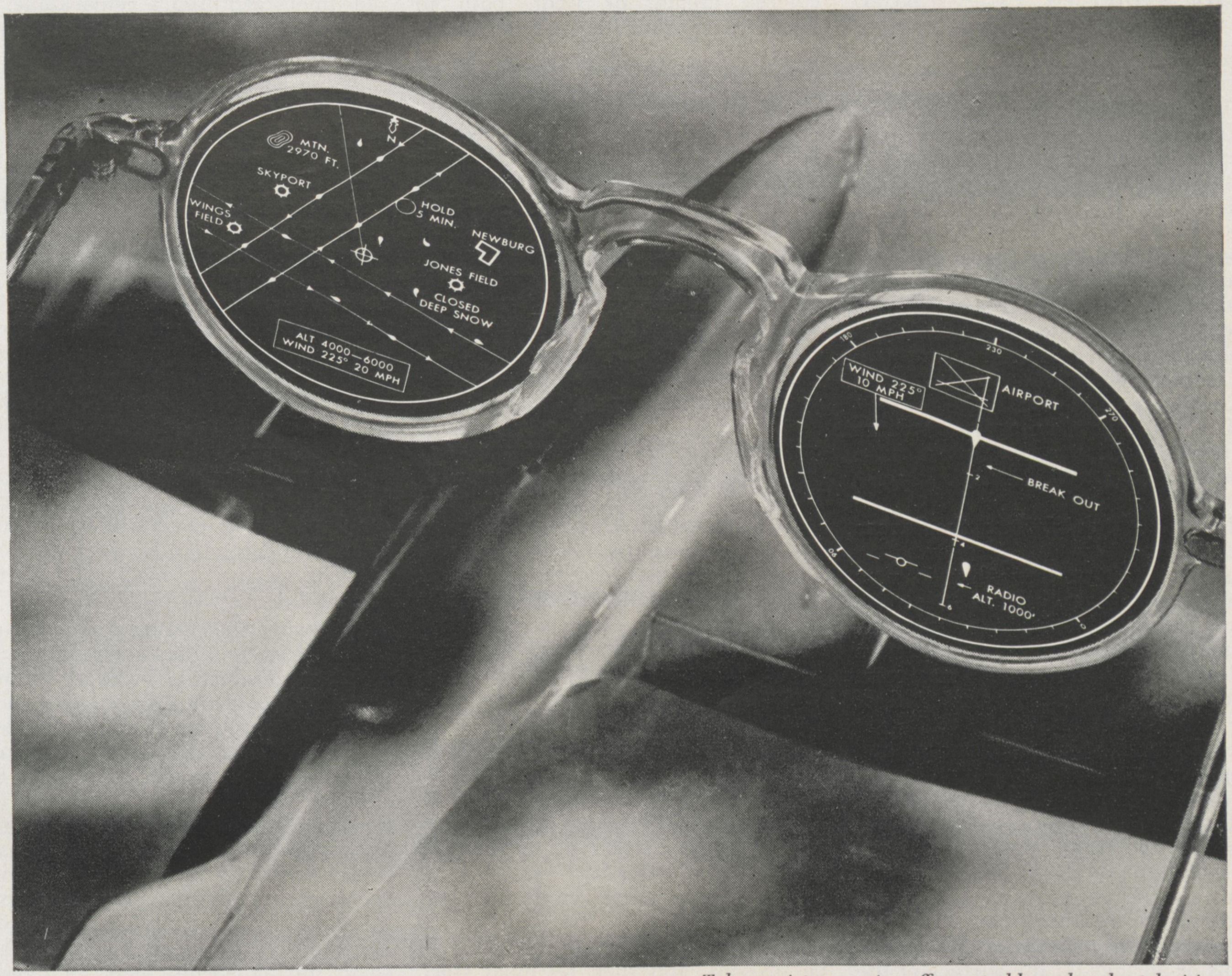

Teleran pictures—air traffic control by radar plus television.

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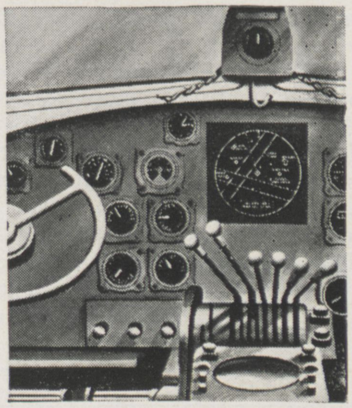

Instrument Panel of the Future. The Teleran indicator, mounted in a cockpit, simplifies the pilot's job by showing his position relative to the airport and to other planes in the vicinity. It promises to become one of the most useful developments in the history of aviation.

RADIO CORPORATION of AMERICA

THE STORY OF PETROLEUM

(*Continued from Page* 7)

ness of selling mummies or their wrappings as common fuel.

In the Bible there are several references to the use of certain materials for building called "slime" or "pitch". The most familiar of these references are probably those of Noah's Ark, which was said to have been made water-tight with this substance, and the Tower of Babel, the stones of which are believed to have been cemented together with it. These substances could be interpreted to mean some form of petroleum, probably natural tar.

Down through the ages petroleum remained in favor in its use as a fuel for altar fires in religious ceremonies.

Later, in Colonial times, the Seneca Indians and some of the early settlers in the territory that is now known as southern New York were using "rock oil" to heal their wounds. When the American Colonies were fighting for their independence from Great Britain, stories were told of the American soldiers marching in the Pennsylvania wilderness and stopping at oil springs along a creek to ease their sores by bathing them with the oil they found there.

From this brief history it is easy to see that the use of the oil is not new. For these thousands of years our ancestors found their "tar," or "rock oil," or "medicine water" in pools or springs on the surface of the earth. Not until fuel for lamps became scarce was there any desire to seek out the resources of this oil and to find a suitable means of getting more.

As man began to search for new fields of fuel supply, he awoke to the possibilities of petroleum. But where was it to be found in quantity?

Occurrence of Petroleum

The original "crude" is found in several forms. It may be thick like tar, oily and heavy like amber-colored cream, or light, both in weight and color, like the gasoline it yields.

It is found at different distances below the earth's surface—anywhere from a few feet to several miles, where it is held between grains of sandy, coarse-grained rock—but to understand how it ever got there, we must turn back millions of years.

In that forgotten eon, millions and millions of years ago, broad sheets of mud and limy materials and sand were deposited in the shallow seas. As this transpired the lime and the mud trapped the plants and the sea animals that fell in them. This went on, layer after layer. Soon bacteria commenced to devour the remains of the entrapped plants and animals, and then the material that continued to fall on them from above began to press heavily on them. The combined action of the bacteria, the pressure, and the heat of the earth gradually transformed the plant and animal remains to oil. Meanwhile the mud and the lime and the sand were processed into rocks. Later oil was squeezed out of the mud rocks (shale) and the limestone and found its way to the porous sandstone. There, in the tiny openings between the grains of sand which make up the sandstone, lies the oil until it is raised to the surface.

To raise the entrenched oil to the surface, man must first find spots where it is fairly certain that oil may be present, and then he must start drillng wells. Today the geologist and the geophysicist are consulted. Such was not the practice in the earlier days. In his first quests for oil, man did not base his search on science; instead, he turned to the "hazel twig" and to those superstitous-minded advisers who suggested that oil was sure to be found if a well were drilled near a cemetery, or on the right hand fork of certain creeks. By playing mere hunches, by observation, and by experience, these old-timers acquired a remarkable, if uncertain, ability to locate oil-bearing regions.

These early methods were rapidly replaced by the scientific methods of the geologist, who found oil by studying the folds and the breaks in the rocks on the earth's surface, and somewhat later by determining the character of the rocks and fossils lying deep below the surface. Many of these fossils are smaller than a pinhead, so that even the tiny rock-fragments broken from the solid rock by the drill contain thousands of complete skeletons of these tiny animals. Through microscopic analyses the fossils are classified, and from this evidence scientists know what bed or rock the drill has reached and how far the drill must go to reach the "sand" where oil will be struck. "Sand" is the name by which all oil men know the porous rock where the oil is held.

Following the geologist comes the geophysicist, who has several instruments with which to work, the most important of which is the Seismograph. You will recall from the description of how oil was formed and where it was collected that oil lies in pockets caused by an upheaval in the earth's layer, and it is upon this knowledge that the scientists base their search for it. They must find those pockets. To do this they use the Seismograph, a device for recording the action of the layers of the earth during earthquakes by measuring the speed and direction of the waves that this motion sets up. A truck carrying the seismograph equipment is taken to a chosen location. There the seismograph is placed in operating position on the ground and the operator measures the distance along the ground to the point where the explosive charge is to be detonated. The charge is set off, creating a "baby earthquake". The seismograph records the time re-

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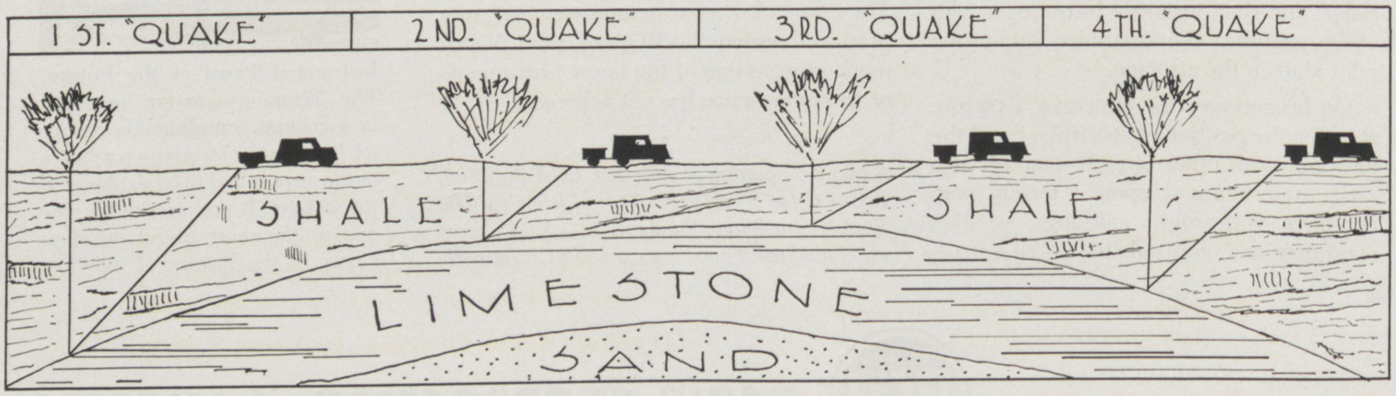

Determining the underground structure of rock and sand layers by picking up blast echoes with a mobile seismograph unit. Oil may be present in the "dome" shown above.

GEORGE WESTINGHOUSE

(*Continued from Page* 16)

Foreseeing the need for adequate signaling and switching facilities as railroad traffic increased, he developed in 1881 a system, operated by electricity and compressed air, automatically controlling signals, and a system for interlocking complex signals to prevent directing a train into danger.

Westinghouse had always been interested in power and its transmission. Thus, it was almost inevitable that he should interest himself in electricity. He started an "electric lighting department" in his Union Switch and Signal plant in Pittsburgh, and brought to it William Stanley, a young electrical engineer who later became famous in that field. On the basis of Stanley's inventions and experiments performed in the electrical laboratory, Westinghouse started building direct-current lighting equipment.

But Westinghouse, like many at that time, was not entirely convinced that electricity was the best source of power. He had not yet discovered the possibilities of alternating current, and before he did, he successfully performed his first experiment in power transmission by use of natural gas.

One industrial plant in the Pittsburgh area had studied natural gas and found that it was as useful as other fuels and had the added advantage of being less expensive. This study attracted Westinghouse's attention, and he soon began work on harnessing these uncontrolled natural resources. Drilling was conducted on the grounds of his Pittsburgh home, and gas was found at a depth of one-third of a mile. For a week, gas and mud from the well gushed uncontrolled until Westinghouse devised a stopcock and brought the flow under control.

In 1884 and 1885 alone twenty-eight Westinghouse inventions pertaining to every aspect of the system were patented. He devised better methods of digging gas wells, a meter for measuring consumption, methods of prevention and detection of leaks, and an automatic shut off which activated when pressure fell too low. The cheapness of gas fuel in Pittsburgh, due to Westinghouse's work, enticed many industries to that city and helped it to become one of the world's leading industrial centers.

One of his most noteworthy contributions to gas power was his system of conveying gas over long distances. The pressure of the gas at the well, higher than that required by the consumer, was used to transmit the gas through a narrow pipe for several miles. Then by successively enlarging the pipe at intervals, he reduced the pressure to that required for consumption. It was this same basic idea for distribution—high pressure at the source and reduced pressure at the point of use—that lay behind Westinghouse's plan for supplying electric power over long distances.

By 1885 Westinghouse had satisfied himself that direct current electricity could not be used as a universal power source, due to the fact that its voltage could not be effectively controlled over more than a short distance. When a system of distributing alternating current, including a transformer which would step up or down alternating current voltage, was designed by Gaulard of France and Gibbs of England, Westinghouse obtained an option on the system.

William Stanley and Reginald Gelfield, other brilliant engineers, redesigned the system and a practical demonstration came soon afterward. On March 20, 1886 the city of Great Barrington, Massachusetts, became the first city to be lighted by alternating current.

The first commercial system, which included a constant voltage alternating current generator designed by Stanley, was tested in Lawrenceville, Pennsylvania and in Buffalo, New York in the fall of 1886. In 1888 the need for an alternating current meter and an alternating current motor was satisfied by Shallenberger, Ferraris, and Tesla.

With the system complete, Westinghouse set out to overcome the stiff opposition from direct current advocates in his attempt to get alternating current accepted for general use. The objection put forth was the deadliness of electricity at the voltage at which it was transmitted by his system. His chance to break through public prejudice came in 1892, when he was awarded the contract for lighting the Columbian Exposition in Chicago. In the six months the exposition lasted it was proved to the public by the lighting and by the Westinghouse exhibit that alternating current was a safe, efficient, versatile power. The Columbian Exposition spelled the beginning of the end of the "battle of the currents."

In 1893 the Cataract Construction Company, in charge of financing and executing plans for harnessing Niagara Falls, awarded to Westinghouse a contract to build three huge hydroelectric generators to change the energy of Niagara waters into electrical energy. In 1896 the generators had been installed and all was ready for operation. On November 16, circuits from Niagara to Buffalo were closed, and before long the generators were providing electric power for large sections of western New York. Inexpensive, versatile power had laid the foundation for a new and growing industrial region.

More important was the fact that that Niagara Falls project proved the value of alternating current transmission systems. The pace was set for vast developments in the manufacture of electrical power all over the world, and the dream that Westinghouse had cherished and struggled to achieve for ten years was finally fulfilled.

After his success in the introduction of alternating current, Westinghouse turned his attention to the conversion of mechanical power to electricity. At this time the reciprocating steam engine was the chief unit in use, but it was rather undesirable due to its low efficiency. Westinghouse had always been interested in the development of a rotary steam engine, but he had been unable to obtain a commercially practicable unit. When he heard of the invention of a highly-efficient steam turbine by Charles Parsons, an Englishman, he therefore acquired exclusive American rights immediately. After effecting several important modifications in both the turbine and the alternator, he was able to install the first turbine-driven alternator by 1899. Soon thereafter the steam turbine became the most important driving force for electrical generators.

One of Westinghouse's last contributions was the development of alternating-current electric railway and interurban systems. Such equipment had hitherto utilized direct current, but this was practical only in crowded areas where the traffic was heavy. By 1905 Westinghouse and his engineers succeeded in submitting an alternating current railway to a trial test, and by 1907 an inter-city electric railway was set up between Woodland, N. Y. and Stamford, Connecticut.

After George Westinghouse lost control of the major portion of his companies in the panic of 1907, he went into partial retirement from industry, but until he died on March 12, 1914, his inventive mind was continually at work. Thus, at his death, one of the most spectacular and brilliant careers in the history of industrial America was brought to a close.

THE STORY OF PETROLEUM

(*Continued from Page 20*)

quired for the "quake" waves to travel down from the surface to the reflecting rock (hard limestone) and back to the recording instrument. If these recordings show, after the charges have been detonated in several different locations, that it takes some of the waves much less time to go down and back than it does for others, it is a sign that there is a rise in the rock. This shows that there is a pocket or dome present. Since oil lies in pockets like these, it is possible that oil may be present.

After sufficient tests have been made and likely-looking areas selected, the land is leased and then—the DRILLING—and with it the anxious and exciting wait until oil is brought to the surface.

Will the owner be rich or will all his money be lost in a shaft—a dry well? Only tense weeks or months of drilling will find the answer. Weeks that are lengthened into months by accidents in drilling operations, or months lengthened into more months because of the depth of the oil pocket. . . . a thousand dollars spent at the beginning may pramid itself into a cost of tens of thousands before drilling operations are completed; thus, drilling a well may cost from $1,000 to $300,000 and may take from a week to fifteen months or longer. The depth to which the drillers go may vary from 1000 to 15,500 feet or more.

Perhaps you are wondering what kind of an accident can make the cost of a well go up several thousand dollars . . . well—

Sometimes the drilling tools break or work loose from their cable or moorings and fall into the well, plugging the hole and delaying drilling operations until the tool is fished out. This sometimes takes days of work, and all the while the cost of drilling continues. Sometimes the drill strikes rock that is impenetrable, so it changes its path and the hole is crooked. Crooked holes cannot be used because casings or pipes through which the oil is brought to the surface have to be put down. This means that the drill must be extracted and the hole straightened. At times the rock is so hard that even this straightening cannot be accomplished. The hole is abandoned, even though it has cost thousands of dollars, and another is begun.

This business of "wildcatting" is full of possible accidents—accidents that mean a loss of time and money. And yet, every man in the business looks forward, through the many disappointments, to the thrill of his life—the day when his well will "come in."

Some wells come in and flow freely without artificial help, while others must be "shot" with nitro-glycerine to release the oil from the pocket in which it lies. In either case great care must be exercised to handle the well so that the oil can be sent to the reservoirs as soon as it comes in. This means that gushers, as exciting as they are, are bad business and are to be avoided as much as possible.

Drilling for oil has always had a fascination for adventurous men. They rushed for it as they rushed for gold. Pioneers left their homes, their farms, their businesses, and often their families to race to the new oil fields as they opened up. Men have riddled their farms with test wells, their own back yards within the very cities, and sometimes have even torn down their houses to look for oil . . . and few of them produced. But the craze is still there and men still spend their lives wildcatting for wells that will produce.

ED. NOTE: *This is the first of two articles by Mr. Miller.*

CAMPUS SURVEY

(Continued from Page 15)

down the field, the Engineers scored again when Ronnie Larson crossed into paydirt. Smith's attempt to convert was wide and the score stood at 13 to 0. In the third quarter the Greyhounds gained on passes and then went across for their first tally in the ball game. The conversion was good and the score stood at 13 to 7 for the Engineers. Although both teams struggled hard for another touchdown, and despite considerable gains, neither team was able to score again in the game and the team presented Rose with a victory in its Home-coming game.

Radio Club

The Rose Tech Radio Club is well on its way to a complete post-war reconversion after a relatively inactive war-time period. Adopting a new system of meetings for the committees, it is now possible for the regular meetings to consist almost entirely of talks and demonstrations by the members. All students have been invited to sit-in the meetings, with no previous knowledge of Radio and Electronics required to understand the discussions.

Some of the demonstrations and explanations conducted in recent weeks have been the operations of the Club's transmitter, explanation of the different bands of the receiver, elimination of the noise from fluorescent lamps in home receivers and how to make records of your voice. These are only a few of the varied and interesting topics which have been discussed.

A.S.C.E.

On Wednesday, October 23 Mr. C. W. Alverson, of the Master Builders Company, Cleveland, Ohio, presented a lecture and movies to the chapter on "Concrete Facts." The advantages of using Pozzolith, a dispersing agent, in cement and the theory behind it were brought forth, after which an open question period was held.

Luncheon meetings have now become a regular forum for the chapter. These meetings are held every other Monday in the Physics Lecture Room, where the members are eating their lunches. During the meeting on October 28, Mr. Kobel and Mr. Elstner gave reports and interesting highlights of the ASCE Student Conference held in Kansas City, Missouri on the 17th, 18th and 18th of October.

Locker Room Chatter

By Alex Vogl, fresh.

Let no one say that there is no place for women on the gridiron. At one of our recent away-from-home games, Ronny Larson was very painfully assisted off the field following some playfulness on the part of a Hanover tackle. When a pretty co-ed cheerleader came over from the opposite side and asked if there were anything she could do for him, Mr. Larson answered very sadly, "No thanks, I'm married." We extend our sympathy.

"Life ain't great without a mate," says Tom Keogh, who likes to be unusual. He went to the Homecoming Dance with a blind date, announced his engagement over the P. A. system at 10:30—the slow poke! Louis Fellwock was there too, acting as if nothing had happened; no one knows yet what he and Jack Torrence were doing with those pretty spectators on the north sidelines during the Indiana Central game. Going after a pass?

Over at Deming Hall big things are in the making. Peanut "Main Cog" Sneider, new president of the Dormitory Association, is adding glamor and prestige to his responsible position by placing a Freshman orderly at the door of 217. The president may be seen by appointment only. While we are at the Dorm, here is a new student's impression a week after moving in; may it bring back fond memories: "This, mother dear, is my new home. My family consists of 148 brothers who don't know my name or where I come from, but always become interested in me when you send me a box of cookies. It always is very quiet here, except when I want to study. There are always plenty of fellows to do things with, except when I want to do things with them. The best food is always served at the beginning of every meal, but any time I get to the head of the line we are having Spam. Mother, what can the matter be?"

Back to football for a moment, we would like to assure all of you who are in doubt about the matter that according to Coach Brown those eleven men on the field last Saturday definitely were playing football. (Any remarks to the contrary should be considered sabotage by I.S.T.C.) Of those eleven men, nine are married and two are not; perhaps there's more to this business of matrimony than meets the eye!

ALUMNI NEWS

(*Continued from Page* 18)

some of the intricacies of the profession of architecture.

Class of '45

With a new graduation coming up in December, it is of interest to note the location of the graduates of December, 1945. A survey gave the following results for the 12 graduates, as far as is known:

Ch.E.

William G. Dedert — Swenson Evaporator Division, Whiting Corp., Harvey, Illinois.

Joseph B. Durra—Partner in Durra Products Co., Memphis, Tenn.

Robert E. Logsdon—Phillips Petroleum Co., Bartlesville, Okla.

Fred C. Maienschein — graduate work in nuclear physics at the University of Indiana, Bloomington.

Ellsworth Staver — DuPont Co., Wilmington, Delaware.

C.E.

Christy Jones — Carter Oil Co., Peru, S. A.

William C. Waldbieser—U. S. Geological Survey, Water Researches Branch, Lansing, Michigan.

M.E.

Stephen W. Liddle—Radio Corp. of America, Indianapolis, Ind.

William G. Johnson — Campbell Soup Co., Chicago, Ill.

E.E.

Henry Schoemehl — Radio Corp. of America, Indianapolis, Ind.

Jack Ice—Guide Lamp Co., Anderson, Ind.

Newsbits

'22 Leroy A. Wilson, vice president of the American Telephone and Telegraph Company, has been elected a member of the board of directors of The Chesapeake and Potomac Telephone Company of West Virginia. Receiving his schooling entirely in Terre Haute and graduating from Rose in 1922, Mr. Wilson went to work for the Bell System as a Traffic Student in the Indiana Division. From 1923-1929 he held the position of district traffic chief and district traffic superintendent.

In 1929 Mr. Wilson was appointed rate engineer for the A. T. and T. Co. He held various positions until 1944, when he was promoted to vice president, and is now in charge of finance.

While attending the alumni banquet during the Rose Poly Homecoming, I obtained quite a few news items from some of the returning grads and will write about them in this column every month.

'28 Andrew J. Nehf, c.e., it is interesting to note, owns his own construction company and is engaged at present in working on the Rose Emergency Housing Project.

'37 Robert I. Sears, ch.e., is a lubrication sales engineer for the Atlantic Refining Company at Pittsburgh, Pa. Address: Perrymont Road, R. D. No. 7, Pittsburg, 2, Pa.

'41 Charles A. Howlett, e.e., is now a design engineer with General Electric at Fort Wayne, Indiana. The new address for all correspondence seekers is 3106 MacArthur Drive.

'42 John H. Vander Veer, m.e., is still working for Sperry Gyroscope Company in the position of Field Engineer Leader. Vandy told me the whereabouts of George Blakey, with whom I have lost contact in the past year. If your are interested, George is working for Sperry Gyroscope as field engineer on the new A-12 Automatic Gyropilot as advisor to Grumman and Republic Aviation Companies.

Deaths

Eugene K. Stoddard, '05, died on Monday, September thirteenth, in Des Moines, Iowa. He was working for the Iowa Machinery and Supply Company.

RESEARCH & DEVELOPMENT

(*Continued from Page* 13)

Blood Temperature Now Measured Inside the Bloodstream Itself

Blood temperature may now be measured directly inside the bloodstream itself by means of a new electric thermometer, according to an announcement by the Office of Technical Services, Department of Commerce.

The minute sensitive part of the instrument, known as a thermistor, is embedded in a glass bead only one millimeter in diameter. This, in turn, is encased in the tip of a rubber tube so slender that it can be pushed through a hollow needle inserted into a blood vessel.

A pair of slender wires lead back from the thermistor to a small box containing apparatus for measuring changes in electrical resistance. From these changes, the temperature of the blood can be determined within a range of 97 to 133 degrees Fahrenheit.

The new blood thermometer was developed during the war by William G. Fastie and Louis F. Drummeter, Jr., under a contract with the Chemical Warfare Service.

New Airplane Engine More Powerful Than a Locomotive

The U. S. Army's new 5,000-horsepower aircraft engine packs more power than the average locomotive and is the most powerful reciprocating aviation engine in the world today, officials of the Army Air Forces claim.

A liquid-cooled, 36-cylinder Lycoming model with a single crankshaft, its radial cylinders are arranged in four rows of nine each. A few of the accessories are mounted conventionally at the rear of the engine, but others, including the two necessary starters, tachometers, propeller governor, and low-tension magnetos and distributors, are placed ahead of the cylinders.

The engine is approximately 10 feet long and five feet in diameter. The 5,000-horsepower is its take-off power, its normal rated power being 4,000 horsepower. It is equipped for either carburetion or fuel injection. When operating at maximum speed and power, it consumes gasoline at the rate of 580 gallons an hour.

Since economy of operation was one of the promary objectives in designing this engine, several unique features are incorporated. The propeller drive is through a two-speed dual rotation reduction gear, either ratio of which can be used at the pilot's discretion. Shifting is accomplished hydraulically and provides a direct drive to each of the two propeller shafts without the use of a friction clutch.

Another feature is the use of camshafts, with two separate sets of cams which can be shifted to change the valve timing for maximum power or cruising efficiency.

" — and it writes for 20 years without refilling!"

POST-WAR AVIATION

(*Continued from Page* 9)

dia through London, Rome, and Cairo, the plane, after discharging passengers at those places, would be making the last phases of the flight almost empty. It would not be able to pick up passengers at any one of the latter stops and carry them to another unless those nations agreed to the fifth freedom. Naturally such a flight would run into economic difficulties. So far 20 nations have signed the five-freedoms agreement, chiefly Latin American countries, China, and the Netherlands.

Also at the Chicago Conference a two-freedoms agreement was made which now has more than 30 signatures. The signing nations agreed to the right to fly over one another's territory and the right to stop for refueling and other non-traffic stops.

Another aviation conference was held in Bermuda during Feberuary, 1946. At that conference a compromise was reached whereby the United States agreed to British demands that minimum fares on North Atlantic routes be fixed by conference. The British in turn gave up their attempts to limit the number of trips to be flown by the United States airlines, and, supposedly, dropped opposition to the fifth freedom. However, the two nations are not yet in full accord on that question.

International Air Travel

Several reliable predictions have been made about the future of commercial air travel. It has been estimated that there will be 4,000,000 passengers a year traveling to Europe when that continent is again able to receive tourists. This estimate was based upon a $200 fare. Difficulties in reaching agreements with other nations may result in a somewhat higher fare. However, even if this estimate should be too high, the aviation industry believes that the volume of air traffic to Europe will soon dwarf the pre-war volume. New York plans to build a $200,000,000 airport, to be called "Idlewild Airport," and by 1960 Idlewild and LaGuardia Field together are expected to be handling 23,000,000 passengers yearly.

Aviation is counting heavily upon the time-saving factor of air travel to bring the great volume of passenger business. Many people who could afford a trip to Europe have been unable to go because they could not spare the time for a long ocean voyage. By crossing the Atlantic in twelve hours by air, the two-weeks vacationer could leave almost any part of the United States and spend ten days in Europe.

Commercial aviation at present is hindered by inadequate terminal facilities, weather, and lack of agreement between nations. The need for a low-cost family-size airplane and the prohibitive cost of flying handicap development of private aviation. However, aviation as a whole enjoys the most favorable position it has ever had, and in the future the luxury of global air travel may be regarded as commonplace.

Fraternity Notes

Lambda Chi Alpha

The Theta-Kappa Zeta of Lambda Chi Alpha celebrated the first post-war Rose Homecoming with several enjoyable activities. After the bonfire Friday the 25th, the Chapter held a hayride which was attended by most of the actives and pledges. Everyone had an enjoyable time outside of the fact that it was somewhat crowded. The following evening the Green Room of the Terre Haute House was reserved by the Chapter for the Alumni and Actives to get together and meet each other. Several of the Alumni stopped in and met the Actives to culminate a very successful week-end.

The Chapter extends its congratulations to Bernard Erickson, New Castle, Indiana; Robert Develin and Wayne McCoy, both from Brazil, Indiana; who were initiated into Lambda Chi Alpha on October 13, 1946. Hell Week was the week-end of the 13th. Besides these three men, three others went through Hell Week at the same time but were not formally initiated. These men were: Robert Bitting, Jersey Shore, Pennsylvania; Robert Nash, Terre Haute; and John Kosko, also of Terre Haute.

The fraternity has organized a bowling team and won its first game, which was with the Theta Xi's.

Theta Xi

Kappa Chapter announces with pride the pledging, during October, of Robert (Bob) Campbell, Franklin, Indiana; John (Johnny) Bryant, Terre Haute, Indiana; and Roland (Tim) Kelly, Terre Haute, Indiana.

The recent Homecoming, one of the most successful ever held, was just as successful as far as Theta Xi activities were concerned. On Friday evening, October 25, about 140 active members, alumni, wives and guests attended a banquet in the Mayflower Room at the Terre Haute House. Greetings were extended to the alumni and prizes awarded to the oldest alumnus, Frank H. Wente, K-11; and to the latest alumnus, Robert Penno, K-296. The tables were arranged in the form of a T X with the speakers table as the cross arm of the T. Special guests of the chapter included Dr. and Mrs. D. B. Prentice and the department heads of the faculty.

After the bonfire that evening a stag party was held at the house. The air fairly buzzed with reminiscences and the renewing of old friendships. Dr. C. P. Sousley and Prof. H. A. Moench of the faculty were present.

After the football game an open house and buffet supper wound up Kappa Chapter's homecoming activities

We were happy to have Brother Jack davison, the national Executive Secretary of Theta Xi, as a visitor during the week-end of Nov. 3-4.

Several bowling enthusiasts have been trying to organize an intra-fraternity bowling league and the result may be some real contests this winter.

Sigma Nu

Beta Upsilon Chapter ushered in the new term with the election of officers. Assuming the responsibilities of the offices were: Eddie Cook, Commander; R. W. Leathers. Lt. Commander; Paul Wible, Chaplain; Perry Ray, Treasurer; Fred Mueller, Recorder; Bill Phillips, Reporter; Bill White, Sentinel; and Bob Kapps, Marshall.

A stag party was held at Louise's after the Homecoming bon-fire to welcome back the alumni. Many faces, once familiar around Rose, were again seen at this the first Homecoming since 1942. Bill Cornell and Bob Brown, who will enter school next term were also guests.

Brother "Pop" Stonecipher, district advisor, and Brother Burns, alumni advisor, were honored guests at the meeting of October 21.

Monday, October 28, formal pledging ceremonies were held for Sherrel Page of Dugger, Indiana, and Roy Sparks of Merom, Indiana.

Brother George Butwin, graduate 1944, was married to Margaret Hunter October 24. One other of our members pulled a surprise on the rest of the chapter; congratulations are in order for James Conover, who married Jane Pittman on October 28.

Sunday, November 10, the chapter attended St. Benedict's Church in a Memorial Sunday tribute to Warren Thiesing who died while in the service of his country.

"It is not the finding of a thing, but the making something out of it after it is found, that is of consequence"
—JAMES RUSSELL LOWELL

Why some things get better all the time

TAKE THE MODERN ELECTRIC LIGHT BULB, for example. Its parts were born in heat as high as 6,000° F. . . . in cold as low as 300° below zero . . . under crushing pressure as great as 3,000 pounds per square inch.

Only in these extremes of heat, cold and pressure did nature yield the metal tungsten for the shining filament . . . argon, the colorless gas that fills the bulb . . . and the plastic that permanently seals the glass to the metal stem. And it is because of such materials that light bulbs today are better than ever before.

The steady improvement of the electric light bulb is another instance of history repeating itself. For man has always had to have better materials before he could make better things.

Producing better materials for the use of industry and the benefit of mankind is the work of Union Carbide.

Basic knowledge and persistent research are required, particularly in the fields of science and engineering. Working with extremes of heat and cold, and with vacuums and great pressures, Units of UCC now separate or combine nearly one-half of the many elements of the earth.

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INDUSTRIAL GASES AND CARBIDE

Sly Droolings

"That's the guy I'm laying for," muttered the hen as the farmer crossed the yard.

* * * *

"Look, mister, just how long is your car going to keep stalling like this?"
"Just as long as you do, honey."

* * * *

"Still engaged to Maude?"
"No."
"Good."
"What?"
"Good, how did you get rid of her?"
"What?"
"How'd you drop the old hag?"
"I married her."

* * * *

She: "Isn't it funny that the length of a man's arm is equal to the circumference of a girl's waist?"
Liberal Arts Student: "Let's go get a string and find out."

* * * *

One: "What color bathing suit was she wearing?"
Two: "I couldn't tell. She had her back turned."

* * * *

She: "What is that can?"
He: "A locomotive boiler."
She: "Why do they boil locomotives?"
He: "To make the locomotive tender."

* * * *

The roadster skidded around the corner, jumped in the air, knocked down a lamp post, smacked three cars, ran against a stone fence and stopped. A girl climbed out of the wreck. "Darling," she exclaimed, "thats what I call a kiss!"

* * * *

"Waiter, there's a button in my salad."
"Must have come off in the dressing."

Active: "Hey there! Don't spit on the floor."

Pledge: "Why not? Floor leak?"

* * * *

Girls are just like cigarettes. You can't enjoy more than one at a time.

* * * *

Cop: "Have you a warning signal on the front of your car?"

Coed: "Yes, sir, I have a little sign that says "Dodge Brothers."

* * * *

"Wine, women, and song are getting me down. I guess I'll have to quit singing."

* * * *

"My dad takes things apart to see why they won't go."

"So what?"

"You'd better go."

* * * *

A street cleaner knows enough not to put the cart before the horse.

* * * *

Ed says that he knows a guy so innocent that he chopped down all the trees around his house because his wife said she wanted a little son.

* * * *

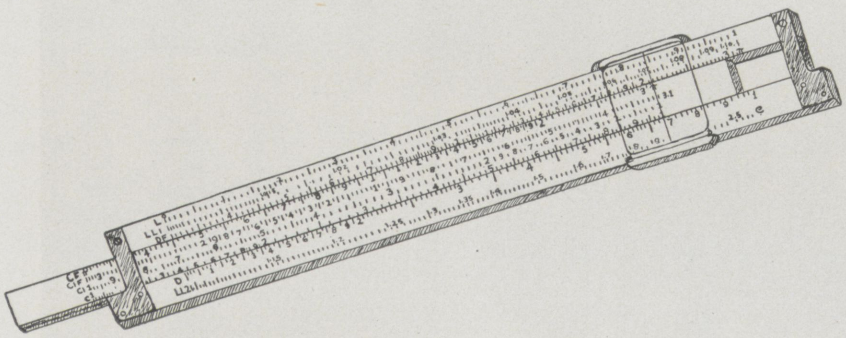
Student: "I'll stand on my head or bust."

Gym Instructor: "Never mind, Miss Miller, just stand on your head."

* * * *

Mother to daughter: "I don't want you to marry: I've seen the folly of it."

Daughter: "But, mother, I want to see the folly of it, too!"



Sly Droolings

By Robert W. Wolf, jr., e.e.

Agent: "Sir, I have something here that will make you popular; make your life happier, and will bring you a lot of friends."

Engineer: "I'll take a quart."

* * * *

From the animal world—Flash—Bighorn, the Ram, committed suicide after hearing the song, "There will never be another Ewe."

* * * *

A visitor at the Capitol was accompanied by his small son. The little boy watched from the gallery when the House came to order.

"Why did the minister pray for all those men, Pop?"

"He didn't. He looked them over and prayed for the country."

* * * *

The main trouble with the straight and narrow is that there is no place to park.

A little girl, sitting in church, watching a wedding, suddenly exclaimed:

"Mummie, has the lady changed her mind?"

"What do you mean," the mother asked?

"She went up the aisle with one man and came back with another."

* * * *

"Don't you think Mable looks ugly in that low-cut dress?"

"Not so far as I can see."

* * * *

Although she knows its useless
When sitting she will seize
Her dress and make an effort—
To hide those pretty knees.
And I sit there puzzled, wondering
If she honestly and true—
Doesn't want me to see them
Or make darn sure I do!

"I can only stay for one more hand, boys!"

Son: "What is an optimist, Pop?"

Pop: "An optimist is a man who thinks his wife has stopped smoking cigarettes when he finds cigar butts around the house."

* * * *

"Why is it that you are always at the bottom of the class?"

"It doesn't make any difference, Pop. They teach the same things at both ends."

* * * *

A mother may hope that her daughter will get a better husband than she did, but she knows that her son will never get as good a wife as his father did.

* * * *

A justice of the peace in a small town was called upon to perform his first marriage ceremony. After he had the knot safely tied, the young couple continued to stand before him as if expecting some further rite.

Whereupon the justice stammered out, in a desperate attempt to round off the ceremony with something of a religious turn, "There, there, it's all over! Go, and sin no more."

* * * *

Statistics show that Yale graduates have 1.3 children while Vassar graduates have 1.7 children. Which proves that women have more children than men.

* * * *

"I'm so upset," declared the young bride. "I've just found out I married a man who simply can't bear children."

"Well," sniffed her maiden aunt, "you can't expect everything of a man."

* * * *

"Right here in this city, a man is knocked down by a car every five minutes."

"I should think he'd be worn out."


In New York City it's
ABC
Chesterfield is the big favorite
in the Big Town, outselling
all other cigarettes by far.
Chesterfield
CIGARETTES
ALWAYS
MILDER
BETTER
TASTING
COOLER
SMOKING
ALWAYS BUY CHESTERFIELD
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