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Rose Technic Staff
Rose-Hulman Institute of Technology

Rose Technic

MEMBER ENGINEERING COLLEGE MAGAZINES ASSOCIATED

OCTOBER, 1951

Another page for **YOUR BEARING NOTEBOOK**

It's a cinch for a winch on TIMKEN® bearings

Heavy loads and wear are the problems engineers have to face when they design earth moving equipment like this. To carry the load on the winch, ten Timken® bearings are used. Thirteen more on the differential, pinion shafts, jackshaft drive wheels and rear wheels assure long life and trouble-free performance. Timken tapered roller bearings take any combination of radial and thrust loads, reduce friction, permit tighter closures. And they normally last the life of the equipment.

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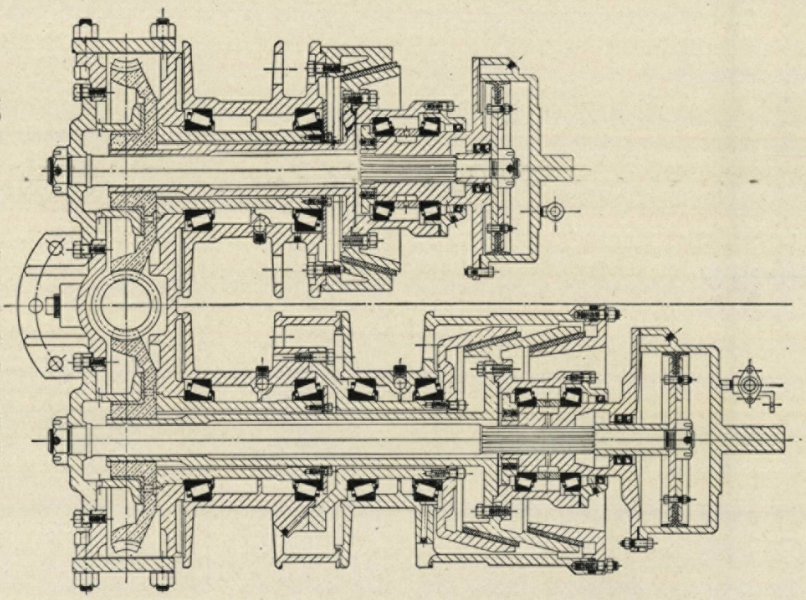

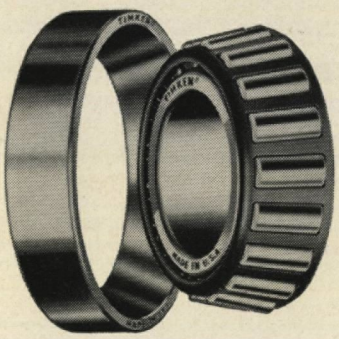

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Rose Technic

VOLUME LXIII, NO. 1 OCTOBER, 1951

In This Issue

Frontispiece

Courtesy of WESTINGHOUSE ELECTRIC CORPORATION.

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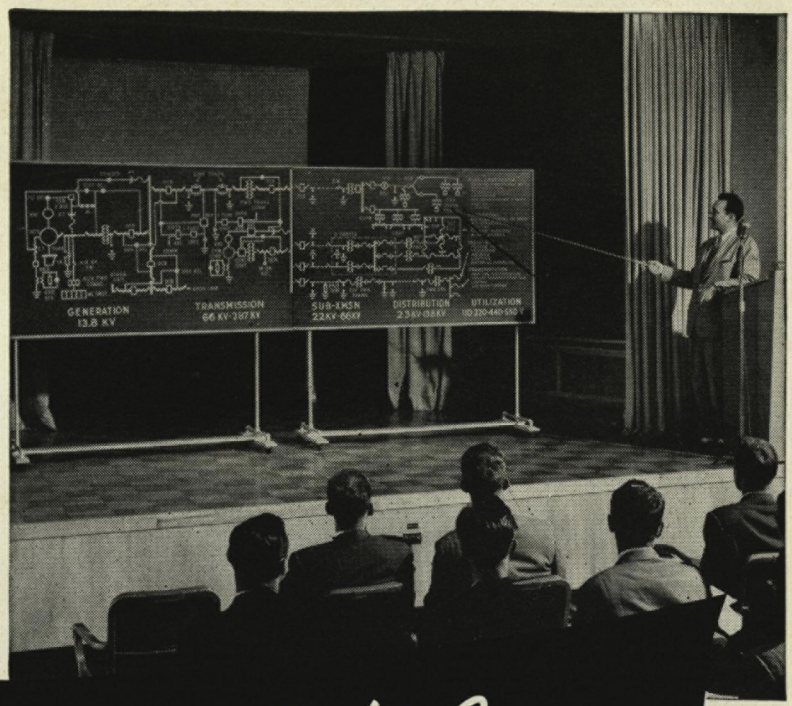
In the new Westinghouse Educational Center, engineers and scientists who are top-ranking men in their field explain the company and show how your college training will be used. You have a voice in choosing the field for which you are best suited from the many that are available at Westinghouse.



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Time is precious to you. False starts, second guessing and indecision are costly.

We have devoted years of study to develop dependable ways to help you get set in the right career.

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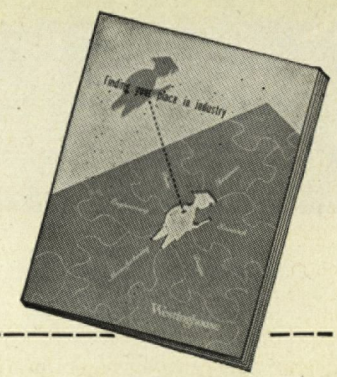

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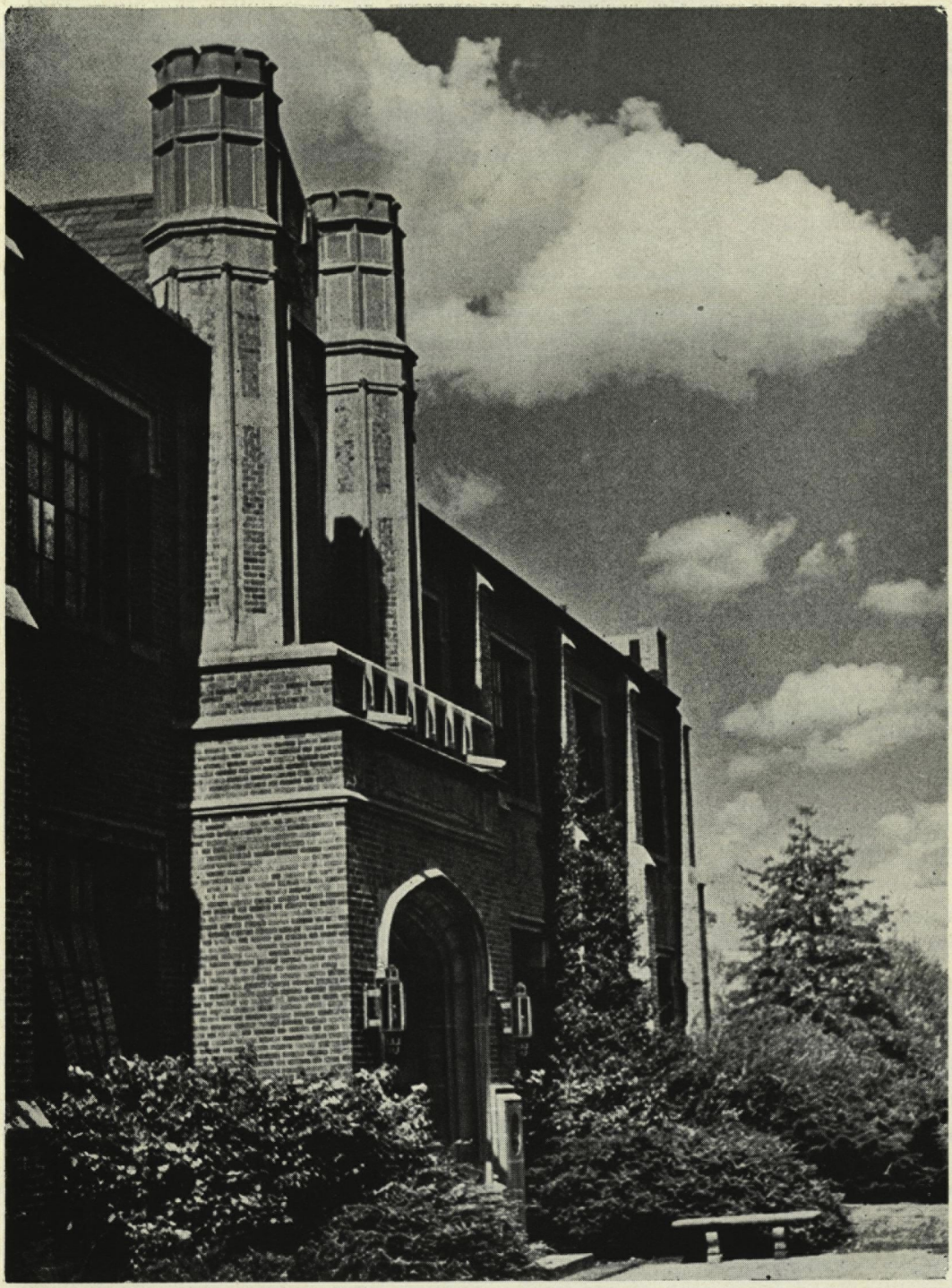


HIGH SCHOOL GRADUATES OF 1952

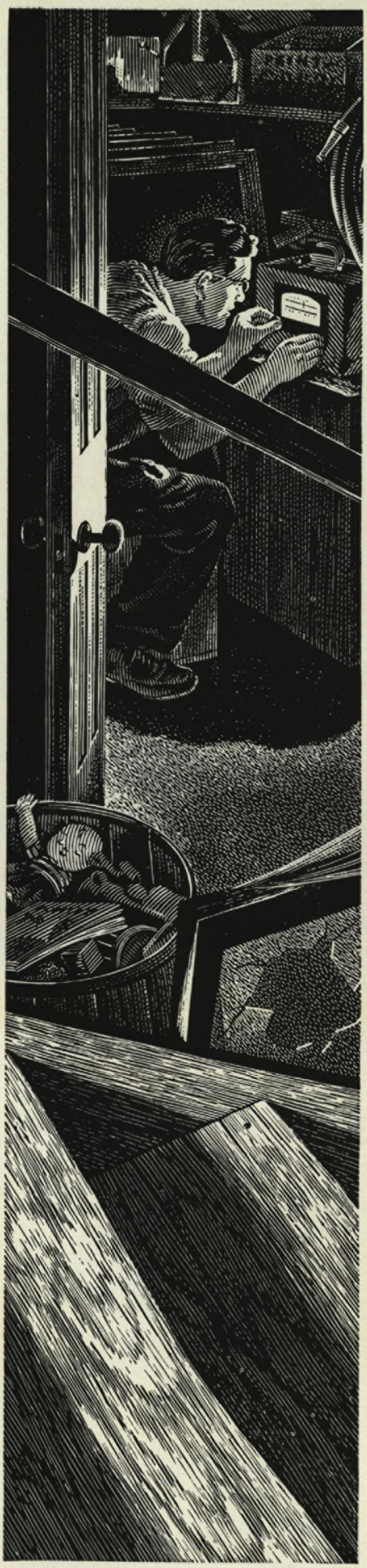
You are cordially invited to visit Rose Polytechnic Institute during this next school year to learn more about your college entrance and the engineering courses available to you at Rose. The next freshman class will be admitted September 8, 1952.

NOBLE C. BLAIR

Admissions Counselor

ROSE POLYTECHNIC INSTITUTE

TERRE HAUTE, INDIANA



The Hidden Radio

"It was spooky down in the cellar.

"The wife had taken over the upstairs radio for her pet soap opera. And the kids had their eyes glued to the western on the TV. So I had to dig up the old portable, hidden away in the basement storeroom.

"When the newscast was over, I clicked off the set and just sat there, thinking about other men in cellars of communist-dominated countries. Men listening at the risk of their lives to broadcasts from beyond the Iron Curtain. To words of Freedom.

"The Great *Red* Father doesn't like hidden radios! I don't wonder he cracks down, because Freedom and dictatorship don't mix. *We* took hold of our Freedoms back in 1776 and, through wars and depressions, we've hung onto them mighty hard.

"Those Freedoms are all in our Bill of Rights, and the chances of any *outside* enemies taking them away from us seem pretty slim to me. But we mustn't forget the enemies *inside* our boundaries, too. The religious and race hate-makers . . . the pint-size dictators . . . the wild-eyed reds and the slimy parlor pinks. The woods are full of 'em!

"And if we aim to keep our Freedom of religion and speech and press . . . if we want to keep our jobs safe, like mine down at the Republic mill, helping produce important steel . . . then we've got to keep our eyes and ears wide open to spot these *inside* enemies. They might be miles away . . . or living within our own community.

"In other words, we must keep informed about what's going on today. That's why I didn't want to miss the newscast . . . even if I had to risk my rheumatics in that dark, damp cellar."

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Republic BECAME strong in a strong and free America. Republic can REMAIN strong only in an America that remains strong and free . . . an America that has built its many industries from infancy to world leadership. *And through all industries Republic serves America.* The Communications Industry is a case in point . . . with its millions of telephones, its miles of telegraph and cable wires, its countless radios and TV sets. Much of the steel used in such equipment . . . carbon, alloy and stainless . . . comes from the many far-flung furnaces of Republic, which is proud to be a part of the voice of America at home and abroad.

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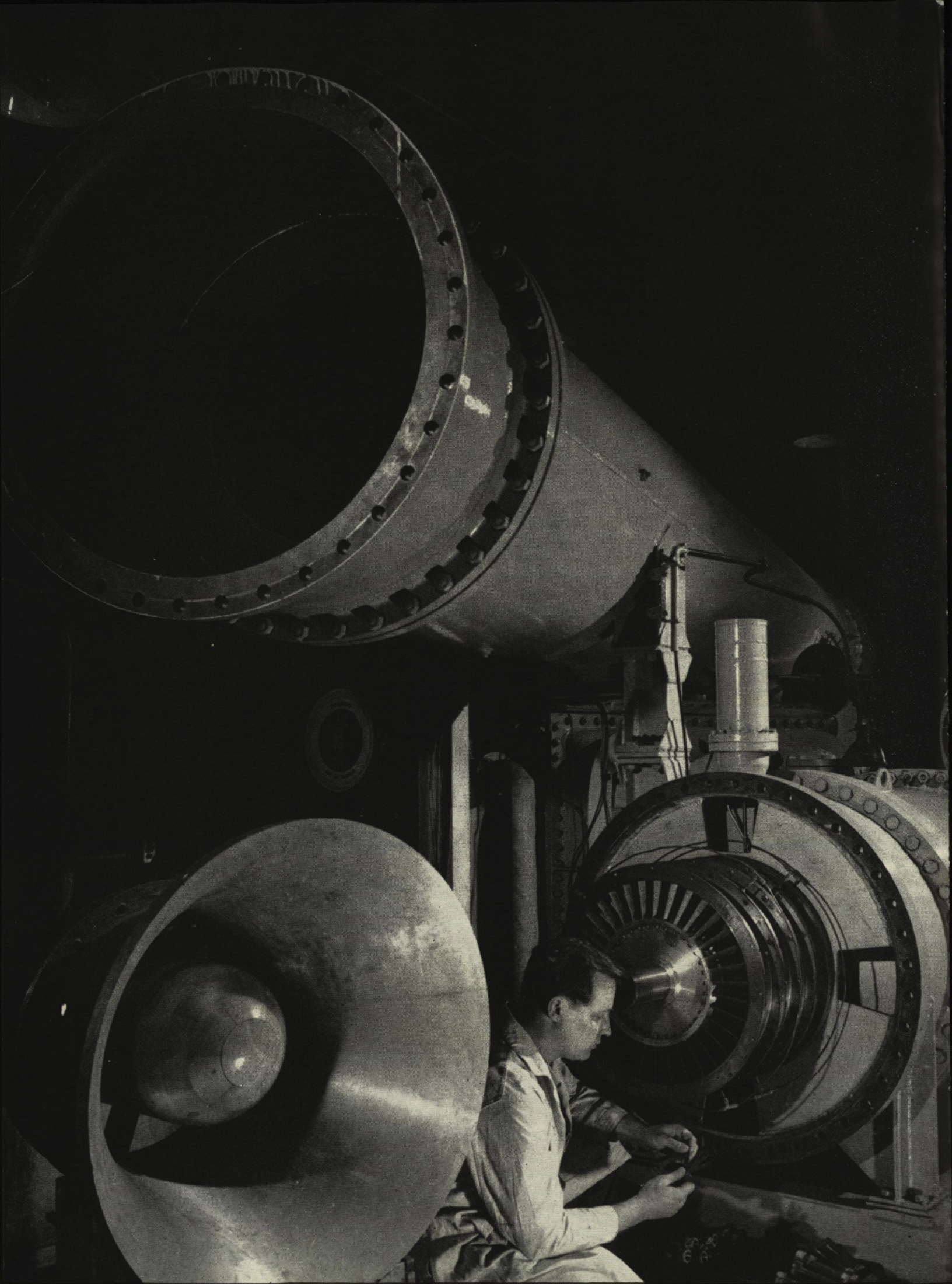

On Electives

In few schools would the student find such an incentive toward broadening his knowledge as that suggested by the rule pertaining to class standings which appears in the Rose Student Handbook:

> **"11. For elective courses in excess of the credit requirements for graduation, grades will be included in the ratings:**
>
> **a. If they raise the semester or cumulative rating.**
>
> **b. If they are below passing."**

By action of the faculty on October 6, this rule was replaced by one which specified that grades in all courses taken for credit are to be counted. Earlier the faculty had found it reasonable to include among the required courses a two—or three-credit "elective"—which might well be termed a "required elective"—in order that individuals desiring to do so might take the Advanced R.O.T.C. course in the junior and senior years.

The addition of this required elective to the program has been given as the reason necessitating a change in the rule. Careful reading of the original rule—stating that counting would be optional for elective courses *in excess* of *the credit requirement for graduation*—clearly shows that grades for one elective per semester would have to be counted. Hence, it is likely that some members of the faculty failed to realize that the original rule sufficed, or they hoped to justify the change by a need which they knew did not exist.

Furthermore, it is doubtful that the effects of the new edict upon the student were carefully considered. A person who desires advanced instruction (for example, one who elects a higher mathematics course) or broadened knowledge (as one who elects a modern language) faces the possibility, if not probability, of lowering his class standing while increasing his education. The truth of this statement is proven by the fact that the carrying of additional electives requires a class standing such that many students taking elective courses would lower their cumulative ratings by receiving anything less than an "A" grade.

Surely taking of electives should be encouraged rather than penalized; certainly a reconsideration of the new rule by the faculty is now in order.

Potato Masher Design

By Roy A. Moody, sr. m.e.

Illustrations by the author

One of the most interesting variations in the arrangement of a four-cycle engine is the type of valve actuating mechanism. The basic arrangement of crankshaft, connecting rod, and pistons has little possibility of any major changes and usually remains a single, four link, slider-crank mechanism.

On the other hand many manufacturers seem to have their own pet ideas as to what means they should use to operate the poppet type intake and exhaust valves common to most four-cycle units. Here is a brief description of several common and unusual types which have been used.

In Figure 1, we have the most widely used type, as found in the Chevrolet, Buick, and several other auto engines. This type is characterized by a camshaft placed low in the block with long push rods actuating rocker arms and valves. This basic design has been improved upon, as in the Barker and Lea Francis midget race engines shown in Figure 2. Their arrangement allows better combustion chamber shape and has less inertia in the mechanism due to the high camshafts and short push-rods. Both the Barker and Lea Francis engines are small cylinder, (approximately 100 cu. in.) in-line, water-cooled units.

Figure 3 is really an arrangement which combines Figures 1 and 2, and is the arrangement used by Chrysler on their new Firepower V-8 (333 cu. in.) engine. By using a camshaft located in the valley of the V-8, it is essentially a high camshaft, and by the use of two rocker shafts the inclined valves and hemispherical combustion chamber are obtained. The high camshaft reduces push rod length and thus reduces inertia forces also.

In Figure 4 an arrangement is shown which was used on a prewar German BMW six-cylinder engine of approximately 180 cubic inch displacement. By the use of an ingenious triple rocker system they obtained double inclined valves actuated by a single camshaft. This was a highly successful engine—developing over one horsepower per cubic inch of displacement. The de-

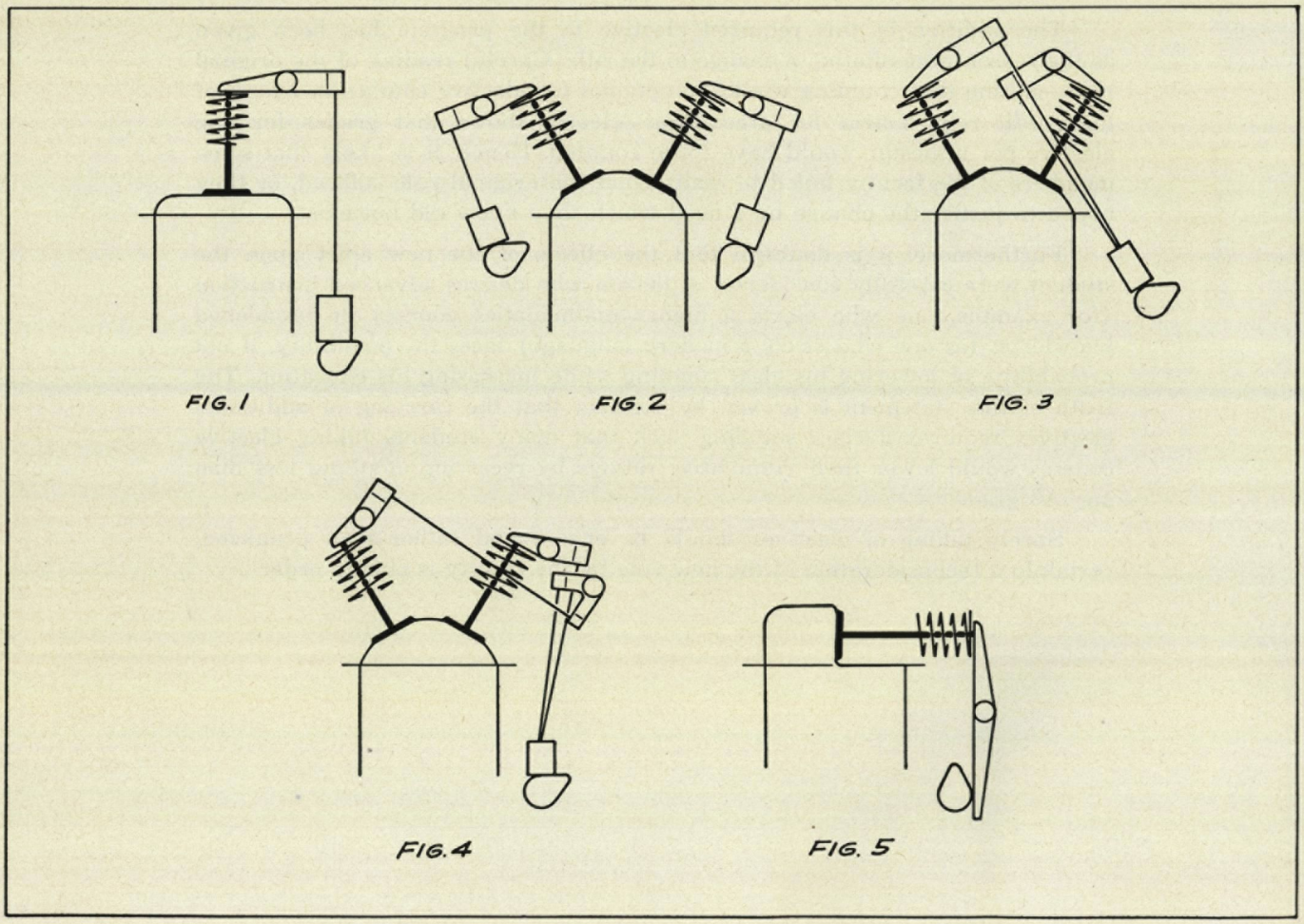

FIG. 1

FIG. 2

FIG. 3

FIG. 4

FIG. 5

sign was characterized by a long, nearly vertical intake port.

Minneapolis Moline Tractor Company has an interesting arrangement shown in Figure 5. By placing the valves horizontally in the cylinder head they can be directly actuated on vertical rocker arms. This works very well at the slower speeds at which this unit is operated, although it gives a peculiar combustion chamber shape.

Most of us are familiar with the small Crosley auto, but maybe not as many know this—its engine is a single overhead cam unit and is the only mass-production American passenger car today equipped with this "racing" type valve mechanism shown in Figure 6. The single overhead cam has the simplest and most direct action of the overhead cam types and lends itself well to high speed applications—typical in the Crosley. All valves are parallel and vertical in the head and are actuated directly through guides by the camshaft lobes. This system is inherently noisy and hard to adjust with shims, but is efficient. In the case of some similar small Italian engines it was found advantageous to load the camshaft with accessories, such as a fan or generator, to prevent "whipping" of the shaft at low speeds due to valve spring pressure on the lobes of the cam.

Figure 7 illustrates a variation of the single overhead cam system which allows the use of multiple valves. This particular arrangement was seen on a 91 cubic inch engine (believed to be a Miller) built for racing purposes. It was a four-cylinder model with 16 valves, two valves actuated by a "T" bar which was depressed directly by the lobes on the camshaft.

Figure 8 shows another variation in the single overhead cam style which allows better combustion chamber shape (hemispherical). This valve system has been used on some foreign single-cylinder motorcycle engines and also here in the United States on the Ranger aircraft engine. Cam action on the rocker arms opens the valves directly.

In Figure 9, we have practically the "standard" set-up for the racing or high speed, high performance engine of today. This system was also used in earlier automobiles, such as the Duesenerg of the Middle Thirties. Engines today which use this arrangement are the Offenhauser and the Meyer-Drake midget engines of American breed, and such English engines as that in the Jaguar XK-120. This valve-actuating system is very satisfactory in all respects. One can have a clear combustion chamber design and also have low inertia forces in the valve system due to the short length and lightweight parts. Ordinarily the cam acts on "cups" over the valve springs, and these cups ride in guides in the cylinder head. Such a valve mechanism is noisier than average, and valve adjustment is usually a difficult task, which can sometimes be accomplished with a grinder, using trial and error methods.

Next we have the unusual types

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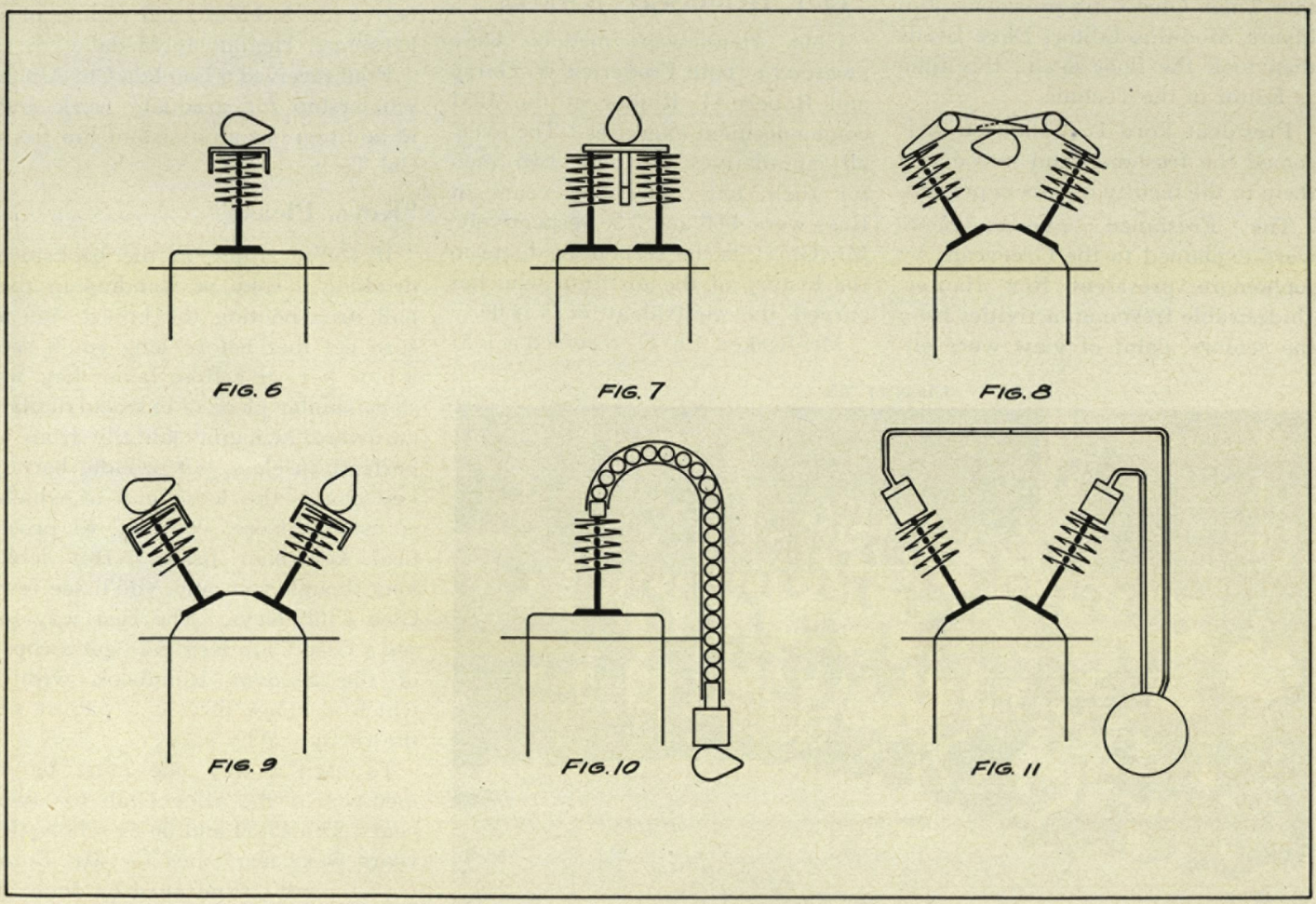


FIG. 6

FIG. 7

FIG. 8

FIG. 9

FIG. 10

FIG. 11

Campus Survey

By Duane Pyle, sr. c.e.
Carl Bals, sr. ch.e., and Allen Forsaith, sr. m.e.

Blue Key Smoker

The annual Blue Key Freshman Smoker was held at Deming Hall on the evening of September 10. Approximately fifty Greencaps and twenty members of the faculty attended.

The M.C. for the evening was Blue Key president Allen Forsaith who introduced the various club representatives. Each representative explained the activities and membership requirements of his club. Dave Leeds, president of the Radio Club, started the program with a short sales talk on the virtues of his organization. He was followed by Bob Johnson, Rifle Club president; Warren Jones, Camera Club; Gunther Thiel, Glee Club president; Jim Myers, Modulus Editor; Dave Leeds then took the floor again, this time as Editor of the Technic.

President Ford L. Wilkinson welcomed the freshmen and introduced them to the faculty members present.

The Freshman commandments were explained to the Greencaps by sophomore president Rex Hauser. Undesirable freshman activities from the seniors' point of view were enumerated by Tau Beta Pi president Joe Perona.

The need for having a bonfire at Homecoming was pointed out to the Frosh and advice on how to go about constructing it was presented.

At this point in the program Coach Phil Brown was observed shyly entering the back door. He reluctantly agreed to address the meeting and spent five minutes expounding on his favorite theme, the 1951 edition of the Fighting Engineers.

After refreshments, consisting of ice cream and cokes, the meeting was closed by a tour through the main building whose dark recesses were, no doubt, full of mystery for the new Greencaps.

"1951 Heminway Awards"

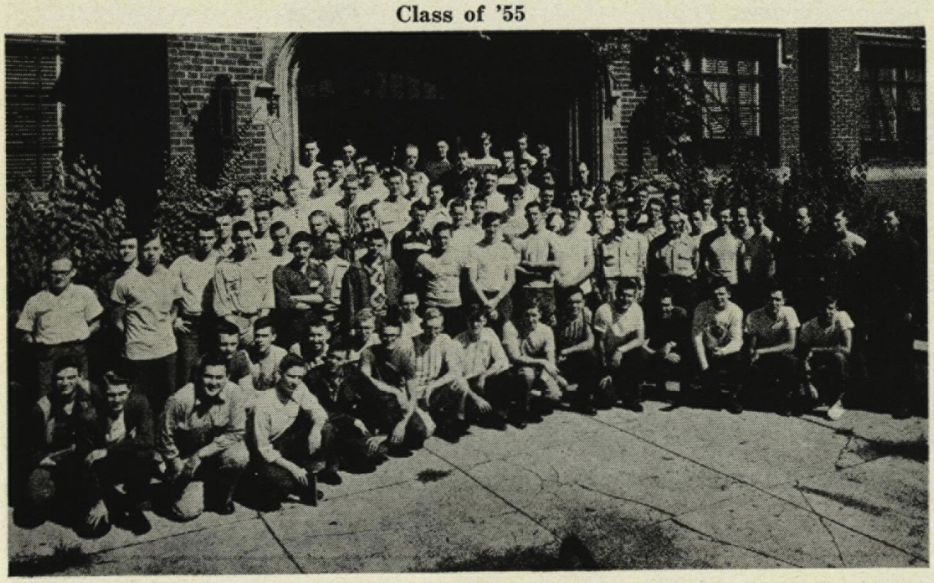
Gold Heminway medals were awarded to both Frederick W. Garry and Robert G. Rinker at the 1951 commencement exercises. The overall cumulatives of these two men for their four scholastic years at Rose were 4.00 and 3.98 respectively. Mr. Garry is the second graduate in the history of the institute who has earned the equivalent of a 4.00.

Mr. Rinker, Ch. E., received a 1951 Tau Beta Pi Fellowship and is attending graduate school at California Institute of Technology where he is taking work in nuclear engineering. For a record of Bob's activities at Rose we refer the reader to the May, 1951, issue of the Technic.

Mr. Garry, M. E., is also attending graduate school at Cal Tech where he is studying jet and rocket propulsion. While at Rose, Fred was president of Lambda Chi Alpha Social Fraternity for two years, secretary-treasurer of Blue Key, president of Tau Beta Pi, a member of the Technic Editorial Staff for four years, a member of the Camera Club and Interfraternity Council, a Rose Honor Man, student member of the Convocation Committee, a member of the A.S.M.E., and winner of a Freshman Heminway Medal.

Fred received a Lambda Chi Alpha scholarship for graduate work and in addition has an assistantship from Cal Tech.

Class of '55



"Keys, Please"

If you're sitting in the bookstore drinking a coke or standing in the hall just shooting the breeze, it's a sure bet that before long you'll see a blue key, or a Rose honor key, or some similar piece of extracurricular hardware, swinging jauntily from a perfectly useless, but proudly borne, key chain—the loose end of which is usually loose, contrary to practical key-chain usage. But look long though you may, you'll see few Glee Club Keys. The best way to see a Glee Club Key is to get a copy of the Student Handbook within which, on page fifty, is a picture of the rarity. Why so?

To earn a key one must be a member of the Glee Club for two years. The 49-50 and 50-51 scholastic years were lean ones for Mr. Emil

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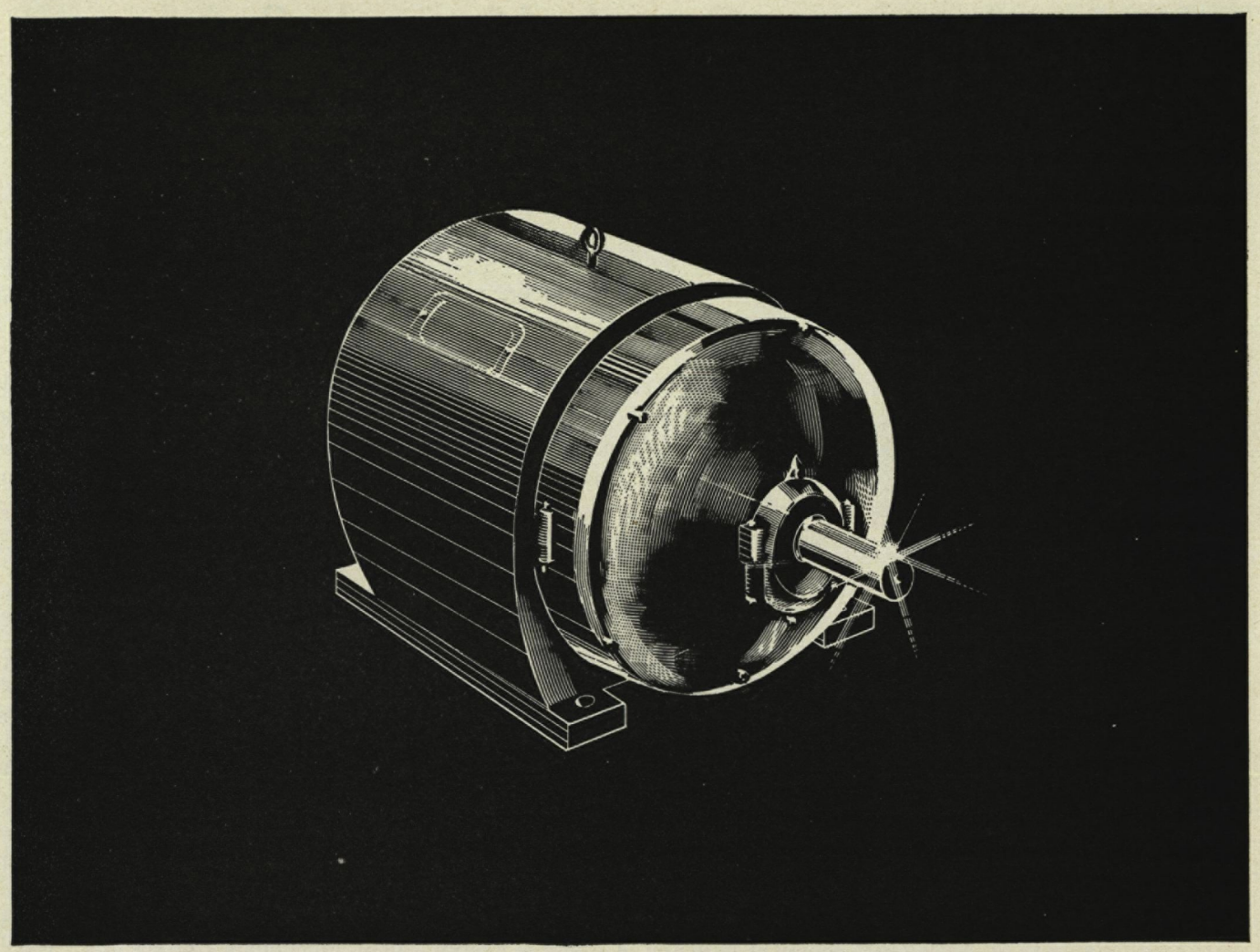

WORKHORSE OF INDUSTRY...

Its granddaddy was a ponderous bi-polar Percheron that weighed hundreds of pounds . . . and cost hundreds of dollars more for the same horsepower. Yet this little miracle of efficiency runs for years without attention . . . has only one moving part. Today, motors are being built that operate safely in dusty, dirty, even explosive atmospheres.

Many nimble minds gave their ingenious best to make these improvements possible. Physicists, chemists, metallurgists, electrical and production engineers, designers, machinists . . . these and a thousand others contributed to the breeding of this alert little workhorse of industry.

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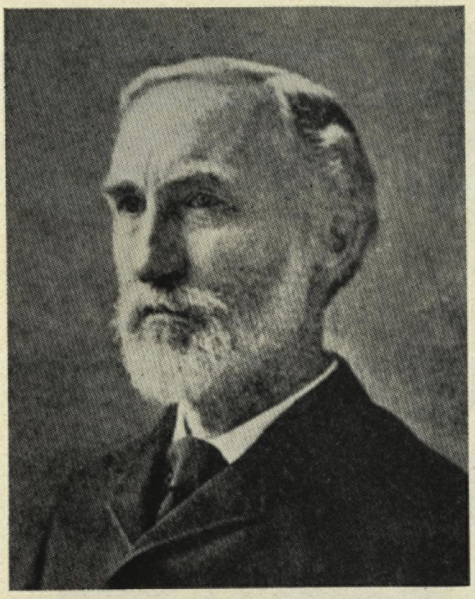
Great Men of Science

By Larry Leonard, sr. ch.e.
Alvin Thomas, sr. ch.e.



America's greatest theoretician?

Americans have long been proud of men like Thomas Edison, Alexander Graham Bell, and Samuel F. B. Morse—inventors with great practical genius—but what of outstanding American theoreticians? These come to mind more difficultly, and it is easier to think of Europeans —Newton, Maxwell, Einstein. The national spirit need not suffer because of this apparent deficiency, for America has produced a theoretician of such high caliber that he was proclaimed by the German physicist, Boltzmann, to be the greatest synthetic thinker since Newton!

The man so distinguished, Josiah Willard Gibbs, has been further classed as one of the ten most influential physical scientists of the Eighteenth and Nineteenth Centuries. Indeed, little wonder that Gibbs, who was responsible for the foundation of three branches of science — chemical thermodynamics, statistical mechanics, and vector analysis — should be ranked with Helmholtz and Maxwell!

In the light of the stated facts, it seems strange that Gibbs was virtually unknown in America during most of his lifetime, yet such was the case, and this neglect is to be understood only through a knowledge of the man and his times. The very nature of Gibbs contributed much to the ignorance of him; primarily a thinker, uninterested in practicality, Gibbs cared little to publicize either himself or his work.

Gibbs lived in New Haven, Connecticut, nearly all of his life, and was born there in 1839. He attended Yale University and received a doctorate in 1863. After serving as a tutor in Latin and natural philosophy at Yale for three years, Gibbs went abroad to study in Paris, Heidelberg, and Berlin from 1866 to 1869 under Weierstrass, Helmholtz, and Kirchoff. In Europe, Gibbs was stimulated to turn his genius to mathematical physics, and he became America's first professor of the subject in 1871 at Yale.

In 1876, the first half of Gibbs' paper, "On the Equilibrium of Heterogeneous Substances," appeared; the remainder came in 1878. In this work, Gibbs evolved from the basic concepts of thermodynamics a scientific system so powerful that it has not yet been fully utilized. The chemical industry of today is deeply indebted to Gibbs for this system of chemical thermodynamics, which interprets quantitatively a vast amount of chemical phenomena. To appreciate the magnitude of Gibbs' achievement, an analogy is apropos: If one were to begin only with the fundamental axioms and simple triangle theorems of geometry and from them develop the rest of the entire geometrical system through logical reasoning alone, he would achieve what Gibbs did.

The so-called "Phase Rule" is embodied in Gibbs' thermodynamic essay, and was quickly applied to German and English industry; the rule was not applied in the United States until many years later, for the American chemical industry was an infant during most of Gibbs' lifetime. Had America been ready for Gibbs, conservative speculation indicates that the chemical industry of today would be twenty-five years ahead of itself! It was America's industrial unripeness coupled with the generality of Gibbs' works (which made them inapplicable directly to particular problems) that further contributed to Gibbs' neglect at home.

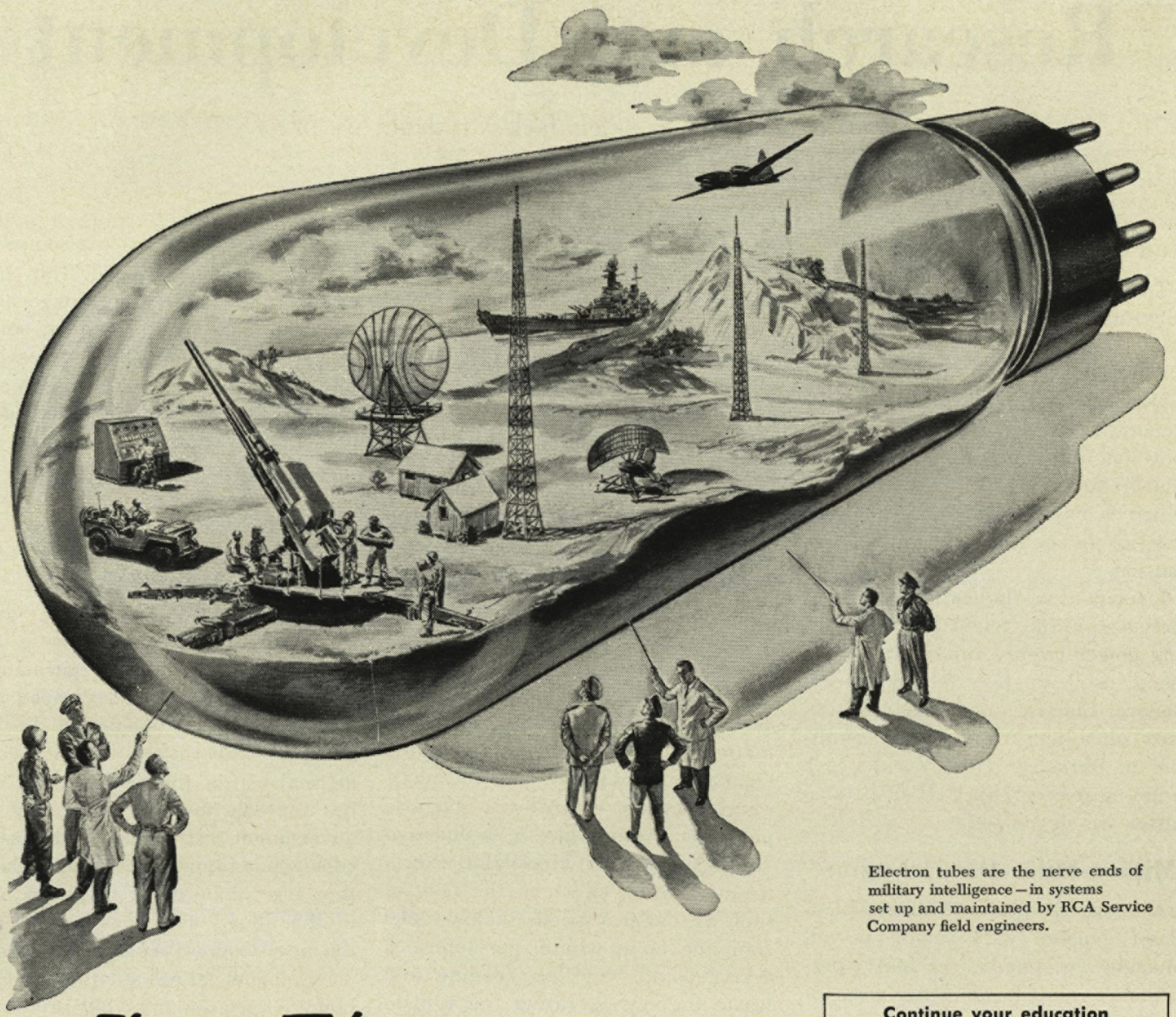
Gibbs devoted the years from 1880-1884 to the development of the mathematical discipline of vector analysis from the work of European mathematicians. Gibbs simplified the elaborate mathematical systems of Hamilton and Grassmann to produce a mathematics of immense usefulness.

Theoretical optics and theories concerning the nature of light occupied Gibbs during 1882-1889. Also at this time, Gibbs, realizing that his sight was weakening, measured his deficiency and ground his own glasses to exactly correct the trouble. This was one of the few times that Gibbs did experimental work.

"Elementary Principles of Statistical Mechanics," Gibbs' last work, was published in 1902, one year before his death.

Despite the fact that Gibbs never married and that he was rather colorless socially, it is not to be thought that he was eccentric. He was a quiet man who did not wish to be disturbed and who in return disturbed no one else. He lived at his sister's home after the death of his parents and took delight in helping around the house with the many chores. And Gibbs was not without humor; it has been remarked that he insisted on mixing the salads at home on the grounds that he was a greater authority on heterogeneous equilibria than anyone else in the household.

Josiah Willard Gibbs was an unaffected man of profoundly great simplicity who left the world a legacy which is still fruitful. America has just cause to be proud of this son who has yet to be excelled by another American theorist.



Electron tubes are the nerve ends of military intelligence—in systems set up and maintained by RCA Service Company field engineers.

Electron Tube with a military mind

With the rapid advance of airplanes, tanks, fast ships, and mechanized weapons of war, a swift, sure means of *communication* and *detection* is as important as are the new weapons themselves. It is provided—by electron tubes and electronics.

So important is this area of military intelligence that RCA Service field engineers have lifted their efforts to new peaks. Working with our Armed Forces, they install and maintain such *communications systems* as shortwave radio and portable radiotelephones. They work with systems of *detection,* such as radar. They help ships and planes *navigate* with loran and shoran. These engineers are the link between research developments made at RCA Laboratories—and America's military strength.

The number of RCA field engineers has *tripled* since World War II. And they serve where needed, wherever an electron tube's "military mind" can be of military use.

* * *

See the latest wonders of radio, television, and electronics at RCA Exhibition Hall, 36 West 49th Street, N. Y. Admission is free. Radio Corporation of America, RCA Building, Radio City, N. Y. 20, N. Y.

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Graduate Electrical Engineers: RCA Victor—one of the world's foremost manufacturers of radio and electronic products—offers you opportunity to gain valuable, well-rounded training and experience at a good salary with opportunities for advancement. Here are only five of the many projects which offer unusual promise:

- Development and design of radio receivers (including broadcast, short wave and FM circuits, television, and phonograph combinations).
- Advanced development and design of AM and FM broadcast transmitters, R-F induction heating, mobile communications equipment, relay systems.
- Design of component parts such as coils, loudspeakers, capacitors.
- Development and design of new recording and producing methods.
- Design of receiving, power, cathode ray, gas and photo tubes.

Write today to College Relations Division, RCA Victor, Camden, New Jersey. **Also many opportunities for Mechanical and Chemical Engineers and Physicists.**

RADIO CORPORATION of AMERICA

World Leader in Radio—First in Television

Research and Development

By Fritz Wheeler, jr., e.e., Jack Vrydagh, jr., m.e.,
and John Rinker, jr., ch.e.

New Type TV Antenna

This radically different type of television antenna is expected to bring stars of television to many new communities.

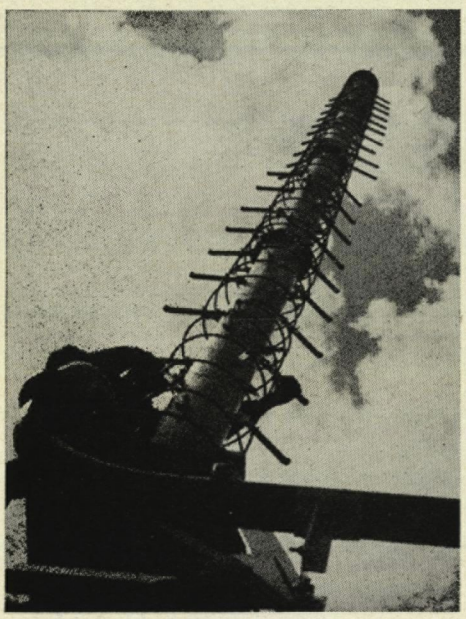
Developed by engineers of the General Electric Company, the forty-foot-high antenna is for use in ultra-high-frequency TV transmission, which is expected to play a major role in the nation's future TV expansion.

Known as a "helical" antenna, it increases initial television transmitting power twenty times. It is now being used in test telecasts from General Electric's one hundred kilowatt ultra-high-frequency transmitteer in Syracuse, New York, which is the most powerful UHF-TV transmitter yet developed.

"Million-Miler Diesel Engine"

A rugged new "Million-Miler" diesel engine with more power, amazing economy, greater performance and longer life was introduced today throughout the extensive line of GMC diesel trucks and highway tractors by the GMC Truck & Coach Division. Built to haul a million miles and more, the "Million-Miler" is a new design of the famed 4-71 and 6-71 GM diesel engines. Horsepower in the four-cylinder (4-71) "Million-Miler" has been boosted to 150 B.H.P., as compared to 133 in the former model, while the six-cylinder (6-71) engine has had twenty-five extra horsepower built into it, now being 225 B.H.P.

TV Antenna



Although horsepower has been increased, a highly important fuel economy has been effected. Most important factor in achieving the new fuel savings is a revolutionary device called a Fuel Modulator, an automatic control that feeds exactly the right amount of fuel and air for maximum efficiency *regardless of throttle position.* Acting like a mechanical "brain," the Fuel Modulator exerts its modulating effect on the flow of fuel at engine speeds below 1500 rpm, the point where, heretofore, a driver could "lug" the engine and waste fuel by operating the vehicle in an uneconomical gear range when he should have shifted into another.

The Fuel Modulator, which is incorporated in a new governor assembly, also is an entirely new contribution toward longer engine life by preventing engine abuse. It restricts "sludging up" and carbon deposits, and thus reduces the need for maintenance. In the former models when engine speed was reduced, blower speed was reduced correspondingly, but excess fuel still could be injected. Such positive fuel control at low speeds is expected to be utilized by truckers having city delivery services that need only low-speed operations.

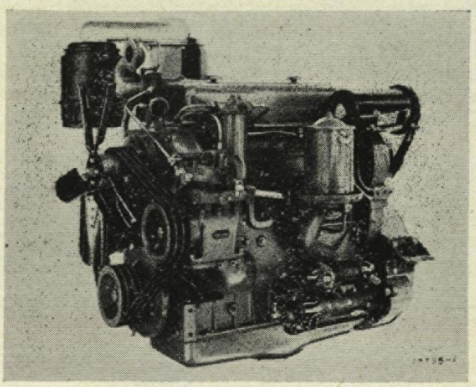
Another new feature of the "Million-Miler" that has increased horsepower is a camshaft that keeps valves open through a greater portion of the shaft revolution, as compared to the former engines. The new camshaft opens the valves longer providing a more free breathing, better scavenging of the burned gases and a better charge of fresh air. Whereas the Fuel Modulator cuts fuel waste below 1500 rpm, the camshaft improves fuel economy approximately six per cent at engine speeds above 1500 rpm.

"A New Magnet"

A cobalt-platinum magnet, which in small sizes is described as the world's most powerful permanent magnet, has been developed by scientists of the General Electric Research Laboratory. Present commercial use of the new magnet will be limited, however, not only by government restrictions on the use of cobalt, but by prohibitive expense of the large amounts of platinum used in the alloy. GE does not foresee the new magnet replacing presently used magnet alloys, such as the Carboloy Alnico magnets, but rather believe that new fields of use will be opened, for which existing magnetic alloys are not suitable.

Compared with Alnico-5 magnets, generally rated as the most powerful in commercial use, the new magnet is less powerful in large sizes but more powerful in small sizes.

New Diesel Engine



How to open a can of fog

The pilot pushes a button on the instrument panel.

And instantly, from metal tanks fixed to a warplane's fuselage, thick streams of artificial fog pour forth.

Today it is possible for a fast plane to obscure an Army division or a Navy squadron in a matter of seconds. For scientists and engineers at Corning Glass Works, working with the Armed Forces, have developed a new way to open a can of fog.

A specially engineered disc of one of the tough Corning glasses is used to form the end of the metal fog chamber. In the center of this glass disc, which is sealed to the metal can, is a percussion cap—connected electrically with the plane's instrument panel.

When the pilot pushes the button, the percussion cap is detonated, breaking the glass disc and opening the end of the cylinder.

Since the containers have to be stored at depots scattered from the tropics to the polar regions, the discs are made of heat- and cold-resistant glass which sudden temperature changes won't break. The glass has to be strong to prevent releasing the fog-making ingredients prematurely.

And the discs are made so that they will break evenly and completely from the force of the exploding percussion cap.

The design for this strong, heat-resistant glass disc that will break in a predetermined way is only one of the more than 37,000 designs for glass products developed by Corning engineers in a full century of glass-making.

Today, throughout industry — *Corning means research in glass*, research concerned with making glass do countless jobs never thought possible before.

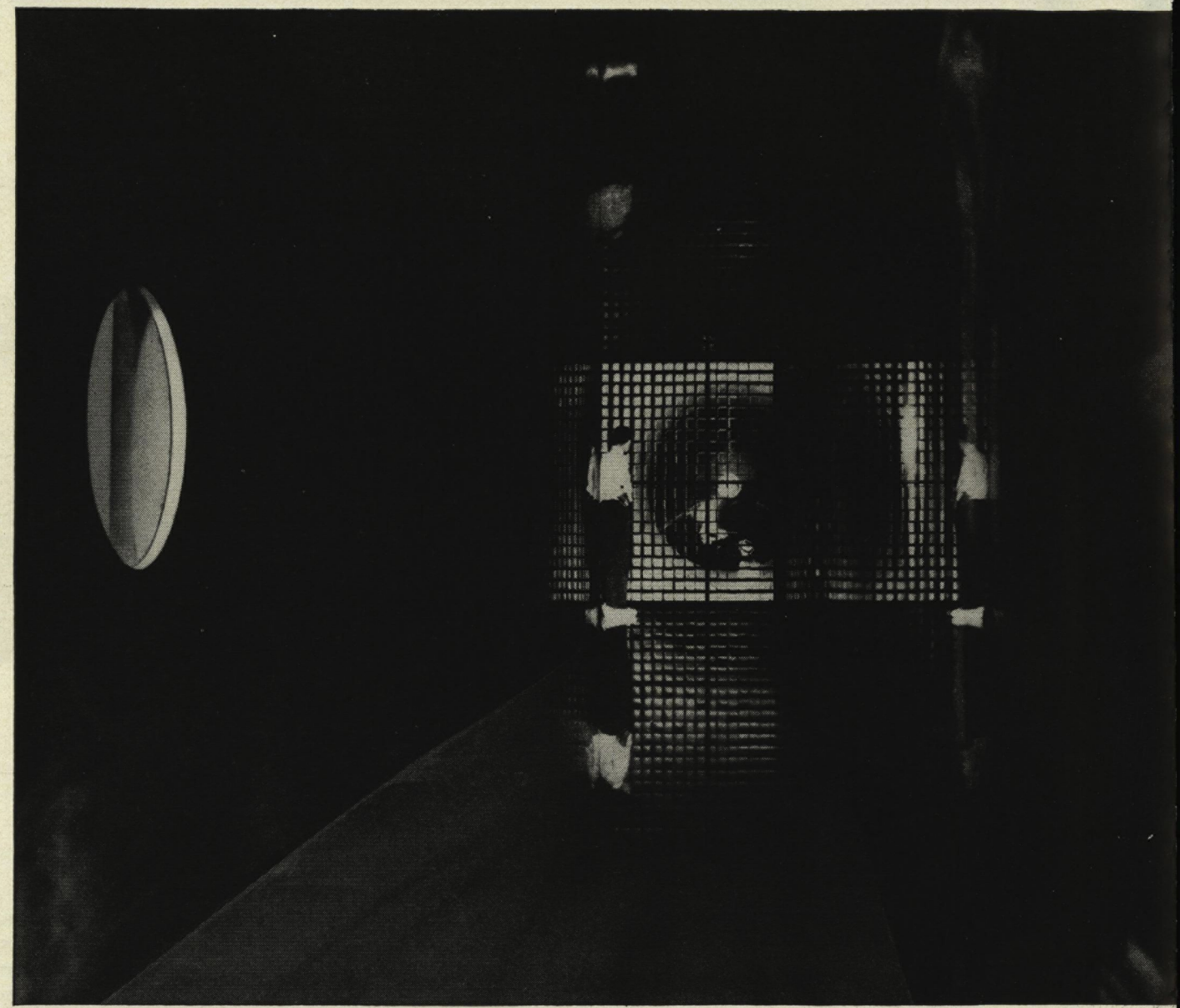
Glass, as made by Corning, is a material of limitless uses. That's a good thing to remember when you're out of college and concerned with new products and processes or improvements in old ones.

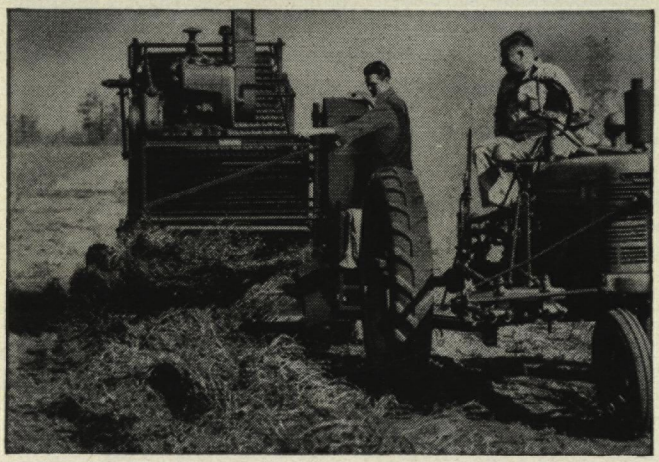
Then, if you think glass can help, we hope you'll write us before your planning reaches the blueprint stage. *Corning Glass Works, Corning, New York.*

CORNING
means research in glass

1851—100 YEARS OF MAKING GLASS BETTER AND MORE USEFUL—1951

Only STEEL can do so many jobs



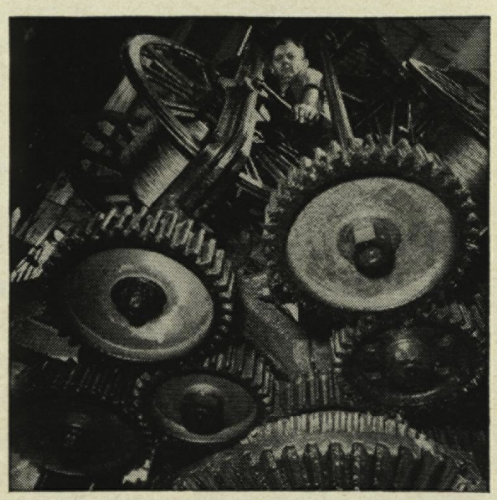


CAVE OF THE WINDS. This largest "supersonic" wind tunnel in the world—at the National Advisory Committee for Aeronautics, Lewis Laboratory, Cleveland—is capable of providing air velocities up to twice the speed of sound for aeronautical research. The tunnel's testing chamber measures 8 by 6 feet, and has flexible walls of highly-polished U·S·S Stainless Steel plates, specially made by U.S. Steel for this vital defense project.

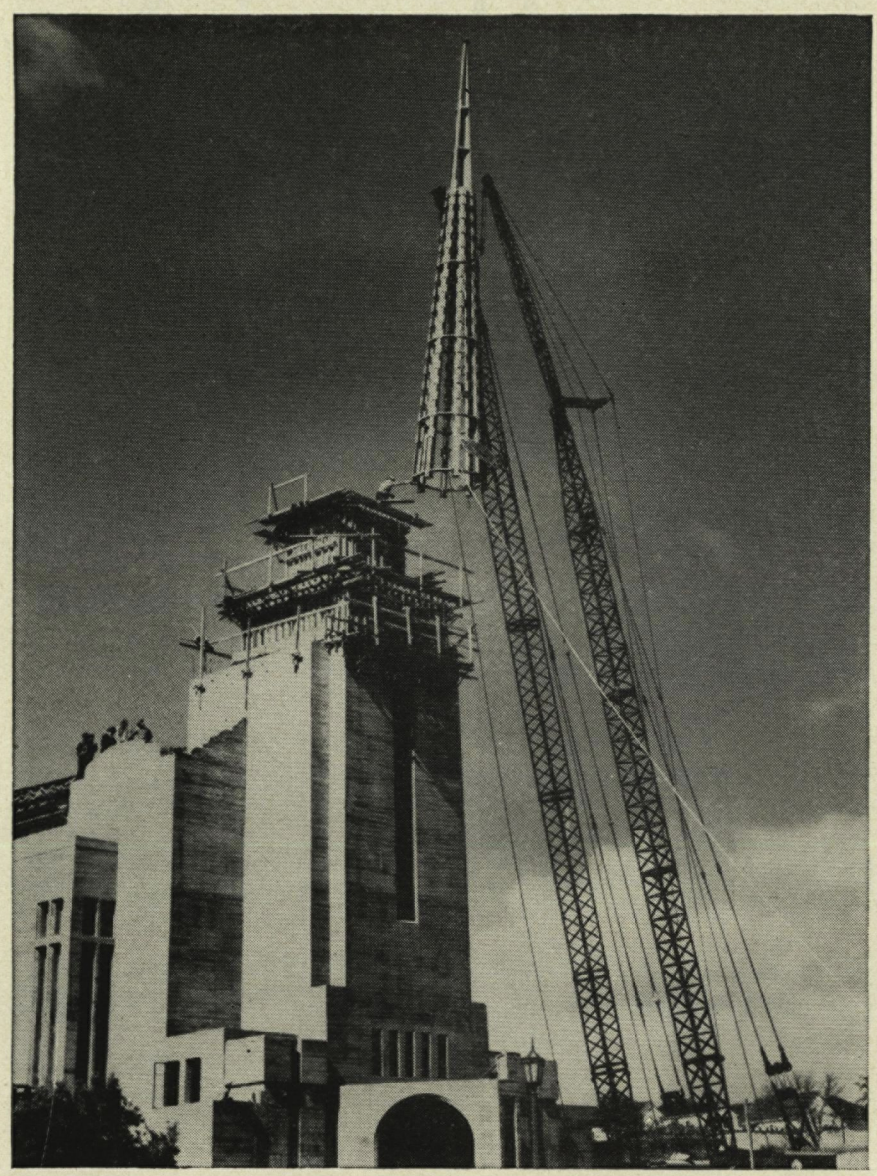
NEW WAY TO GATHER GOOBERS. This new peanut combine threshes along the row where the peanuts are grown, gathers up nut-laden vines, picks them clean, and deposits the mulch to condition the soil for the next crop. In tests, it has reduced harvesting man-hours per acre from 30 to 4, lets two men do the work of 12, saves $40 an acre. By supplying steel for such equipment, U.S. Steel helps build a more productive America.

AMERICAN BRIDGE COMPANY • AMERICAN STEEL & WIRE COMPANY and CYCLONE FENCE DIVISION • COLUMBIA STEEL COMPANY • CONSOLIDATED WESTERN
TENNESSEE COAL, IRON & RAILROAD COMPANY • UNION SUPPLY COMPANY • UNITED STATES STEEL COMPANY • UNITED STATES STEEL EXPORT COMPANY

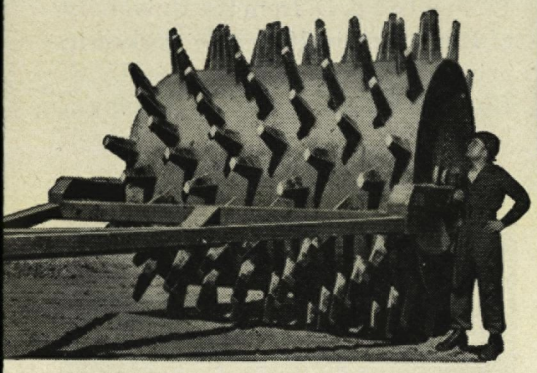
so well...



WHEELS WITHIN WHEELS. Here you are looking into the driving gears of a 10-ton vertical closing machine, making U·S·S TIGER BRAND Elevator Rope to lift and lower the elevators in many of our country's famous skyscrapers. This equipment also manufactures general hoisting rope for applications such as the cranes shown in illustration at right. Whether you need enormous steel cables to support a bridge, or wire that's finer than a human hair, United States Steel manufactures a wire suited to your special requirements.



HOW TO SWING A STEEPLE 80 FEET UP. Here are two cranes completing the 80-foot lift of a prefabricated steel steeple, and about to swing it over its base. United States Steel has won a world-wide reputation as fabricators and erectors of steel work for everything from football stadia to church steeples, from bridges to television towers.



GIANT SHEEPSFOOT ROLLER. Army Engineers find this odd-looking, 36-ton steel roller a very useful tool for compacting and leveling off fill in the construction of airstrips. Although the defense program will require increasing amounts of steel, the constantly-expanding steel-producing facilities of United States Steel should enable it to supply steel for many essential everyday uses, too.

FACTS YOU SHOULD KNOW ABOUT STEEL

In 1951, the American steel industry must be able to purchase 30 million tons of high grade scrap *outside* the industry, if it is to achieve the record steel production goals set for it by our defense program. Memo to manufacturers, farmers and proprietors of auto "graveyards": Turn in your scrap! It means money for you, more steel for America!

FIFTY YEARS OF SERVICE 1901 USS TRADE MARK 1951 STEEL UNITED STATES STEEL

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Alumni News

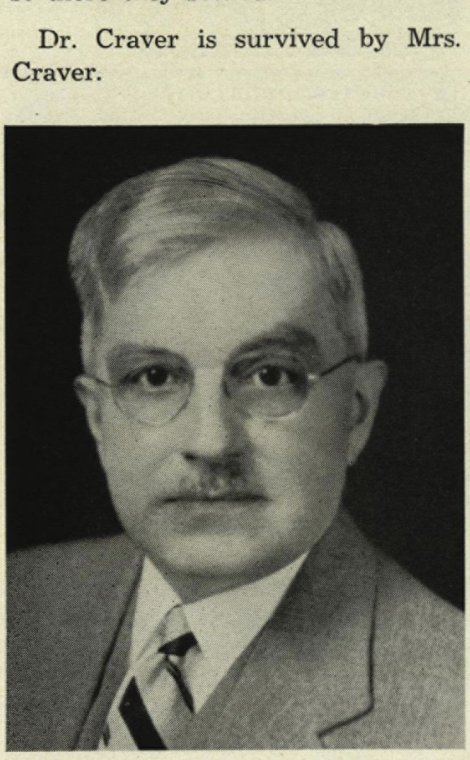
By Chris Sharpenberg, sr. m.e.

'95 Dr. Harrison W. Craver, Ch. E., passed away July 27, 1951, in Baltimore, Maryland. He was a retired director of the Engineering Societies Library in New York, and former president of the American Library Association.

Dr. Craver was born in Oweneco, Illinois. After graduating from Rose, he worked as an industrial chemist for several years. Joining the Carnegie Library in Pittsburgh in 1900, he organized its technological department. After serving as director of the Carnegie Library from 1908 to 1917, he became director of the Engineering Societies Library, where he remained for 29 years. In 1935, Rose awarded him an honorary degree of Doctor of Science.

In 1949, Dr. Craver and his wife made an extensive tour of the country, looking for an attractive community in which to live. Baltimore was the ideal location for them, so there they settled.

Dr. Craver is survived by Mrs. Craver.



Dr. Harry A. Schwartz

'01 Dr. Harry A. Schwartz, E.E., has been named by the Malleable Founders Society to receive the Charles H. McCrea Medal for 1951. This award is made for his outstanding contribution toward progress and development in the Malleable Iron Industry.

Dr. Schwartz, Director of Research for National Malleable and Steel Castings Company, Cleveland, Ohio, has been identified with that company since 1902. He has been honored in both this country and in England for his scientific contributions to the metallurgical field.

He received the honorary degree of Doctor of Science from Rose in 1933, and was honored by Case Institute of Technology with the honorary degree of Doctor of Engineering in 1936. He was awarded the Penton Medal of the American Foundrymen in 1939.

He has contributed extensively to scientific journals in the metallurgical field and is the author of several books that are widely used by industrial and engineering colleges.

Dr. Schwartz is widely known in Terre Haute because of his interest in his alma mater, which he has served as Alumni Member of the Board of Managers for two terms.

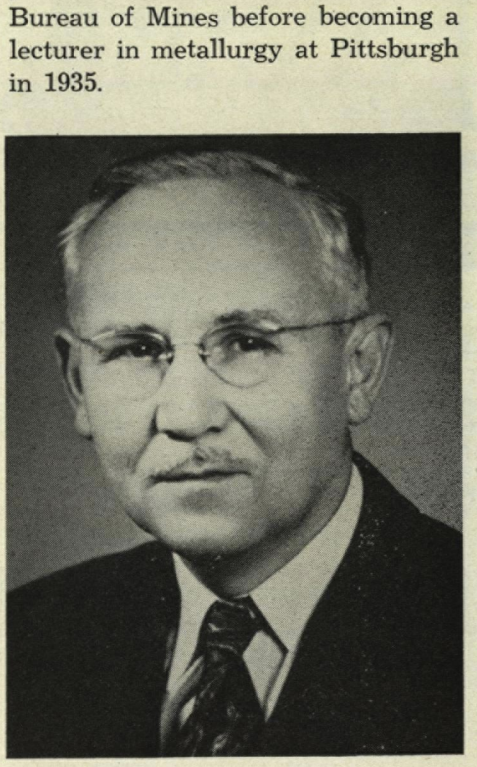
'01 A. C. Lyon, Ch. E., has moved to Fresno, California where he is engaged in the development of real estate.

'11 W. E. Baker, E. E., has been named vice-president and assistant to the president of Servel, Inc., the nations largest gas appliance manufacturer. Mr. Baker had been vice-president in charge of manufacturing since he joined Servel in 1934.

'18 John W. Bolton, Ch. E., director of metallurgical research for the Lunkenheimer Company, has been elected director of the American Society for Testing Materials. Mr. Bolton started with the Lunkenheimer Company in 1927. He has been interested particularly in such material as cast iron, copper, and copper alloys, and in the use of steel at elevated temperatures. He is considered an outstanding authority on the applications of these materials in the valve and fittings industry. Bolton's work in the foundry field has been recognized by several awards and honors. He is also active in many scientific and engineering groups.

'24 Dr. G. R. Fitterer, Ch. E., head of the University of Pittsburgh Department of Metallurgical Engineering since 1939, has been appointed dean of the School of Engineering and Mines.

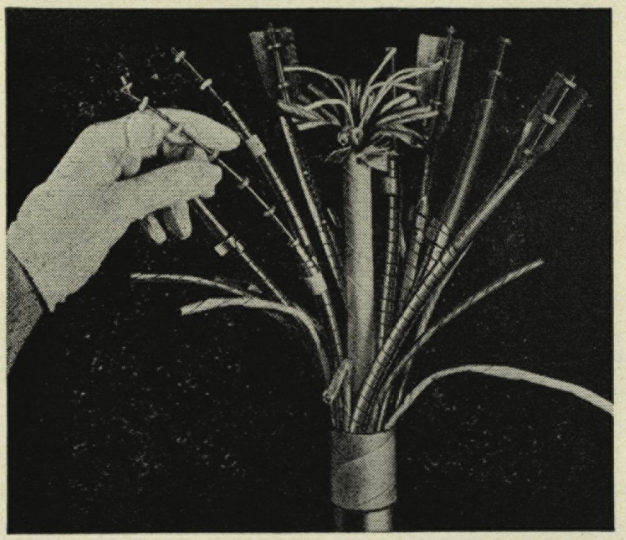
Dr. Fitterer received his M.S. from Carnegie Institute of Technology in 1927 and a Ph. D. from the University of Pittsburgh in 1930. He worked in private industry and for the U. S. Bureau of Mines before becoming a lecturer in metallurgy at Pittsburgh in 1935.



John W. Bolton

Newsworthy Notes for Engineers

Between the gloved fingers, you see the plastic discs which separate and insulate inner wire from outer tube of coaxial unit.



Plastic "life-savers" For Coaxial Cable

(ACTUAL SIZE)

In every mile of new eight-unit Bell Telephone coaxial cable there are over half a million little plastic insulating discs. They look simple enough—like small plastic "life-savers"—but there's a lot of engineering behind them.

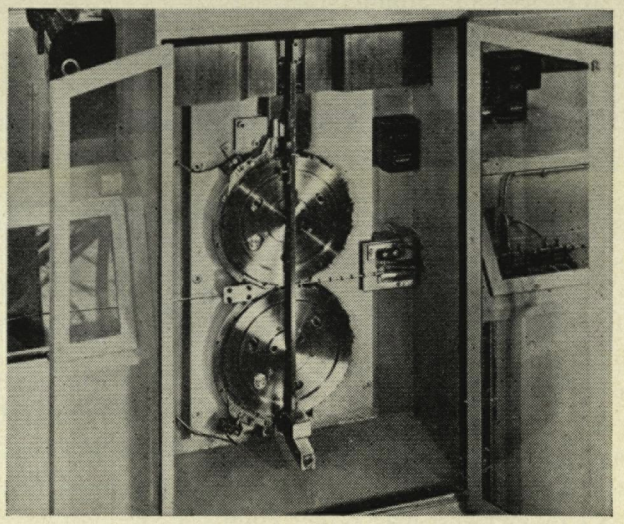
In early coaxials, the insulators were made of hard rubber. But scientists at Bell Telephone Laboratories found that polyethylene—because of its extremely low power factor and lower dielectric constant—reduced shunt losses to about one-twelfth of those with rubber discs.

Use of polyethylene plastic, however, required the development by Western Electric—manufacturing unit of the Bell System—of unusual handling techniques and special machinery.

Punching the discs, with a neat hole in the center, from sheets of the tough plastic is routine. To position them on the coaxial conductor accurately and speedily is not so simple. Equipment was designed and built which receives the discs from a hopper, forces each against a knife edge to slit it, and slips them on to the wire at regular intervals of one inch. At the same time another part of the machine forms copper tape into a tube around the wire and discs, gives a high voltage test, and wraps the tube with two spiral layers of steel tape to produce a completed coaxial unit.

Before the discs go into the machine, they are subjected to an "ozone atmosphere" and to the radiation from radium salts to remove static electricity which would cause them to stick together and refuse to enter the feeding tracks.

All of this — the development of new production methods and machines, the infinite care in manufacture — requires engineers of many kinds—electrical, mechanical, chemical, metallurgical, industrial. Working closely together, they help to convert scientific developments in communications into economically manufactured products for the Bell System.



Plastic insulators, fed into this mechanism, are slit — and pressed on to the coaxial conductor exactly one inch apart.

Western Electric

A UNIT OF THE BELL SYSTEM SINCE 1882

Fraternity Notes

Alpha Tau Omega

The halls of Alpha Tau Omega were again alive after a brief recess of ten weeks. The chapter began its year's activities by preparing for Homecoming. The result was well worth the effort of all the actives since there was really a "blow-out" during the weekend of October 12-14. All the A.T.O. alumni who visited the house were witnesses of several improvements that were made during the spring and summer.

The new paint on the house, along with the new furniture purchased from the dormitory, and the interior "refacing" made quite a change in the dwelling. All those involved in making these improvements were quite pleased with the results and were better pleased with the praises received.

The new year was well begun socially. A house party was staged after the "Senior Stomp" on September 28 and the parties during Homecoming were ones from which many "stories" will linger.

Three more A.T.O.'s have found for themselves members of the "weaker" sex. Best wishes go to Mr. and Mrs. Larry Leonard who are recent newlyweds. Mrs. Leonard is the former Miss Elaine Thompson. At the second meeting of the school year, Stan Updike "announced" his pinning of Miss Betty Leachman of I.S.T.C. The following week, the fraternity learned of Jim Matthews' pinning Miss Dottie Lou Miller. Dottie is an I.S.T.C. girl and was Wiley High School's 1950 football queen. Congrats from the chapter to Stan and Jim. Who's next?

Sigma Nu

Beta Upsilon ushered in the 1951-52 academic year with the annual stag party on the night of September 10. At the business meeting which preceded the stag, plans were completed for Homecoming decorations.

Looks like there will be some big things in store for the Junior class with brother Ingle as prexy. The chapter also has hopes that the chem lab won't "blow up" one of these days with "Monk" Jones and Ken Brinson as secretary and treasurer of the A.I.Ch.E. Dick Green and Ric Werking were elected Marshall and Alumni Contact Officer to fill vacancies left by brothers Good and Osborne who transferred to G.M.I. and the University of Illinois, respectively.

On the evening of September 29, members of the chapter and guests climbed on "ye olde hay wagon" and went for a tour of North Terre Haute and vicinity. Refreshments consisted of hot dogs, cider and cokes. After breathing hay dust and enduring some "talented" uke playing, it seemed that "all were had by a good time."

The chapter extends congratulations to brothers Maurice Jones who pinned Miss Shirley Gardner, and Kenneth Cross, who pinned Miss Joyce VanDerMeulen. Both girls are from Indianapolis.

Lambda Chi Alpha

During the summer months Lambda Chi Alpha acquired a new house. The two story house is located at 461 North Sixth Street. It has recently been reshingled and repainted. On Saturday, September 29, a hard day's work was spent by the brothers preparing the house for homecoming.

On Friday night, September 28, the first open house of the season was held. The brothers and their dates gathered around the fireplace and sang the old favorites. Popcorn was popped over the open fire. Dancing room was made, and the couples danced till early in the morning.

Lambda Chi Alpha is represented on campus this year in many organizations. Al Forsaith is president of the senior class, Skip Zopf is president of the sophomore class, and Glen Rout is president of the Glee Club. On the football team are Dick Thomas, Leo Little, and Jim Dunlop.

Congratulations are in order for Al Stiles, who became engaged to Miss Betty Gilson over the summer, to Bob Failing, who pinned Miss Marlene Scheiner of Chicago. Miss Gilson is from Rushville, Indiana.

Theta Xi

The Theta Xi house opened early this fall to accommodate the members that returned early for a week of football practice. When school started Monday, all the TX men returned with the exception of Brother Tague who is now at I. S. T. C. and Pledge Dickerson who is at the present time with "Uncle Sam."

Congratulations are in order for Don Somes, who recently pinned Miss Joan Collister of Terre Haute, and George Wence who announced that he is engaged to Miss Phyllis Sue Darnold of Mt. Vernon, Illinois. Best wishes to Bob Heckelsberg and his wife, the former Miss Wilma King of Terre Haute, and to Rudy York and his wife, the former Miss Mary Ellen McCoy of Palestine, Illinois. Mrs. York is employed at the Union Hospital as a graduate nurse.

It was announced that Dr. Oden S. Knight, of Terre Haute, will again be the Chapter Adviser for the coming year.

Kappa has pledged two more men this term: Bob Waldbieser and Bill Miller.

Besides a large representation on the football squad, TX is proud to have one of its Brothers, Tom Grinslade, as Captain.

Recently TX acquired a new house member. This one is not in school however, for he is a canine. His name—"Kappa," naturally.

Chemistry *makes it yours!*

A whole new world of better products is being created to serve you!

The great progress made in American chemistry has been in the past 30 years . . . within the lifetime of most of us.

Versatile plastics—health-giving wonder drugs—fine man-made fabrics . . . they're only a few of the modern chemical achievements which have opened up a whole new world of better living for all of us.

Vision—75 Years Ago

Though the greatest advances have been made within three decades, the foundation for this progress was laid by the pioneering American chemists who 75 years ago had the vision to form the American Chemical Society. Their society has grown from a handful of members to well over 60,000—the world's largest professional scientific organization. The people of Union Carbide are glad to pay tribute to the American Chemical Society on its Diamond Jubilee, and on the occasion of the World Chemical Conclave.

Union Carbide Grows With Science

Chemistry and the related fields of physics and metallurgy have long been major interests of Union Carbide. The application of these sciences to producing new and better materials has been the backbone of UCC's growth.

FREE: *Learn more about the interesting things you use every day. Write for the 1951 edition of the booklet "Products and Processes" which tells how science and industry use the ALLOYS, CARBONS, CHEMICALS, GASES, and PLASTICS made by Union Carbide. Ask for free booklet L.*

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PREST-O-LITE Acetylene • LINDE Oxygen • PYROFAX Gas • ELECTROMET Alloys and Metals • HAYNES STELLITE Alloys

POTATO MASHER DESIGN

Concluded from page 9

of valve mechanisms which must form a part of any complete discussion on the topic. Figure 10 shows a system which could be purchased to "soup up" your Model T back in the days of the "Rajo" and "Fronty" heads. This overhead valve unit had the tappets connected to the valve stem with a long curved tube which was filled with steel balls. The tappets forced the balls through the curved tube and opened the valve. In those days you had to have all of your "marbles" or your Model T wouldn't run too well.

Again drawing on the midget-engine field, we have in Figure 11 another peculiar type of valve-actuating mechanism, one which was completely hydraulic. A small hydraulic cylinder was placed over each valve stem and connected by an oil line to a hydraulic "distributor." This distributor supplied oil under pressure to the hydraulic cylinder at the proper time, and thus opened the valve. The particular engine seen was hand-made and evidently performed satisfactorily. The engine was an unblown four- cylinder, in-line unit of approximately 100 cubic inch displacement.

These eleven types show some of the variations of overhead valve mechanism which have been built, and research will undoubtedly bring up many more.

These few should show however, that almost all practical combinations have been tried, and evidently the more economical ones are those which have survived.

HERBERT J. RASS

ENGINEER—in charge of OPPORTUNITIES

by HERBERT J. RASS, *Manager, Employment Department*
ALLIS-CHALMERS MANUFACTURING COMPANY (*Graduate Training Course 1942*)

MAYBE that's a far-fetched way of putting it—but I am an engineer (Marquette 1941, Electrical Engineering) and a great many men do pass through the Employment Department to opportunities with Allis-Chalmers. I did the same thing myself.

During my last two years at Marquette in Milwaukee I worked as a cooperative student at Allis-Chalmers on the electrical test floor, in electrical product departments on both design and application work, and in the shops. When I graduated, I continued in the Graduate Training Course, on training location with what is now the Employe Relations Department. After six months—opportunity came around to look me up. The Company officer in charge of Industrial Relations talked to me about personnel work and asked if I'd like to go on with it as a career.

Liked Working With People

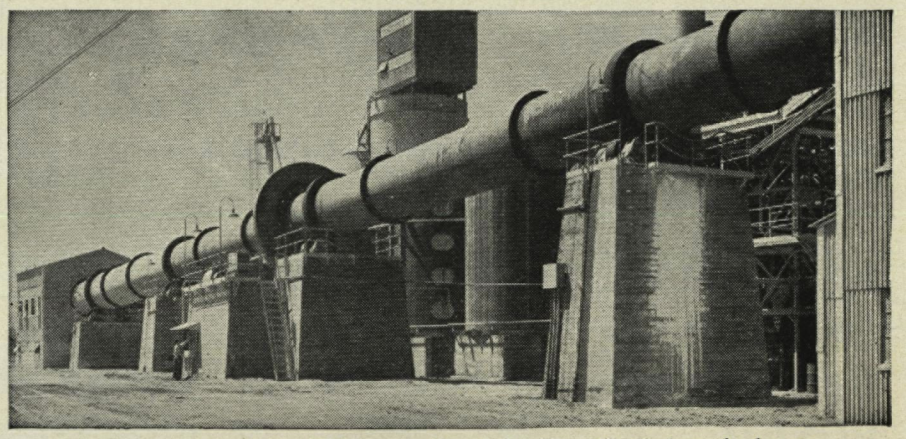
By that time I'd seen a lot of the Company, both product design and manufacturing, and I knew I liked working with people better than with machines, so it was just the break I wanted. During the war I was in the shops on personnel work, got a thorough grounding on operations carried on throughout the plant, and made many contacts. In 1950 I was made manager of the Employment Office.

Recruiting engineers for the Graduate Training Course is one of our functions, and perhaps this is a good place to tell something about the course.

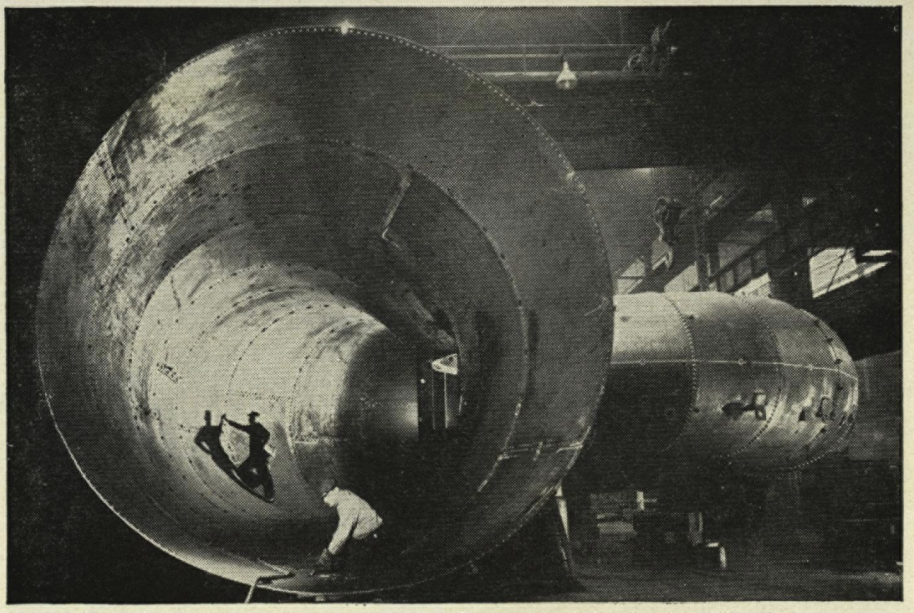
The course here is actually tailor-made for each man, and you help plan it. You can work it out to get concentrated training and experience in almost any phase of work that you want . . . even go on and get advanced degrees. Or, like so many of us, you may use it as an opportunity to get experience with many phases of the Company's operations.

Industry's Broadest Range

There are over 75 training locations for Graduate Training Course engineers at Allis-Chalmers' Milwaukee Plant alone. They include research, design and sales application on a wide range of products such as motors and generators, crushing, cement and mining machinery, steam and hydraulic turbines, centrifugal pumps, transformers, electronic equipment and milling machinery.



This is a 7 ft. x 8 ft. x 250 ft. rotary lime sludge kiln. Allis-Chalmers is also an important supplier of kilns to the cement industry.



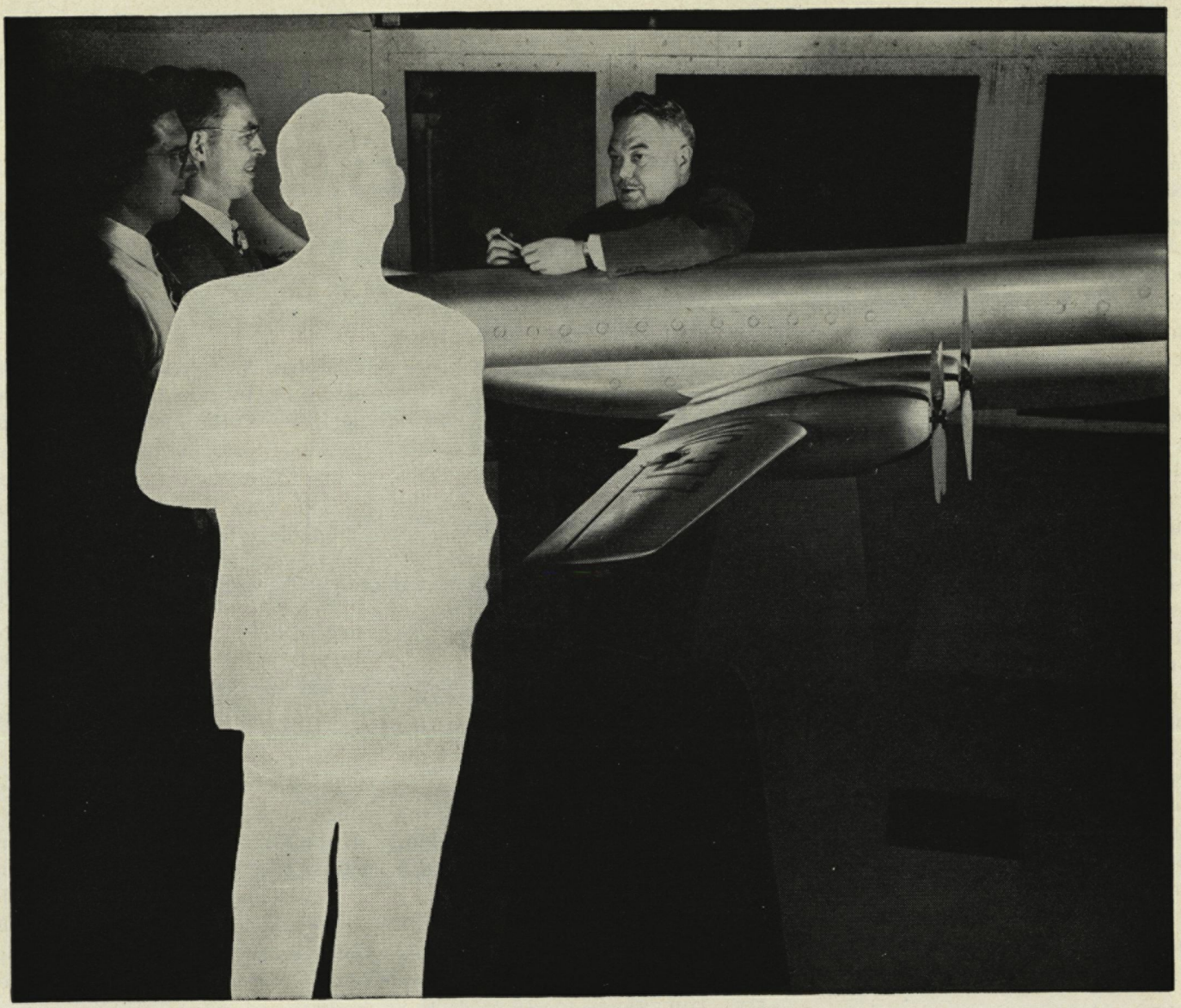
Giant spiral casing for hydro power project is one way of showing that Allis-Chalmers can build them big.

That's only part of it. You can go into the shops and manufacturing end of the business—work in planning and production control, personnel, time study, wage determination and labor relations. Or, there's laboratory and research, purchasing, advertising, sales training, export sales. Somewhere during the two-year course you're going to get a start in the work that suits you best. If you have the stuff, opportunity is going to come your way.

If you'd like more information about the Graduate Training Course, stop in for a visit at your nearest Allis-Chalmers district or regional office—or write for literature.

ALLIS-CHALMERS

Allis-Chalmers Manufacturing Company, Milwaukee 1, Wisconsin



Do you fit in the Boeing picture?

Boeing's world-wide reputation for sound engineering achievement is founded on *men*. Boeing engineers and physicists are graduates of many universities and technical schools. They come from every state in the Union. Under inspiring leadership they have been welded into one of the most potent forces in any field of scientific advance.

If you can measure up to Boeing standards, there is an attractive future for you in this renowned group. In addition to the prestige which attaches to being a member of the Boeing engineering team, there are other definite advantages:

1 The challenge of working on such vital programs as the B-47 and B-52 jet bombers, guided missiles and other revolutionary developments.

2 Stability of career opportunity with an engineering division that is still growing steadily after 35 years.

3 The invigorating atmosphere of the Pacific Northwest — hunting, fishing, sailing, skiing, temperate climate all year around.

4 Good salaries. And they grow with you.

5 Moving and travel expense allowance.

6 If you prefer the Midwest, similar openings are available at the Boeing Wichita, Kansas, plant. Inquiries indicating a preference for Wichita, Kansas, will be referred to the Wichita Division.

Boeing's immediate needs call for experienced and junior aeronautical, mechanical, electrical, electronics, civil, acoustical and weights engineers for design and research; for servo-mechanism designers and analysts; and for physicists and mathematicians with advanced degrees.

Write today to:

JOHN C. SANDERS, Staff Engineer—Personnel
Boeing Airplane Company, Seattle 14, Wash.

BOEING

27826

Concluded from page 10

Taflinger and Mrs. Bennett, the director and pianist, respectively, of the club. Last year from twenty to thirty-five men reported sporadically to rehearsals and at the end of this year at least thirty keys will have been awarded. Well applauded performances were given last year at Garfield, Woodrow Wilson, Gerstmeyer and Brazil schools as well as at Rose, St. Mary's and the Rotary Club. A general Glee Club opinion was that the St. Mary's audience was the best, from a variety of viewpoints.

Since a working repertoire learned last year is now available, the club can find more time to add polish and a few novelties to the program. The possibility of scheduling a three-way singfest with State and St. Mary's musical groups is being studied. The goal for the club in 1952 is the procurement of a Grand piano for the auditorium similar to the one recently placed in the lounge of Deming Hall.

Quakers Take Opener 13-0

The Quakers of Earlham College, bolstered by twenty returning lettermen, blanked the Fighting Engineers 13-0 in the first contest of the 1951 gridiron campaign. The game was slowed down by a wet field and neither team was able to launch a sustained ground attack. Both of the Earlham touchdowns came as a result of aerials.

The game opened with Earlham kicking off to the Fighting Engineers. The Polymen failed to obtain the necessary yardage in the first three tries and booted the pigskin back to the waiting Quakers. The Quakers returned the favor four plays later. This continued like clockwork until Earlham took to the air late in the first quarter. A pass from Lichtenberg to Goens was good for a T.D. The attempted pass for the extra point was knocked down. At the half the score was 6-0.

During the third quarter a Poly pass went astray and fell into the open arms of Quaker Dud Moore who carried it 75 yards for the second Earlham score. The extra point was added by Thurman Washington who ran the ball over after an intended kick was spoiled by a bad pass from center.

The only Rose scoring threat of the game occurred in the fourth quarter when the Engineers opened up with a passing attack that carried seventy yards in eight plays to the Earlham twenty. Joe Verdeyen and Rex Leonard split the passing chores while Bill Sharpenberg and Bob Mogle alternated on the receiving end.

The Engineers displayed a tough defense that held the Quakers to 69 yards on the ground. With a stronger offense the club could come up with a winning record this season. Here's hoping.

Library Notes

It seems most appropriate to begin this month's article with a "Thank you" to the Rose Technic for the gift of the below mentioned books to the library:

Brown, Aubrey I. and Marco, Salvatore M., Introduction to heat transfer, New York, McGraw-Hill, 1951. This book presents the essential fundamentals of the transmission of heat in a manner that is readily understandable to engineering students.

Carlson, Earl R., Born that way, New York, John Day Co., 1951. The author tells what attitude towards himself and the world a handicapped person should adopt and what attitude his family should take towards him.

Tschebotarioff, Gregory P., Soil mechanics, Foundations, and Earth structures. New York, McGraw-Hill, 1951. The theories of soil mechanics are developed from first principles and examined from actual practice, with illustrations of the application of these theories as well as their limitations.

The Technic staff is making it possible to have in the library a collection of magazines, similar to the Technic, from other engineering schools. We in the library feel that these will be exceedingly interesting to the students at Rose.

We are particularly proud to announce that the library now has a 1951 edition of the Americana Encyclopedia to replace our old 1904 edition.

The librarian is making up the new list of periodicals for next year. If you have any periodicals in mind which you would like to see in the library, please get your requests in as soon as possible.

The library is continuing to make great progress in adding to the collection. Come in and brouse around; you will find something of interest!

THE DU PONT DIGEST

M.E.'s AT DU PONT

Diversity of chemical products spells opportunity for the mechanical engineer

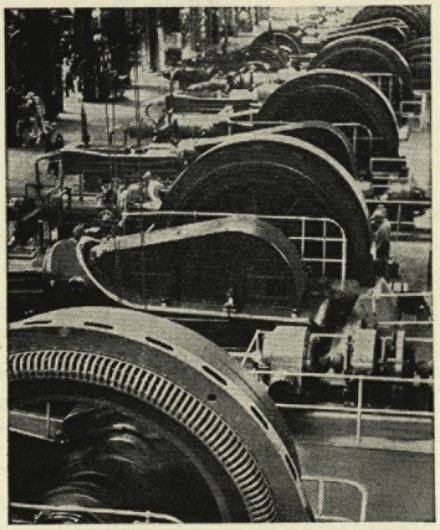
Students of mechanical engineering sometimes assume there is little opportunity for them in the chemical industry. In fields where products are made in more or less standardized equipment, this may be so.

But in a company like Du Pont which operates in many fields of industrial chemistry—where products are made at pressures over 15,000 pounds per square inch as well as in vacua low as two millimeters of mercury—mechanical engineers are in heavy demand.

What jobs do they fill at Du Pont? Literally hundreds, not including the normal run of mechanical engineering work such as design of standard equipment, scaling up from blueprints, etc.

For example, here are some of the problems encountered in the manufacture of nylon yarn alone:

1. Nylon polymer, a poor thermal conductor, is melted by a contact surface grid at 550°F. The polymer decomposes slowly at this temperature, and there is a major heat-transfer problem. Many types of melting grids had to be designed before one proved satisfactory.



The compression *stages of these 50 ton/day hypercompressors (15,000 p.s.i.) for nitrogen, hydrogen, etc., were designed by Du Pont mechanical engineers.*

2. The molten polymer is pumped to spinnerets under pressures over 1000 pounds per square inch. With nylon as the only lubricant, the pumps must operate continuously at 550°F. Specialized problems in sealing, gasketing and materials of construction are inherent in this operation.

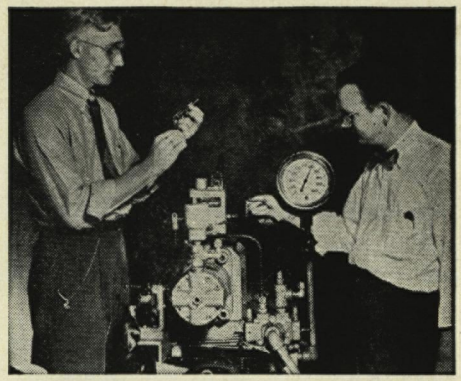
3. The melt is forced through multiple holes (diameters of 7 to 22 thousandths of an inch) in a special alloy disc. They must be made to conform to "jeweler's specifications."

4. The emerging fibers are cooled in a specially designed "air conditioned" chimney. Precise control is essential in this critical operation.

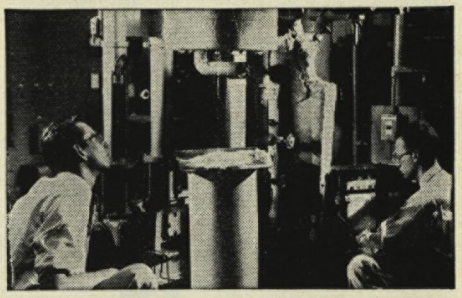
5. The fibers are wound on spools at surface speeds around 1000 yards per minute. Design calls for constant change in speed so that there is no localized stretching or relaxation of the fiber.

6. Finally, the fiber is drawn about 400% and wound on spools traveling at 5000 feet per minute. Bearing lubrication and dynamic balance presented important design problems.

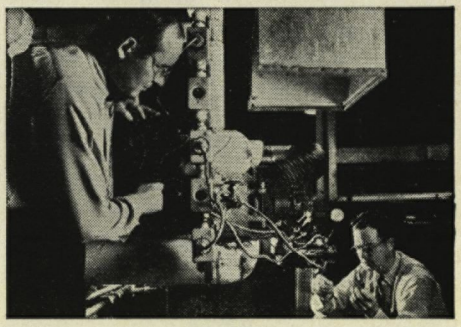
These are but a small part of the mechanical engineering problems arising in the manufacture of a single product by only one of Du Pont's ten manufacturing departments. Literally hundreds of other products, ranging all the way from cellulose sponges to metals like titanium, present similar challenges. So long as new processes continue to be sought and old processes improved, there will be important work for the hand and mind of the mechanical engineer.



Ralph C. Grubb, *B.S.M.E., Tennessee '51, and Paul D. Kohl, B.S.M.E., Purdue '46, study characteristics of a super-pressure pump (75,000 p.s.i.) designed by Du Pont engineers and made in Du Pont shops.*



Heat-transfer *problems in the design of new fiber-spinning equipment are investigated by J. C. Whitmore, B.S.M.E., Virginia '44, M.S.M.E., Delaware '49, and L.B. Collat, B.S.M.E., Georgia Tech '50.*



Uniquely designed *adapter for a screw extruder under study by Ralph J. Covell, B.S. M.E., Purdue '49, and John F. Bowling, B.S.M.E., Purdue '41. The adapter heats, filters and forms polymer into filaments.*

Send for your copy of "The Du Pont Company and The College Graduate." Describes opportunities for men and women with many types of training. Explains how individual ability is recognized and rewarded under Du Pont plan of organization. Address: 2521 Nemours Building, Wilmington, Delaware.

DU PONT

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YOU COULD EXPRESS THIS PROBLEM AS

$$\frac{(\text{Temperature}) \times (\text{Corrosion}) \times (\text{Fabrication})}{\text{Cost}}$$

The day after VJ-Day, engineers from a leading appliance manufacturer showed us plans for their postwar refrigerator with a great new feature—*a king-size freeze chest.* But the size increase threatened prohibitive costs. And no combination of metals so far had satisfied the requirements: Fast heat transfer; corrosion resistance; ease of fabrication. They asked, "Can we do it economically in aluminum?"

Now the freezer is simply a sheet metal box with passageways around it to conduct the refrigerant. Knowing that aluminum is an excellent conductor of heat, we suggested that the evaporator be made by brazing aluminum tubing to aluminum sheet. "Sounds good," they said and together we started designs.

Aluminum Research Laboratories found the answer to the first important question: Aluminum is compatible with most commonly used refrigerants.

Alcoa's Process Development Shops suggested an amazingly simple fabrication process, "Place the tubing on flat brazing sheet and furnace braze the assembly. Then form the unit into box shape." The first 25 units were made in this manner—a process so practical and economical that it hasn't changed since. You'll find aluminum freezers, formed by this method, in a great many refrigerators today.

This case is typical of the problems Alcoa men undertake and solve. Throughout the Alcoa organization, similar challenging jobs are in progress and others are waiting for the men with the imagineering ability to solve them.

ALUMINUM COMPANY OF AMERICA, 1825 Gulf Building, Pittsburgh 19, Pennsylvania.

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ALCOA®

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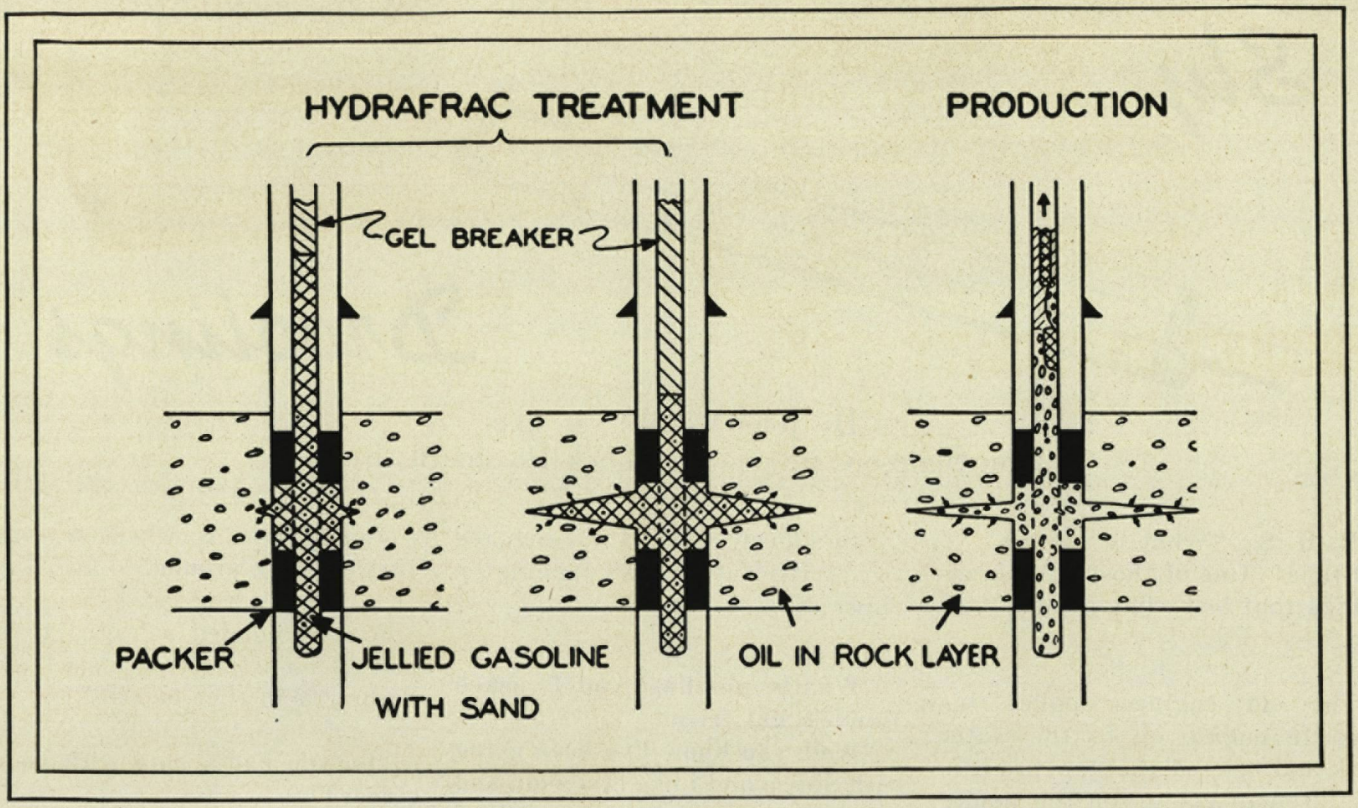


How "Jellied Gasoline" puts played-out oil wells back on their feet

THE PROBLEM of "rejuvenating" wells has become more and more urgent as tremendous civilian and military demands for petroleum products have continued to mount. A new hydraulic fracturing method has now passed the test of use on more than 3,000 wells in the field as the best way to get more oil from sources that have stopped producing.

Essentially, the new "Hydrafrac" method consists of two steps. First, a viscous liquid containing sand, or other granular material, is injected into the well under high hydraulic pressure. This causes fractures, or extends fractures, from the well bore into the oil-bearing formation.

Second, the viscous liquid—usually crude oil or kerosene and Napalm, the newly developed soap which was used in the war to make "jellied gasoline"—is broken down by injecting a gel-breaker solution. On release of the injection pressure, the resulting thinner solution flows back out of the fracture, now extended and widened, leaving the sand behind to hold the channel open for flow of oil into the well.

The Stanolind Oil and Gas Company of Tulsa, Oklahoma, Standard Oil's principal producing subsidiary, developed the Hydrafrac process after tackling the problem of "milking" old wells.

The process has been used both to obtain sustained production increases on "dried up" wells and to get a commercially practical flow from "tight" oil-saturated formations. Hydrafrac is now available, as a service, to the entire industry, helping it reach the higher and higher production goals of today.

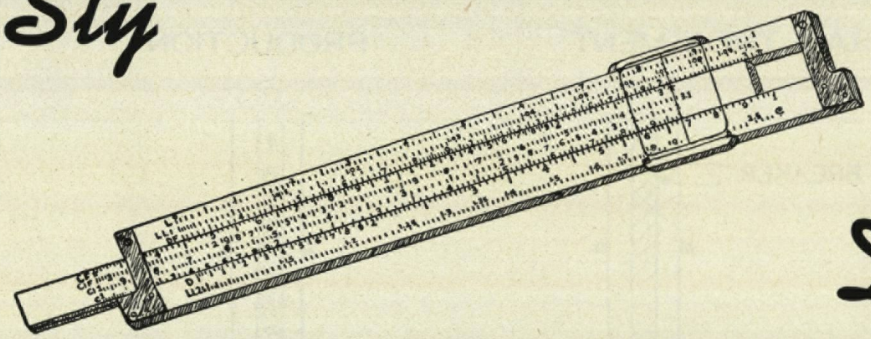
This is an example of the interesting problems young engineers at Standard Oil face. And satisfaction in its solution is another instance of the rewards that come to the man whose research helps Standard Oil meet America's vitally important civilian and preparedness needs.

Standard Oil Company

910 South Michigan Avenue, Chicago 80, Illinois

STANDARD

Sly Droolings



By John Voelker, jr. m.e.
John Simpson, jr. c.e., and Dick Bosshardt. fresh.

R. K. S.: "What is a gram?"

Stupe: "One of those little brass things that looks like a collar button."

* * *

The old engineer pulled his favorite engine up to the water tank and briefed the new fireman. The fireman got up on the tender and brought the spout down all right but somehow his foot caught in the chain and he stepped right into the tank.

As he floundered in the water, the engineer watched him with a jaundiced eye.

"Just fill the tank with water, Sonny," he drawled. "No need to stamp the stuff down."

* * *

The woman who thinks she can hold her husband with just her cooking should remember that he wasn't eating a sandwich when he proposed.

* * *

Both of the blacksmiths stuttered. One had finished heating a piece of pig iron and placed it upon the anvil for the other to hammer.

"Hi-h-h-h-hit it," he stuttered to his helper.

"W-wh-wh-wh-where?" asked the other.

"Aw, g-g-g-gosh, n-n-n-n-now we'll ha-have to h-h-h-h-heat it again."

* * *

A college education: Something that enables a man to get a job from a man who never went to school.

She's lovely . . . . . She's engaged . . . . . Her father uses Remington Super X.

* * *

"What's puzzling you?" asked Mamie's gal friend.

"Well, you know I've been going with Simon and I like him a lot, and now I have a proposal from Duke."

"Well, so what?"

"I can't make up my mind whether to be ducoed or simonized."

* * *

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

* * *

Have you heard the story about the fellow that took his girl out in the night and mist.

* * *

Mary had a little skirt
She stood against the light.
Who gives a damn
For Mary's lamb
With Mary's calves in sight.

* * *

Then there was the fellow who had a hobby of collecting stones and putting them in his bathroom. He had rocks in his head.

* * *

The gas company advertised in the local newspaper:

Wanted: Hard-boiled, beauty proof, woman-hater to read meters in sorority houses. We haven't made a dollar this year.

Jungle love is where a couple just monkey around.

* * *

Absent minded salesgirl to her boy friend after being kissed goodnight: "Will that be all?"

* * *

"So you had a date with an engineer?"

"No, I tore my dress on a nail."

* * *

A young man is at the in-between age in life when he knows **why** a strapless evening gown is held up, but he doesn't know **how.**

* * *

Rose man: "Gee, but I'm thoisty."

State frosh: "Wait a minute, I'll get you some water."

Rose man: "I said I'm thoisty not doity."

* * *

They call her Alma Mater———
She's educated a lot of boys.

* * *

They laughed when I came with shorts on, but when I sat down they split.

* * *

Ch. E.: "What made those red marks on your nose?"

C. E.: "Glasses."

Ch. E.: "How many?"

* * *

Bus Driver: "All right back there?"

Feminine Voice: "No, wait till I get my clothes on."

Then the bus driver led the stampede to the rear to watch a girl get on with a basket of laundry.

Extreme accuracy makes photography a matchless engineering tool

DRAWINGS ARE COPIED FAITHFULLY. Photocopying reproduces engineering drawings, data, specifications, with high speed, utmost accuracy and in any quantity. Bright copies can be made from dimmed material. Originals are saved from wear and tear.

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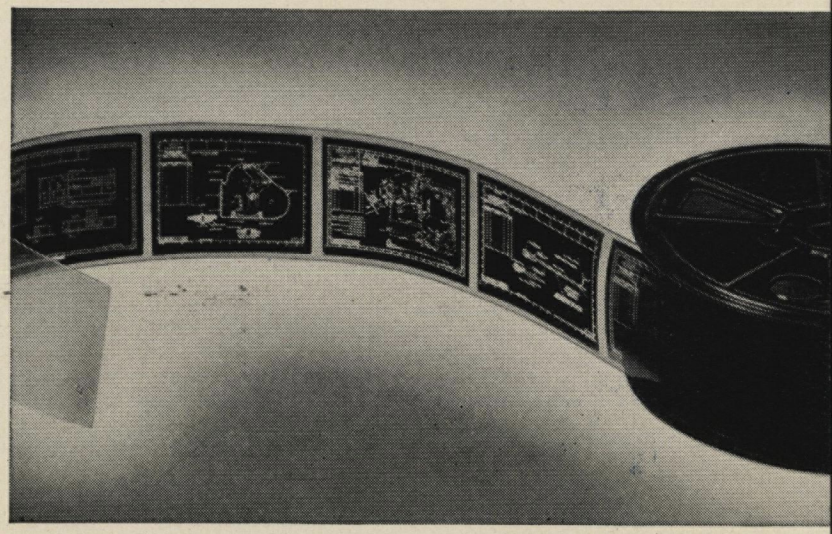

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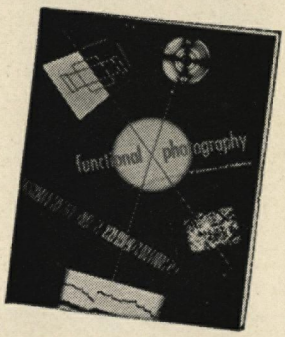

It tells how photography is used to:
Speed production · Cut engineering time
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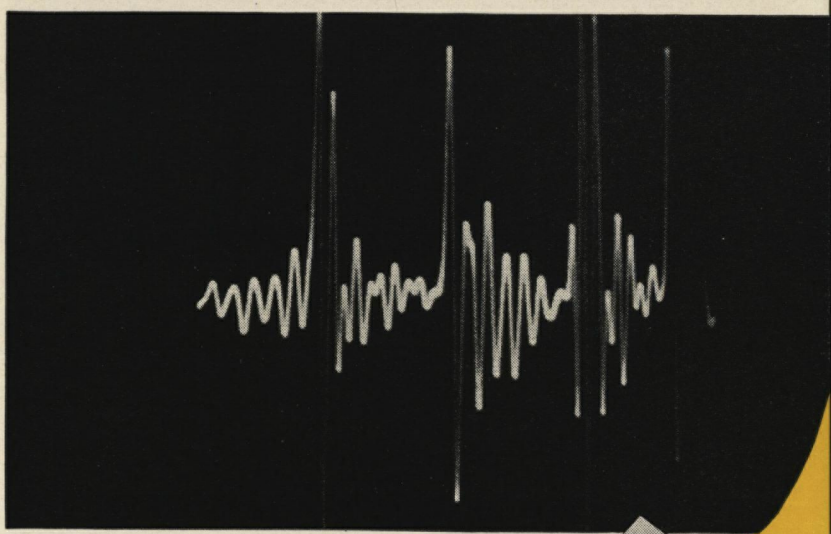

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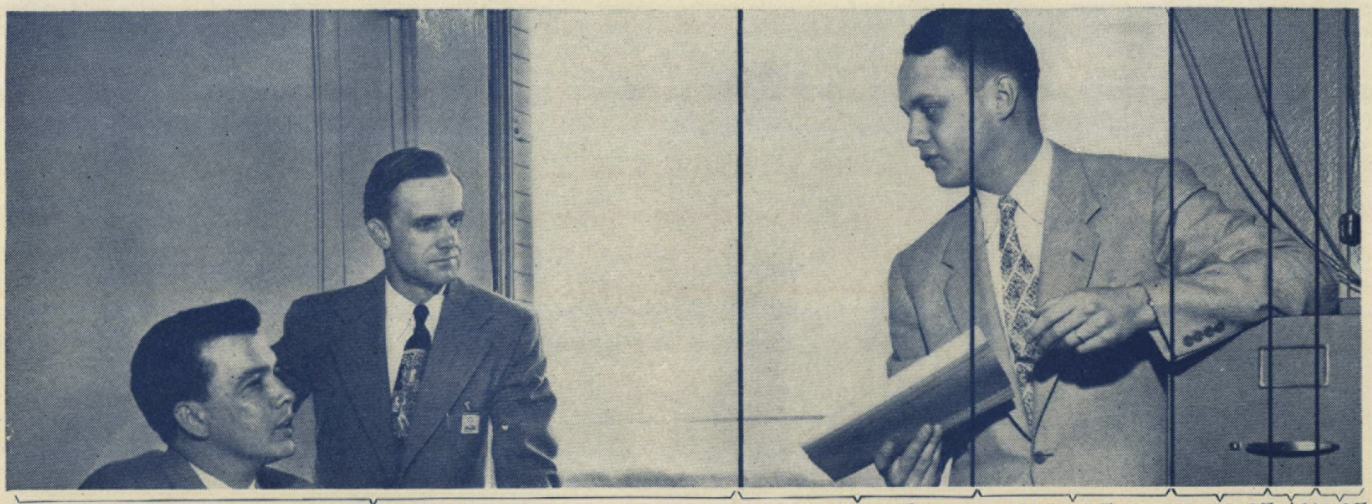
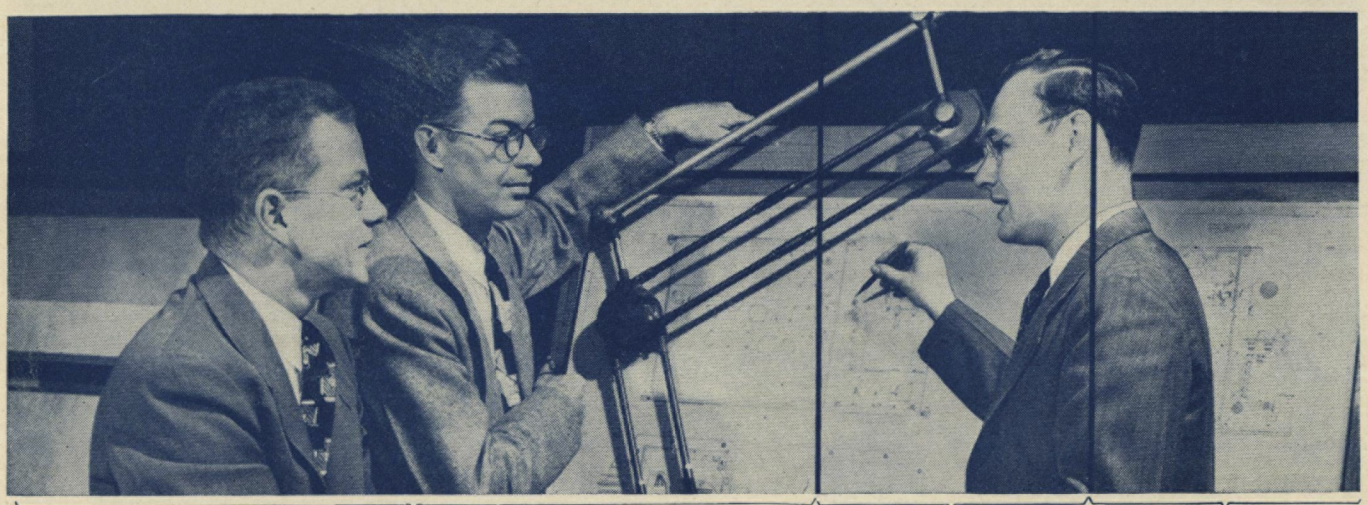


Accounting, Auditing, 55% | Marketing, 17% | Admin., 15% | Other Jobs, 7% | Advt., 3% | Mfg., 3%



Research—Development, Design, Production, Application Engineering, 60% | Marketing, Sales, 20% | Other Jobs, 20%

What happens to all the college graduates General Electric hires?

About 55 per cent of the graduates of General Electric's Business Training Course are now making their careers in accounting and auditing work. About 17 per cent are in marketing; 15 per cent in administrative and management; 3 per cent in advertising; 3 per cent in manufacturing; with 7 per cent in fields ranging from purchasing to employee relations.

Of the more than ten thousand engineers and other specialists at General Electric, about 60 per cent are in some phase of engineering or research, with 20 per cent in marketing, and the other 20 per cent in manufacturing, purchasing, etc.

Figures like these help to prove that there are no fixed paths for college graduates at General Electric. The graduate who enters a G-E training program doesn't commit himself irrevocably to one type of work.

It's a G-E tradition to encourage the newcomer to look around, try several different assignments on for size, find the kind of job which he believes will be most satisfying and to which he can make the greatest contribution.

You can put your confidence in—

GENERAL ELECTRIC