Spartan ENGINEER

"Miss Engineer"

lovember 1951

VOL. 5, No. 1

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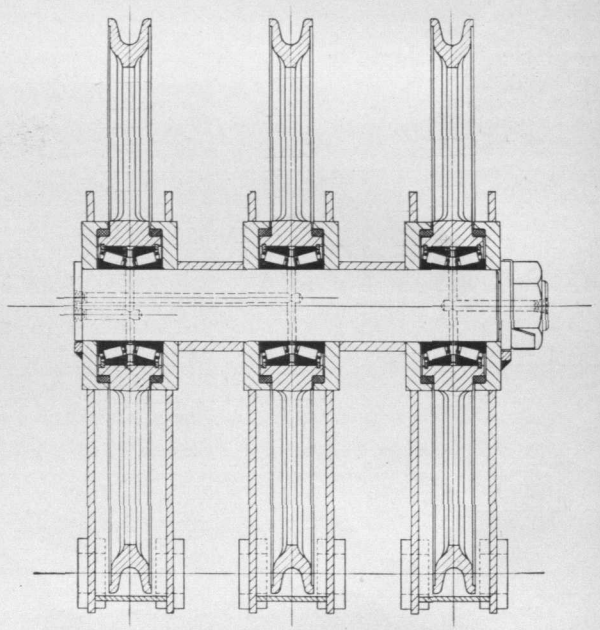

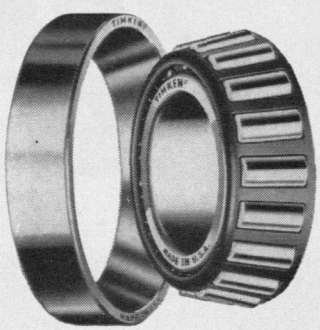

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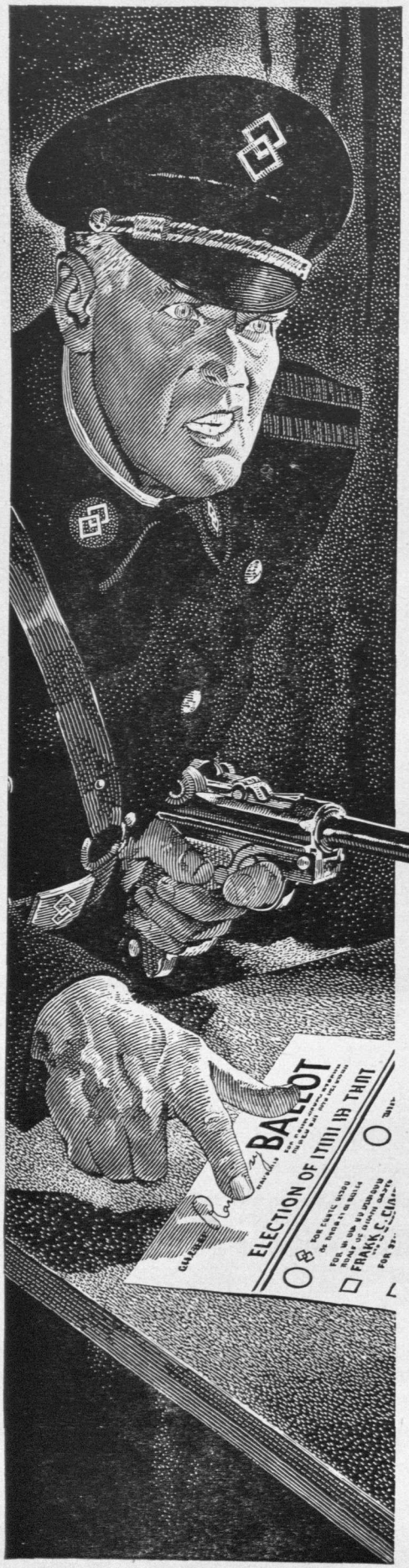

"Put your *X there!*"

"Ever have nightmares?

"I don't, often. But I sure had one last night! Wasn't my usual one, being chased by a lion and falling off a cliff. In *this* dream it was Election Day. I was at the polls, kidding with some of the boys I knew . . . but they weren't kidding back. They looked sort of worried or scared or something.

"Anyway, I got my ballot, stepped into the voting booth and pulled the curtain. I wet the end of the pencil . . . to make my X's big and black. *Then the nightmare part began.*

"A tough-looking soldier stepped into the booth. He put his finger on the ballot and said, *'Put your X THERE! And THERE . . . and THERE . . .'* None of the names I'd picked, either. He had a big black gun pointing right at me.

"That was last night. Today, all day, I've been thinking about it. I'd known that was how some elections got settled in other places. But it never occurred to me before how lucky I was to be a citizen of *this* country. *Here* I vote according to my conscience, not a gun. And I do other things the way I please . . . like going to church, or picking out my own kind of job down at the Republic plant. Try that where there's no freedom!

"That's it . . . *Freedom!* We've got all the Freedom in the world. But, honestly now, do we *really* appreciate it? Do *you?* I admit I've done *my* share of griping . . . probably never will get over that habit.

"But, with Freedom-grabbers at work here as well as abroad, I want to be sure on Election Day that we're *all alone* in that voting booth. With nobody to tell us, *'Put your X THERE!'* No sir!"

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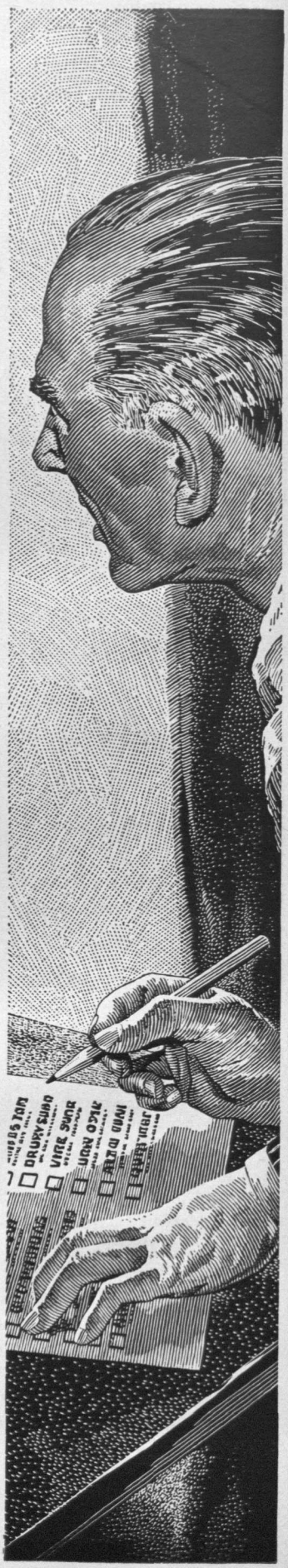

SPARTAN ENGINEER

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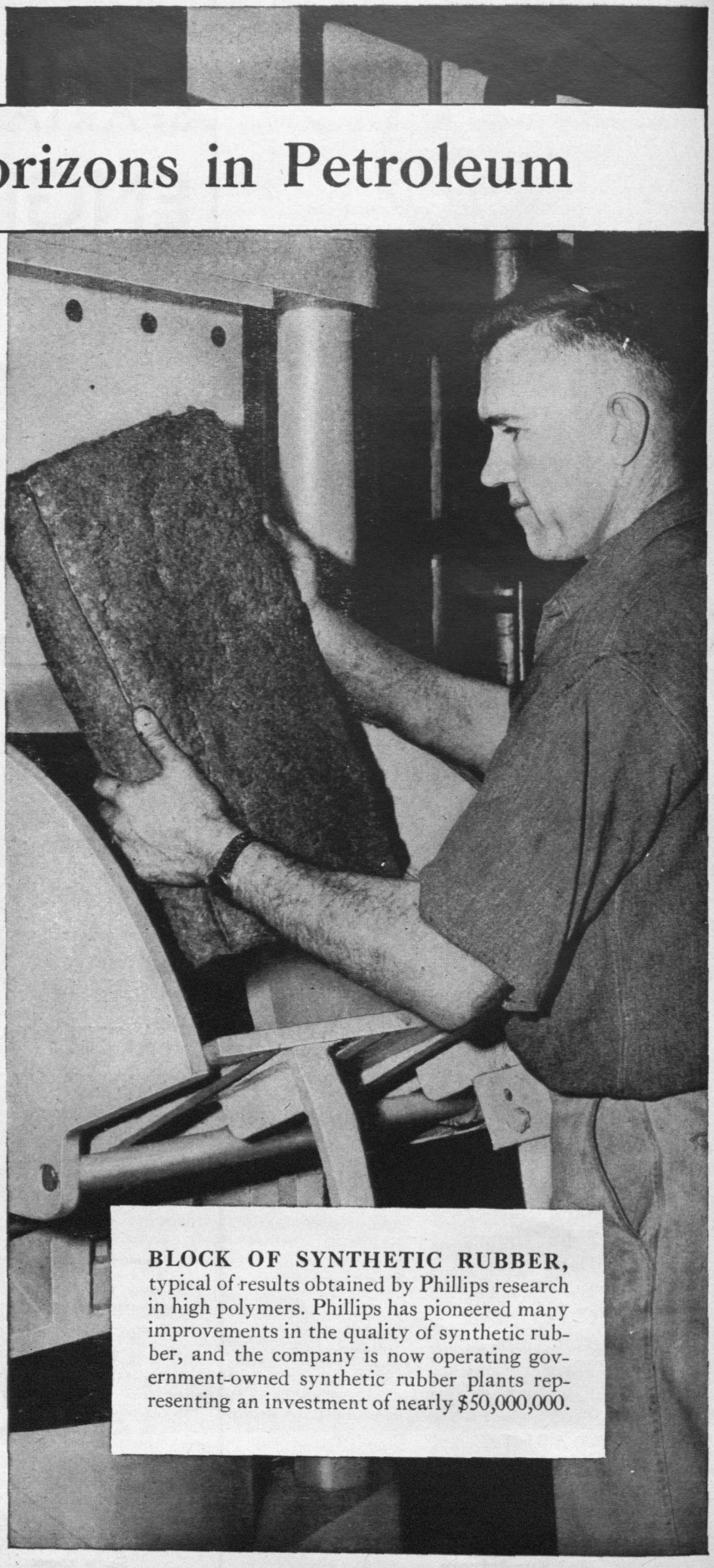

★

WHETHER IT'S BUTADIENE . . . carbon black . . . ammonium sulfate . . . or any of many other products made by Phillips Petroleum Company and its subsidiaries . . . they all have one thing in common. They are derived from crude oil or natural gas.

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We invite qualified men to write to our Employee Relations Department for further information about opportunities with our company.

BLOCK OF SYNTHETIC RUBBER, typical of results obtained by Phillips research in high polymers. Phillips has pioneered many improvements in the quality of synthetic rubber, and the company is now operating government-owned synthetic rubber plants representing an investment of nearly $50,000,000.

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Bartlesville, Oklahoma

RADIOACTIVE WASTE

By ANDREW NESTER
Senior M.E.

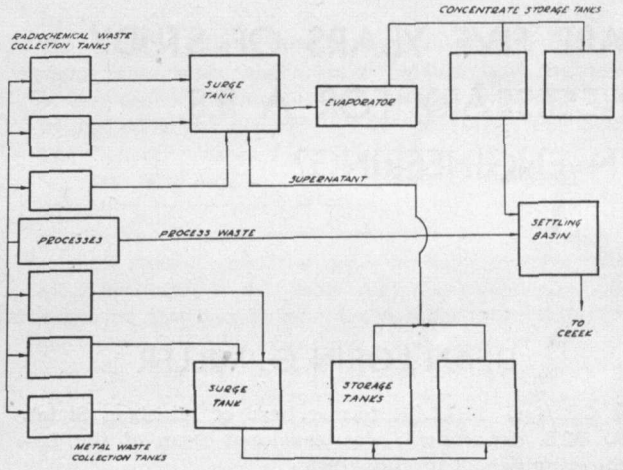
As with any large scale industry, elimination of waste has been an important factor for normal operation. The development of atomic energy industry presents new problems to the sanitary chemist and engineer. In this case, the new problems are much more difficult than those ordinarily encountered. One must think in terms of an expanded use of radioactivity for peace time developments which will of necessity result in the handling of more and more radioactive waste.

Although much has been uncovered by the Subcommittee on Waste Disposal and Decontamination, which operates under the auspices of the National Committee on Radiation Protection, the field is relatively new and will require a more elaborate and intense study for coping with the many problems that will arise from radioactive materials. Radioactive waste is not to be segregated to only chemical solution but also may include other materials such as clothing, utensils, laboratory animals and plants, laboratory equipment and exhaust air. This incomplete list suggests the complexity of the subject. It is not feasible that an article of this nature could do justice to all forms of radioactive waste, therefore for the remainder our interest shall be concentrated toward disposal of liquid waste.

Before liquid wastes can be discharged into receiving streams or rivers, precautions must be taken to prevent contamination of these waters by atomic energy installations. To inform the reader of the task that these atomic energy installations will have to undertake, it might be well to investigate some of the properties of radioactive elements, which directly affects the design of the installation.

Perhaps the paramount factor in dealing with radioactivity is that it cannot be destroyed. No degree of heat or cold, no chemical reaction can speed up or slow down the emanation of particles and rays from radioactive atoms. This is the only agency capable of eliminating the effects of radioactivity. This fact presents the large scale producer of radioactive waste with two alternatives for disposing of it: (a) He can render the radioactive waste harmless by diluting it and dispersing it until the concentration of radioactive components is too low to damage animal tissue, (b) He can separate the radioactive components from the waste, concentrate them to a convenient volume, and store them until time can destroy them by natural decay.

The method used at Oak Ridge National Laboratory which employed a radiochemical waste evaporator followed alternative (b) for disposing of radioactive waste. The evaporator performed the function of concentrating the radio active components of the radiochemical waste and storing it. Its position in the disposal system may be seen on the liquid waste flow sheet (Fig. 1). Here again, time being the necessary factor to deplete the radioactive potency of the material in the concentrated storage tanks.



OAK RIDGE NATIONAL LABORATORY - LIQUID WASTE FLOW SHEET (FIG. 1)

At Knolls Atomic Power Laboratory, evaporation was selected for concentrating radioactive waste because it was the simplest and most certain method of complying with the policy that no detectable amounts of radioactive materials be discharged into the Mohawk River. The allowable limit for "no detectable radioactivity" has been arbitrarily established as 300 disintegrations per minute per liter of alpha activity and 4000 disintegrations per minute per liter of beta-gamma activity. The dilute waste contains up to 1.2×10^4 disintegrations per minute per liter alpha activity and 1.4×10^6 disintegrations per minute per liter of beta-gamma radioactivity.

A forced circulation type of evaporator system having a rated capacity of 500 gallons per hour was used. This system consisted essentially of a flash pan, circulating pump, heat exchanger, a separating tower and condenser.

Cost for highly concentrating the dilute radioactive waste in a safe and effective manner is approximately 3 cents per gallon. Indirect and amortization costs in this installation were about 8 cents per gallon additional.

Two other treatments are employed in some installations. These are treatment of waste by ion exchange

(Continued on Page 22)

FIVE YEAR ENGINEERING?

I. B. BACCUS
Head, E. E. Dept.

L. C. PRICE
Head, M. E. Dept.

ARE FIVE YEARS OF STUDY NECESSARY FOR A B.S. IN ENGINEERING?

DEAN LORIN G. MILLER

LORIN G MILLER former head of Michigan State's M.E. department, was appointed Dean of the Engineering School in July, 1948.

Prior to joining the staff at MSC in 1929, he served with the Western Electric company, was an assistant professor of machine design at the University of Wisconsin, and Dean of Engineering at Des Moines University.

He received a B.S. degree from Des Moines University in 1910, and a B.S. in E.E. there in 1911. He did two years of graduate work at M.I.T. in 1913 and 1914.

Dean Miller was president of the Michigan chapter of the American Society of Heating and Ventilating Engineers in 1936 and 1937. He also served as president of the Michigan chapter of the American Society for Engineering Education.

Prominent in the field of heating and ventilation, he is retained by Montgomery Ward for expert witness in patent cases and has written a number of articles for engineering publications.

SHOULD THE PRESENT UNDERGRADUATE ENGINEERING CURRICULUM BE EXTENDED TO FIVE YEARS?

Dean Miller

THE fundamental purpose of education is to teach the individual to think and to furnish him with knowledge. The reasoning powers developed by mathematics; the insight gained from the study of the physical sciences; the appreciation of the impact of economic, social, and political factors; the ability to correlate knowledge and experience with imagination—all these constitute education in its broadest sense.

The proposition under question must be considered in the light of these fundamentals. Unless engineering is to be placed on a completely graduate status, there is only a limited amount of time available to the undergraduate for the acquisition of these fundamentals. Necessarily this time should be devoted to gaining these attributes which will best fit him to take his proper place as an educated man in our competitive world. It follows that those courses which might be of value only to a technician must give place to those of a broader nature.

Observations have shown that assimilation of engineering material reaches its maximum for 80% of students after four years. Those desiring more formal education usually attend graduate school. If the present system were extended to five years, it might impose financial difficulties for those who have limited funds and impose hardships for students changing colleges.

If the five year plan were to come into effect, all major engineering schools should do so at one time. Smaller schools would then probably follow suit.

IRA BISHOP BACCUS

PROFESSOR BACCUS came to Michigan State College as an assistant professor in 1940 and, in 1947, he was appointed a full professor and head of the electrical engineering department.

Previous to his arrival at MSC, Professor Baccus was an assistant professor at Oklahoma A. & M. He was also associated for a number of years with several private utility companies which include the Texas Power and Light Company, Dallas, and the Central Power and Light Company, San Antonio. During the war, he was a lieutenant in the United States Navy, and an instructor at the U.S. Naval Academy, Annapolis, Md.

Professor Baccus worked in collaboration with seven others to write two electrical engineering textbooks published by the U.S. Naval Institute.

He received his B.S. degree in electrical engineering at Texas A. & M., and his M.S. in electrical engineering at the University of Texas. He also obtained the professional degree of E.E. at Texas A. & M. and did additional graduate work at the University of Southern California and the University of Texas.

Professor Baccus is a member of the American Society of Engineering Education, Association for the Advancement of Science, American Society of Professional Engineers, Tau Beta Pi, Sigma Tau, Phi Lambda Tau, Ancient Free and Excepted Masonry, and Pi Kappa Alpha.

SHOULD THE PRESENT UNDERGRADUATE ENGINEERING CURRICULUM BE EXTENDED TO FIVE YEARS?

Professor Baccus

AS THE scope of modern engineering widens, the need for a more intensive engineering education increases. But as our society becomes more complex, the need for the individual to understand society and his position in it also becomes greater.

It is almost impossible to increase the course load of the present engineering student. Although many students desire both liberal arts and engineering training, they do not wish to see their baccalaureate program extended by an additional year. Since the importance of a broader engineering education seems to be widely recognized, the student might utilize his first few summers in college taking courses that will augment his engineering training. The only change that may be needed in our present engineering curriculum is one of approach. Possibly the basic college is a trend in this direction. An engineer is not made in any specified amount of time, since engineering is an evolutionary process. The only real solution is actual work experience.

Another solution may be to keep the B.S. degree on a broad basis instead of making an attempt to give too much specialization in strictly technical subjects. It would then be generally understood that those students desiring to become specialists must continue with graduate work.

LEONARD C. PRICE

PROFESSOR PRICE joined the mechanical engineering department at MSC in 1942 and, in July, 1949, he was appointed head of the department. Since coming to Michigan State, he has also been in charge of all machine design.

Previous to his work at MSC, Professor Price taught experimental engineering at Cornell University from 1923 to 1926. He then transferred to the University of Arkansas where he instructed mechanical engineering from 1926 to 1942.

Professor Price is a member of the American Society of Mechanical Engineers, Society for the Promotion of Engineering Education, American Association for the Advancement of Science, Tau Beta Pi, Phi Kappa Phi, and Sigma Xi. He is also author of numerous articles in the field.

He received his M.E. and M.M.E. degrees at Cornell University.

SHOULD THE PRESENT UNDERGRADUATE ENGINEERING CURRICULUM BE EXTENDED TO FIVE YEARS?

Professor Price

THE question of four years versus five for an engineering college degree involves three main considerations:

1. The recent increase in both breadth and depth of engineering knowledge.

2. Differences in capability between individual students.

3. Whether a fifth year is proposed to precede or follow the bachelor's degree.

Technological advances have raised engineering from the "mechanic arts" stage to that of a science. In the field of design, for instance, large factors of safety were formerly used to allow for unreliable materials and our ignorance of how they behaved under varying stresses. That method is still used in some cases, but there are many other cases where exact knowledge of the effect of live loads and control of material properties allow the use of factors of safety not much greater than unity. The "ignorance factor" is still with us but is disappearing fast. Engineering today requires an exactitude and an ability to use mathematics and other basic sciences to a degree unheard of in former years.

If all students had the same ability to handle technical problems, a five-year (or more) college course might be the best thing. Individuals differ, however, and only a minority are able to profit by more advanced training. The others, with talents not necessarily inferior but simply different, reach their technical limit at a lower level, and it would be a waste of time, money, and effort to try to train them further.

The most logical answer to the question seems to be in advanced training only for those students who want it and are capable of putting it to use. All must be given a thorough training in engineering fundamentals, but to compel every one of them to attend college five years for a bachelor's degree would be unfair to those who neither want a fifth year nor can use it. This is especially true as long as there are many colleges which would certainly continue to give the same degree after four years. All the arguments about how poor those colleges were would not alter the fact that all bachelor's degrees look just alike on paper.

No definite line is agreed upon as to where the fundamentals end and advanced training begins. But whether the dividing line belongs at the end of the present four-year course or not, one conclusion seems clear:

1. Grant a bachelor's degree at the end of a college course in the fundamentals of engineering. Let those who can and will take advanced training continue for a master's or even a doctor's degree.

If it is decided that four years are right for the fundamental training, then we are led to a second conclusion which answers the original question:

2. Give the bachelor's degree at the end of four years of study during which the fundamentals are emphasized. Give a master's degree at the end of a fifth year for advanced study and specialization.

"Falling Leaves"

ANNUAL ENGINEERS' BALL TO BE HELD NOVEMBER 10

By MARGARET FETTIG
Senior Journalism Major

NOVEMBER 10 is the date for all engineers to circle on their calendars for that is the day of the eighteenth annual Engineers' Ball, sponsored by the Engineering Council.

Previous to the first ball, the Engineers used to hold an annual banquet. Then, in 1932, it was decided that instead of a dinner, a yearly dance should be held. The first ball was at the Masonic Temple in Lansing and was a closed affair for Engineers only. However, since the war, the Engineers' Ball has been an all-college dance and semi-formal rather than strictly formal.

"Falling Leaves" is the theme of the dance this year which is being held in the Women's Gym. The decorations committee, headed by Jerry Lampe, is working hard to give the dance a true breath of autumn through their artistic achievements.

Multi-colored leaves will be strewn about the edges of the floor and gay streamers of crepe paper will adorn the walls and ceiling as some 300 couples dance to the music of Drexel Lamb and his 10 piece orchestra.

Drexel Lamb, who played at Island Lake last summer, has gained a great amount of popularity throughout the Mid-West for his many fine performances at various college dances. Lamb's style is very similar to that of the old, and well-loved band of Glenn Miller. Lamb features his rhythm section along with five saxophones and a trumpet.

Also featured with the band is Miss Dorothy Ryan, vocalist, who was formerly with the Sonny Dunham band.

Other decorations will be miniature bridge structures, triangles, and crests of all engineering societies on campus. Even the tickets will be made up in the form of slide rules.

Fifteen of the 20 door prizes will be subscriptions to the Spartan Engineer and the remaining five will be revealed at the dance.

During intermission, "Miss Engineer" and her court will be introduced by master of ceremonies, Chops Munir. "Miss Engineer," who is a pert green-eyed brunette by the name of Barbara Vogel, will then be presented with a crown which she will wear for the remainder of the ball.

Barbara is a sophomore from Adrian, where she was named "Miss Aviation" last summer. She was also a member of the Harvest Ball court a year ago.

The members of "Miss Engineer's" court are Joan Dever, Detroit senior; Marilyn Griffin, Pontiac junior; and Jo Pickens, Royal Oak junior. The queen and her court, who are the first group ever named by the Engineers, also reigned at the Engineers' Exposition last spring.

Committee chairmen for the ball are: publicity, Bob Kitchen and Paul Eaton; decorations, Jerry Lampe; and tickets, Harry Lipsitt.

Tickets are now on sale at the Union desk and the Engineering office in Olds Hall, or they may be purchased from any member of the Engineering Council.

THE CYCLOTRON
ELECTRONIC MAGIC

By L. BRUCE MILLER
Senior E.E.

IN the hills near Berkeley, California, is a building that looks like a toy roundhouse from a distance, but inside this building it looks large enough to hold a football stadium. This is the home of one of the largest cyclotrons on the earth.

The control room is located along the circular wall. Countless black panels are speckled with hundreds of indicators, clocks, lights, buttons, and switches. Blue, green, and amber moving lines flash messages on dials. In the center of all this electronic magic is a man who can shut off the whole atomic "shooting match" with one finger. He watches the dials, makes calculations, and decides what the 4000 ton electromagnet is to do.

This cyclotron weighs 4900 tons. The 4000 ton electromagnet contains enough steel to build an ocean liner. It imparts extremely high velocities to atomic particles by using electrical impulses.

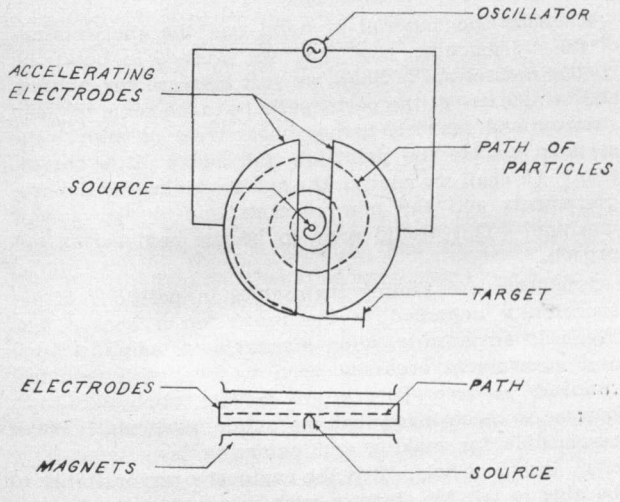


Fig. 1

Fig. 1 shows the principles of the cyclotron. Atomic particles such as deuterium (heavy water) nuclei are released from the source. The accelerating electrodes impart high velocities to the particles. They travel around in a spiral until they fly off at a tangent and strike a target. A timing system controls the electric impulse which increases the speed of the bullets as they cross the gaps between the electrodes.

Atoms are composed of electrons whirling about a nucleus in their respective orbits. These parts of the atom can be smashed with the present high voltage cyclotrons, but there are other subparticles called positrons, mesons and hypothetical particles called neutrino. These subparticles are what scientists are primarily interested in at the present time. Cyclotrons must duplicate the atom smashing cosmic rays of nature to release these particles.

Mesons are particles which come very close to zero, both in the space they occupy and the time it takes for them to emit their energy. They are believed to have binding force which holds the atomic nuclei together.

According to Einstein's theory of relativity, energy is converted into matter at high velocities. This caused some trouble in the early cyclotrons. As the particles which were being accelerated approached the speed of light their masses became greater. This caused the particles to slow down and the timing system was thrown off.

This limited the cyclotron operation to less than one million volts because greater voltages imparted velocities to the particles which were too great. But relativity was thwarted with a frequency modulator which operates on the same principle as FM radio. This modulator adjusts the frequency of the electric impulses to the speed of the particles, and enables cyclotrons to attain voltages of 400 million volts.

All 92 elements can be made radioactive by bombarding them with particles. Bombarding an atom changes a stable structure to an unstable structure, causing it to emit radiation. Some of the elements can be changed to an element which is lower in the atomic scale, such as iron to cobalt, or manganese. Radioactive elements are used in industry, biology, medicine, chemistry and agriculture as well as in research work.

Radioactive elements retain all the physical properties of the original elements, and are utilized exactly the same by plants and animals. Scientists can use these facts to learn many things about living things. By supplying a radioactive element to a living organism they can trace its path through the body with a geiger counter. Such small amounts of the substance are used that it has no ill effects on the body. Tests have shown such things as how long it takes a substance to be dispersed throughout the body, and how much of a substance is destroyed in a 24 hour period.

Radioactive yttrium is being used in the industry. It emits a ray which will penetrate up to ten inches of steel. By placing a photographic plate on one side of a steel plate and shooting these rays through it, any flaws in the steel can be detected by dark spots on the photographic plate.

Radioactive materials are being used experimentally in the treatment of diseases. Beams of neutrons can penetrate deeply into living tissue and release local radiation which can be made intense enough to kill cells. Much work has been done with this in the treatment of cancer patients.

From the above examples, it can be seen that developments in the radioactive field are unlimited and a large number of engineers will be required to expand this field.

"LET'S BUILD A BETTER MOUSE-TRAP"

LORIN G. MILLER
Dean of Engineering

THE scientific advances of a nation are largely generated by a comparatively small number of scientists, thinkers and scholars. Like the traditional mousetrap builder, the world has literally beaten a pathway to the individual doors. The names of Edison, Bell, McCormick, Westinghouse, Einstein and Steinmetz illustrate the point. These men were forerunners of today's engineers in whose capable hands lie the technological advancement of the future.

However powerful the engineer may have been in developing the nation scientifically and forcing industrial revolutions, he is almost never a leader in exploiting his own product. As one writer has said he has "brought forth tools and agencies of tremendous power —and left them lying around to be picked up by anyone, to use for any purpose. It is as though we made up nice packages of gunpowder and matches, and scattered them around in a kindergarten and walked away." It remains for the engineers of the future to interest themselves in the control of the powerful items he has produced.

To build a better mousetrap, or a better engineer, one must first consider the material at hand. What are the mental and moral resources of the raw material of which engineers are made? First he must have a better-than-average mind with some ability or discipline in logical and orderly thinking. Reason and reasoning are to be his stock in trade. In addition he must be endowed with imagination or at least a spark of originality. Dishonesty may not exist as a part or an alloy of the engineer. He is responsible for the comfort, health and lives of his fellows as well as great investments in time and money. And finally this reasonable, imaginative, honest individual must be endowed with enough industry, persistence and confidence and blessed with such a fair measure of health and strength that objectives can be accomplished.

But what of the old mousetraps? Engineers as a body are prone to exhibit more interest in "things" than in people. He is not given to inquire into what makes folks act like they do. This type of personality is apt to be lacking in the element commonly called "leadership." His training has had so much emphasis placed on truth and precision that he fails to express himself so that laymen can understand him. More than that he is not inclined to express himself at all in public. Likewise his habit of depending upon calculated results has impaired his intuitive judgment. Another expression for such judgment is "common sense" in which the engineer is not apt to rate high.

Knowing the material at hand and the shortcomings of the old machine, how shall we proceed to build the "better mousetrap?" Shall we just increase the number and complexity of the parts, perhaps make some of them stronger and heavier, perhaps heat treat or alloy some sections, change the paint-job and add a little chrome trim? Or shall we analyze the shortcomings, the new requirements and the new markets and design a new machine? This would seem to be the engineering approach.

Engineers are finding themselves in positions of responsibility unknown to the profession a decade ago. Fields in advertising, sales, management, administration and government are now open to men with technical training. As a corollary to this fact the whole world has become so mechanized that the public, particularly those responsible for making and enforcing laws must have some technical help. It is the engineer's responsibility to be able to tell his story in such words that the laymen can hope to understand him.

World affairs are in such condition that it will require the combined effort of all trained men to maintain progress toward an acceptable way of life for the peoples of the world. Engineers have provided the necessities and then the luxuries of life. They have also developed the production of destructive agencies to the point where, if used, such civilization as we have could be destroyed. They must gain experience with human problems as they have learned to deal with physical problems.

I am confident that engineers when convinced that they have a greater part to play will prepare themselves for it. They should become convincing in speech, immovable in morals and active in politics. Undergraduate years provide the time, the place and the facilities for such preparation.

CLUB AND SOCIETY NEWS

EDITOR'S NOTE: Club and Society News is a regular feature of the SPARTAN ENGINEER. If you are in an engineering society, honorary or club which does not have a story of your activities in this issue, I suggest your organization appoint a publicity chairman who will report your group's activities for each issue. News of physics, math and science organizations is also welcomed. This news should be turned into the SPARTAN ENGINEER office not later than Dec. 1 for the January issue—A. V. N.

J.E.T.S.

Junior Engineering Training School

This is the Golden Age of Engineering—golden in opportunities, for achievement and service, for rewards and opportunities. Never before have the demands for engineers been greater, nor the need for technical men more critical. The sense of satisfaction, the feeling of pride, and the rapidly increasing financial rewards for graduate engineers exceed all previous expectations.

Dean L. G. Miller of Michigan State College's School of Engineering foresaw the present engineering shortage, which has now become so acute that some national leaders are predicting it will be our defense bottleneck. Therefore, he conceived the idea of a "Junior Engineering Training for Schools" Club for high school students. J.E.T.S. is a chance for high school boys to become junior engineers.

J.E.T.S. Clubs have already been organized in such places as Belding, East Lansing, and Bath, Michigan. J.E.T.S. Club members begin as apprentices and advance to junior and senior engineers.

Any group of four or more who are interested in engineering may form a club in their high school. The club offers opportunities to know engineering through engineering projects, visits with engineers in industrial plants and on construction jobs; to have engineers come to the club and explain the different branches of engineering.

It also offers opportunities to visit the Engineering Exposition at Michigan State College, see movies about engineering, and to compete for a college scholarship at the Engineering Exposition at Michigan State College in May.

The officers of the club are: Captain, First Officer, Communications Officer, Navigator, and J.E.T. Pilot from the high school faculty, plus consulting engineers from industry.

It is possible for one member from any club to win a college scholarship for next year. If you are interested in having fun while learning about engineering, just drop a card to: Lorin G. Miller, Dean, School of Engineering, Michigan State College, East Lansing, Michigan.

ENGINEERING COUNCIL

The Engineering Council recently held its first meeting of the 1951 fall term. New officers for the year are:

A. Verner Nelson, president
Donald Davis, vice president
Paul Kline, secretary
Robert Gay, treasurer

The Engineering Council is composed of two members from each of the various engineering societies on campus and one from each honorary.

Professor H. P. Skamser, faculty advisor to the Engineering Council, talked on the shortage of engineers and explained what MSC is doing to remedy the situation.

He outlined the Junior Engineering Training for Schools plan which consists of setting up a JETS club in Michigan high schools to give prospective engineers some insight as to the opportunities and varied fields of engineering. The Engineering Council has pledged its support of the MSC JETS program.

Plans for the Engineers' Ball, which is to be held on November 10 in the Women's gym, were discussed and committees appointed. The dance is to be an all-college semi-formal affair with tickets at $2.00 per couple.

The Engineering Council wishes to bring to the attention of the engineering societies this tentative bi-weekly meeting schedule which was proposed last year.

The schedule is designed to eliminate conflicts in meetings with other societies, and it is suggested that the organizations concerned try to arrange their meeting schedules in accordance with it.

2nd Tuesday of November — ASCE, ASME, ASAE, AIChE, ASM, AIEE, Eta Kappa Nu
2nd Wednesday of November — Engineering Council
2nd Thursday of November — Phi Lambda Tau
1st Tuesday of November — AFS, SAE, ASH and VE
1st Wednesday of November — Pi Tau Sigma, Chi Mu Epsilon
1st Thursday of November — Tau Beta Pi

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AMERICAN INSTITUTE OF CHEMICAL ENGINEERS

The purpose of the American Institute of Chemical Engineers is to bind more closely together the students enrolled in chemical engineering; to acquaint them with the code of ethics of the profession; and to prepare them for membership in the parent organization.

All students, including freshmen and graduates, majoring in chemical engineering are eligible for membership.

Meetings are held throughout the year, for which speakers are brought in from industry to talk on and discuss various phases of the profession.

Other activities include a winter term banquet, spring term picnic, occasional field trips to industrial plants, and participation in campus activities such as the Activities Carnival and the Engineering Exposition.

(Continued on Page 26)

ALUMNI NEWS

(Contributions to this feature are welcomed.
Send to Alumni News Editor c/o Spartan Engineer)

LEWIS J. Patterson, C.E. '39, has been appointed Assistant Manager of Operations for the Michigan Limestone and Chemical Company, at Rogers City, Michigan. The appointment was effective as of July 1, 1951.

Herbert L. Helbig, Ch.E. '43, is now Division Manager for the Central Atlantic Division of Reichhold Chemicals, Inc., and is located in Charlotte, North Carolina, where the company is building a new plant. The Atlantic plant will specialize in the manufacture of synthetic resins for the area's paper, plywood, furniture and textile industry.

Lee J. Rothgery, C.E. '21, was a campus visitor recently. He is now Associate Engineer for the California Institute of Transportation, which is located at the University of California, Berkeley 4, California. Mr. Rothgery was connected with the Civil Engineering Department at State before going to California.

Prof. C. M. Cade, C.E. '13, retired as Professor of Civil Engineering at State last July, and is now located in San Diego, California, where he plans to teach for the next year or two at San Diego State College.

Robert G. Parkhurst, E.E. '43, visited East Lansing and the States this summer. He is now located at Caracas, Venezuela, and is connected with the International General Electric Co.

Donald J. Alverson, M.E. '50, has just published a technical report on "The Effect of Annealing Upon Castings Containing Burned on Sand" for the Foundry Educational Foundation of Cleveland, Ohio. Alverson is a Core Room Supervisor at the Eaton Manufacturing Company plant at Vassar, Michigan, and his report was selected as an example of outstanding achievement of a recent M.S.C. engineering graduate in the cast metals industry.

Eldon Shotwell, Ch.E '38, is Process Engineer in the Electroplating Department of Ternstedt Division of General Motors, and is now located in Detroit.

Herbert Lloyd, Mte. '50, is studying for his M.S. Degree at M.I.T. He was a summer visitor on the campus and reported that he had met Jim Jursik, E.E. '51, who has started his advanced work there, and that he frequently saw Fred Buttner, Mte. '44, who has completed his Ph.D. work at M.I.T. Both Herbert and Fred work under the direction of Professor Howard Taylor, who graduated from M.E. at State in '36.

Albert Kurisu, M.E. '51, reports that he arrived safely in Hawaii. He is with the Pearl Harbor Naval Shipyard Commission, and lives at 536 Main St., CHA-3, Honolulu.

Charles Brum, C.E. San. '51, is with Drury, McNamee & Porter, Ann Arbor, Michigan, and lives at 316 Thompson St.

Walter Chmielewski, M.E. '51, is with the Union Electric Company of Missouri, and now makes his home in St. Louis, Missouri. Brother Jerome, M.E. '51, is with the U. S. Rubber Company, 6600 E. Jefferson, Detroit, Michigan.

Adrian Chamberlain, Ag.E. '51, is doing graduate work at Washington State College, Pullman, Washington.

John Clay, C.E. '51, is with the Boeing Airplane Co., at Seattle, Washington.

Ray A. Friend, M.E. '51, is with the Saginaw Malleable Iron Central Foundry Division of General Motors, and is making his home at 1821 Hanchett, Saginaw.

William (Bill) Throop, C.E. San. '51, is working for Chain Belt Co., Milwaukee, Wisconsin, and reports that he sees Bob Easter, Herkie Bowers, and Tracy Clark occasionally.

William D. Barnes, Ch.E. '48, is Research Chemist for Interchemical Corp., 432 W. 45th St., New York City. He is working on his M.S. Thesis in Ch.E. at Polytechnic Institute of Brooklyn.

Robert Brezsny, Ch.E. '48, has returned to Michigan from Oklahoma and is now employed by the Peerless Cement Corp., 8941 W. Jefferson, Detroit 17, Michigan.

Gerald Edgerly, Ag. E. B.S. '48, M.S. '51, is with the U. S. Rubber Co., Detroit, as Junior Technician, and is working on rubber research for agricultural machinery.

Clifford F. Grary, Jr., Ch.E. '48, is partner in Gray Equipment Co. and lives at 1007 S. Highland, Dearborn, Michigan.

Robert Hitchcock, M.E. '48, is District Manager for The Louis Allis Co., in Engineering Sales Department. He is with the Grand Rapids Branch and lives at 1657 Chamberlain Ave.

Gerald Klinger, M.E. '51, has just accepted a position with the Olds Motor Company in Lansing.

Don Morfee, C.E. '48, has been transferred by the American Bridge Co., to the Boston Office. His home address is 111 Independence Dr., Chestnut Hill, Massachusetts.

Fritz Bowers, C.E. '48, is now with the Commonwealth Associates, Consulting Engineers, Jackson, Michigan.

William G. Roper, M.E. '48, is with Westinghouse Electric Corp., and lives at 647 4th St., Sharpsville, Pa. Reports that he has just moved into a new home.

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ENGINEERS IN SERVICE

Willard E. Barrett, '50, was previously with American Air Filter of Kentucky and is now teaching in the artillery school in Fort Sill, Oklahoma.

Pvt. John D. Bottje, '50, is an instructor in the use of basic hand tools at Camp Gordon, Georgia.

Lt. Donald R. Brundage, '50, is training officer for basic training group of Signal Corps Replacement Training Center, Co. 12 BTG-SCRTC, Camp Gordon, Georgia.

Lt. Baldwin R. Carr, '50, has been missing in action since April 25, 1951. No further information to date.

James R. Carr, '50, was discharged from the Navy in August and is now with Foster Engineering Co. of Lansing.

Lt. Charles L. Cheever, '50, recently completed a thirteen-week course at Ft. Monmouth, New Jersey.

Lt. William G. Clemons, '50, is assistant Air Adj. General with the 2847th Transportation Control Wing, U.S.A.A.F., Newark, New Jersey.

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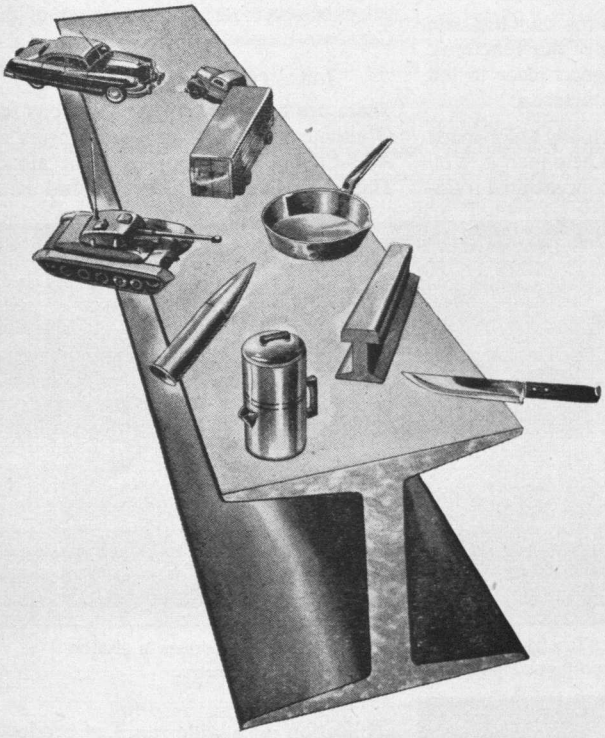
"THAR'S GOLD IN THEM METALLURGICAL FIELDS"

By LAWRENCE S. KLASS
Senior Met.E.



I bet you recall the good old days when Dad was a youngster and when full-length skirts and bustles were as popular as Bikini bathing suits are today. I imagine you also recall the cry that sounded and resounded at Sutter's mill about 102 years ago that "Thar's gold in them thar hills."

Today a similar cry is arising throughout the country and that is that "Thar's gold in them thar metallurgical fields." The only difference is that the response to this modern cry has been slight and the gold to be found does not exist in the form of gold nuggets or gold dust. For this metallurgical bonanza consists of expanding opportunity—yes "golden" opportunity in a very old art, but an extremely young science, because a few years ago metallurgists were as unknown as the nickel beer is today.

The question may arise that if such wonderful opportunities exist, then why not a great surge within this field? The answer lies in the fact that most of the people in this country either have no idea of what metallurgy consists of or else just a vague idea. However, the public is not at fault for extremely few high schools teach any metallurgical courses, and very few colleges offer metallurgical curricula. It is unfortunate this condition exists. It can be remedied in due time, but education must lead the way, for what we want in the nation we must first put in our schools.

As for a metallurgical career in general, it may be concerned with steel, cast iron, copper, aluminum, brass, bronze or any of the dozens of existing metals and alloys. It may have to deal with their application in industry or the testing of their properties. It may involve production in furnaces, rolling mills, forge shops or foundries, research, heat treatment and design. Last but not least consulting, teaching, and editing or writing may be added to the list of the general frontiers in metallurgy.

Quite often the question arises as to whether metallurgical engineering is an important profession or not. The answer is **definitely,** that it is. It would be practically impossible to name one commonly used modern product that does not contain metal, is not manufactured by the aid of metal, is transported without the help of metal or is consumed or utilized without the aid of metal. Without metallurgy there would be no airplanes, automobiles, telephones, refrigerators, tools, and hundreds of thousands of other useful things we take for granted, existing from a range of products that vary in size from ball-bearings you can conceal under your fingernail to gigantic diesel and electric locomotives.

All the mentioned achievements were not contrived solely by metallurgy for no branch of science is independent of every other. Each borrows from the other and each aids the other's usefulness. Regardless, metallurgy is indispensible to modern civilization; for a glimpse at one field only, that of transportation, will reveal how basic and important was the aid given by metallurgy and metallurgical engineering in building America.

As for interesting work, the field of metallurgy leads the way for the metallurgist or metallurgical engineer who works in a world of natural secrets and meets the challenge of producing and creating for mankind by bending nature to his will.

Perhaps you have seen Walt Disney's film, "Nature's Little Acre," where living creatures were observed in their natural environment and splendor. It was spellbinding for it showed the beauty of nature as few of us actually observe it. Well, metallurgy is of a similar category, for it is nature's little metallic acre and the wonders observed both visually and under high powered microscopes are striking and extremely interesting.

Also very interesting is the general plan for training young men for the metallurgical profession. The first two years in training are largely devoted to the fundamentals of science, as are most engineering courses. After this indoctrination, the student is introduced to the science of metals, followed by the practical application of this science in heat treatment, cold working, grain growth, hardness testing, photomicrography, and countless other tools of metallurgical engineering. During this period the student obtains experience in electroplating, chemical spectroscopy, atomic physics, and

(Continued on Page 22)

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

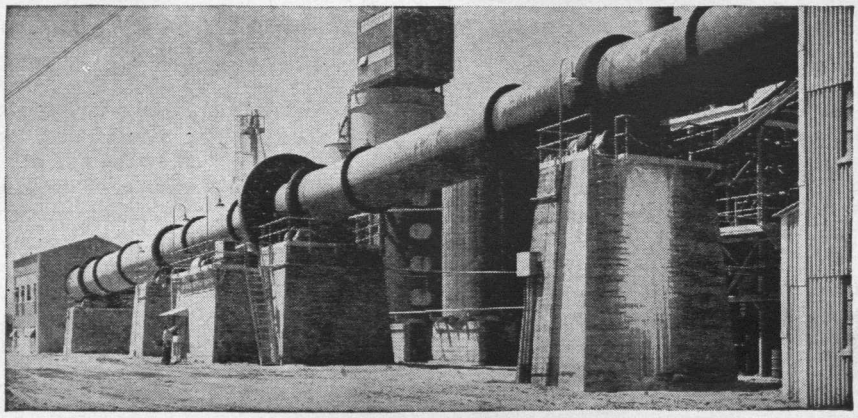
By that time I'd seen a lot of the Company, both product design and manufacturing, and I knew I liked working with people better than with machines, so it was just the break I wanted. During the war I was in the shops on personnel work, got a thorough grounding on operations carried on throughout the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

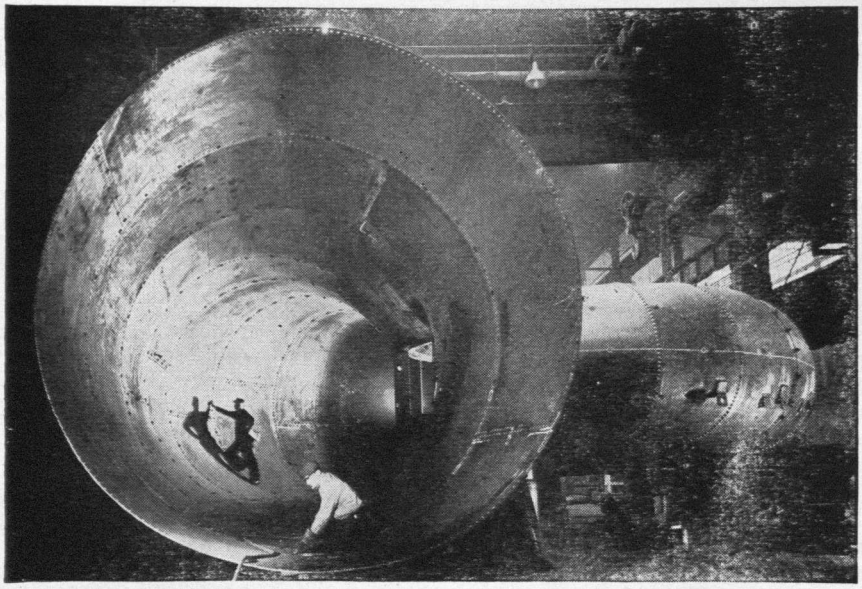
The course here is actually tailor-made for each man, and you help plan it. You can work it out to get concentrated training and experience in almost any phase of work that you want . . . even go on and get advanced degrees. Or, like so many of us, you may use it as an opportunity to get experience with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

New Developments

NEW AUTO-PILOT FOR SHIPS

THE US Navy is now possessor of a completely automatic marine pilot system, capable of holding a ship to within one-half a degree of its exact course.

Three main features give the automatic pilot an advantage over the hand method of piloting a ship. First, it has an automatic compensator that "trims" the ship when there is more force or resistance on one side of the ship than on the other. This prevents the ship from going on a circular course, should there be any deviation in force.

Then for making turns, there is an automatic compensator that prevents the vessel from turning past the desired compass heading. A third advantage is a weather adjustment which can be set to minimize rudder action in heavy seas, cutting down stresses on the hull caused by excessive rudder action.

In addition to these advantages, the auto-pilot will save fuel because of less rudder moving, and will require almost no maintenance. This is because it has some magnetic amplifiers that can be used to step up the power as it is needed.

Finally, the instrument has an override, which in case of an emergency, can be fixed for a helmsman to take over.

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DIRECT RECORDING FOR FILMS

Motion picture producers now can do their own recording directly onto film.

By means of a magnetic stripping applied to a film and a prototype camera, the sound can be recorded on each film directly. This means that a film can have any number of sound tracks, and that they can be recorded on a previously made film.

The new film, Magna-Stripe, is made by placing a strip of magnetic oxide on the base side of a standard black and white or color film. The stripping, approximately 1/10 inch wide for 16 mm., can be placed on the film either before or after it has been used for picture taking, and even if it already has an optical or photographic sound track.

The projector used with the magnetic tape is equipped with a microphone, through which sound is recorded, and can be played back immediately after the recording is completed. If revisions are necessary, an electronic mechanism will erase the sound from Magna-Stripe, and the recording repeated.

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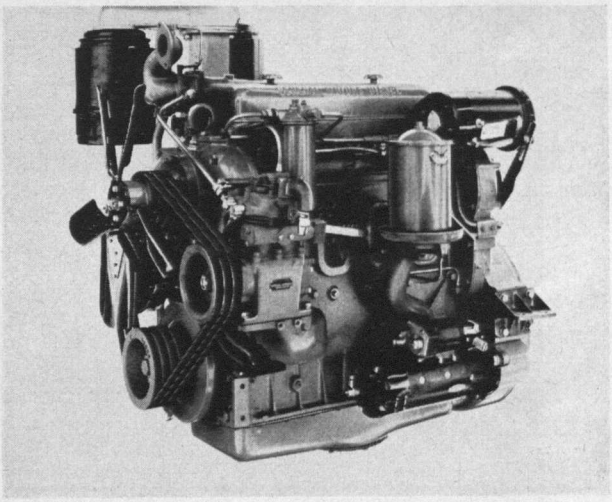
MILLION-MILER DIESEL

The Million-Miler is a new Diesel engine developed by General Motors for use in future GMC trucks.

Horsepowers in the new engine have been increased from 133 to 150 in the 4-71 series, and from 200 to 225 in the 6-71 series. At the same time, a fuel saving-device has been installed in the form of a Fuel Modulator, an automatic control that feeds exactly the right amount of fuel and air for maximum efficiency regardless of throttle position. The Modulator regulates the fuel flow at 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



An exterior view of General Motors' new "Million Miler" Diesel engine

range when he should have shifted into another.

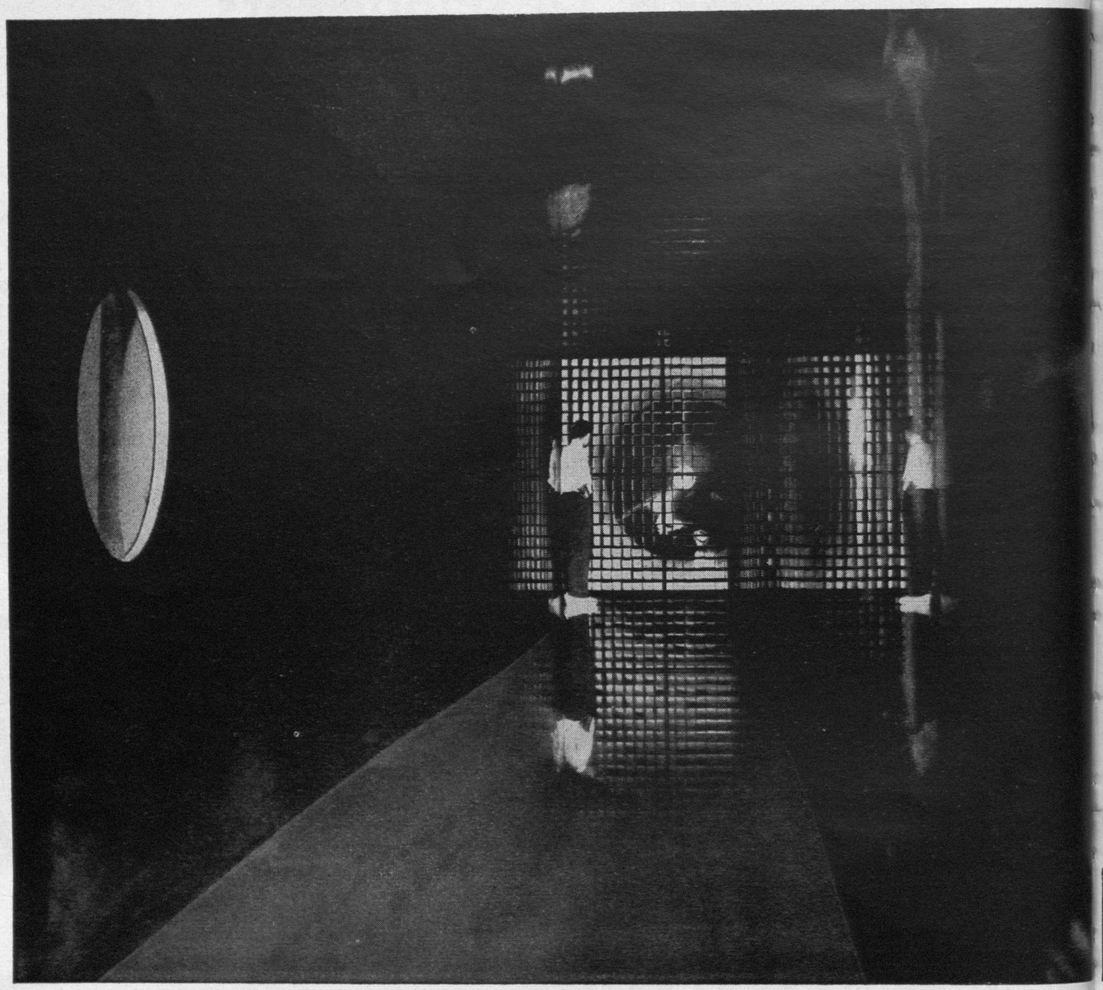
Another new feature of the Million-Miler that has increased horsepower is a camshaft that keeps valves opening through a greater portion of the shaft revolution, as compared to the former engines. The new camshaft opens the valves longer, providing freer breathing, better scavenging of the burned gases,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

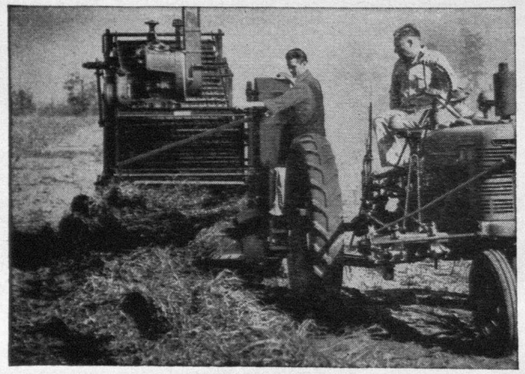
To supply the necessary amount of fuel, the fuel injectors have been changed from 70 cu. mm. on the old engines to 80 cu. mm. on the new Diesel. To lessen the need for shifting, the governed top speed of the new engine has been increased from 2000 rpm. to 2100 rpm.

The cylinder head and cylinder block have ground faces, allowing metal-to-metal contact without need for a head gasket. Synthetic rubber rings and strip gaskets seal water and oil openings, while a cupped washer type ring seats on the individual cylinder sleeve and seals the combustion chamber. The cylinder head is heavier-proportioned, with increased wall thickness, heavier ribs and struts to minimize deflections, while the crankcase

(Continued on Page 28)

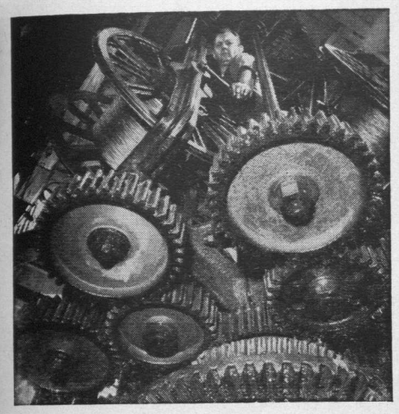
Only STEEL can do so many jobs so well...



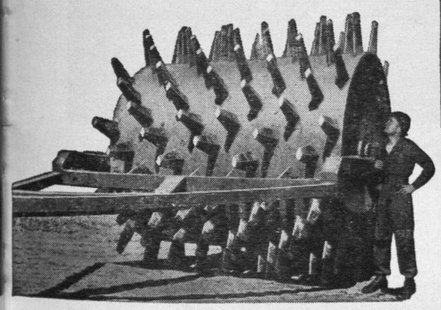


CAVE OF THE WINDS. This largest "supersonic" wind tunnel in the world—at the National Advisory Committee for Aeronautics, Lewis Laboratory, Cleveland—is capable of providing air velocities up to twice the speed of sound for aeronautical research. The tunnel's testing chamber measures 8 by 6 feet, and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

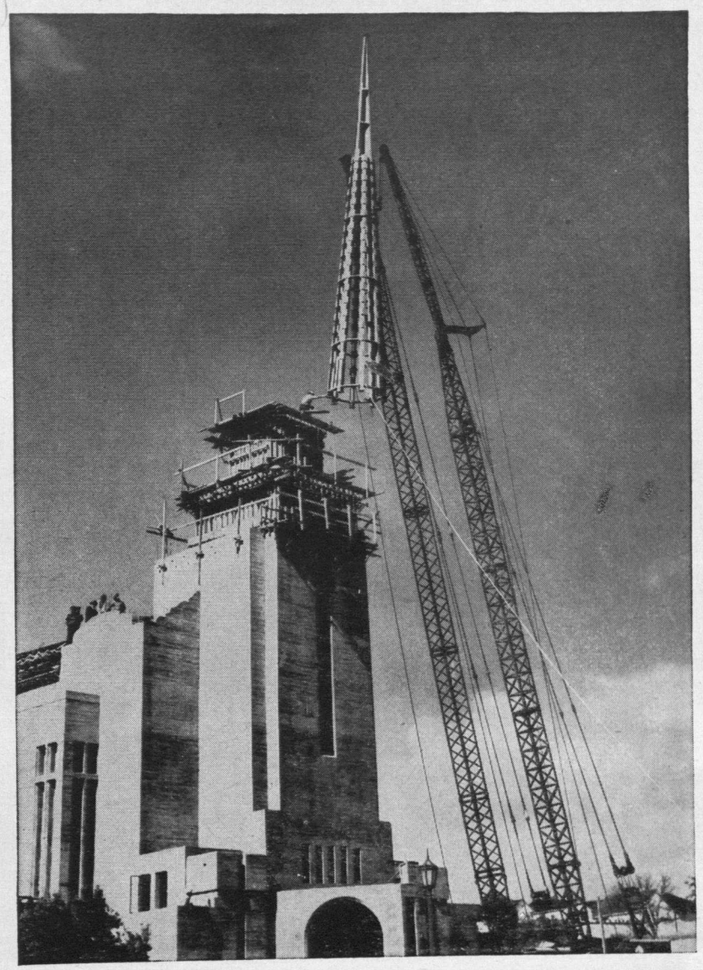
NEW WAY TO GATHER GOOBERS. This new peanut combine threshes along the row where the peanuts are grown, gathers up nut-laden vines, picks them clean, and deposits the mulch to condition the soil for the next crop. In tests, it has reduced harvesting man-hours per acre from 30 to 4, lets two men do the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



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.



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.



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.

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

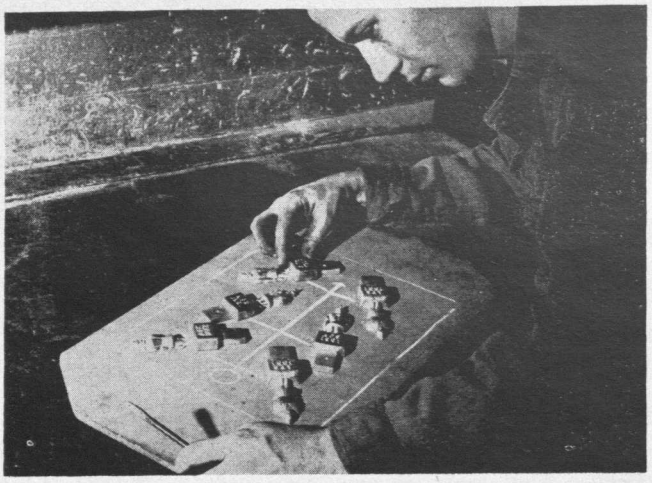
UNITED STATES STEEL

Helping to Build a Better America

This trade-mark is your guide to quality steel

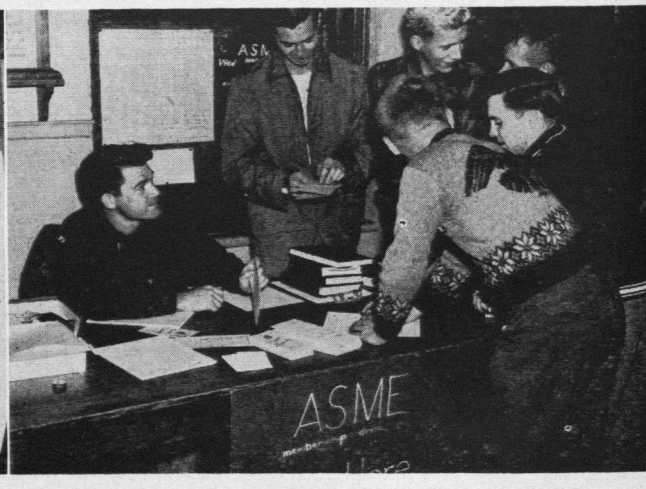
AMERICAN BRIDGE COMPANY • AMERICAN STEEL & WIRE COMPANY and CYCLONE FENCE DIVISION • COLUMBIA STEEL COMPANY • CONSOLIDATED WESTERN STEEL CORPORATION • GERRARD STEEL STRAPPING COMPANY • GUNNISON HOMES, INC. • NATIONAL TUBE COMPANY • OIL WELL SUPPLY COMPANY
TENNESSEE COAL, IRON & RAILROAD COMPANY • UNION SUPPLY COMPANY • UNITED STATES STEEL COMPANY • UNITED STATES STEEL EXPORT COMPANY • UNITED STATES STEEL PRODUCTS COMPANY • UNITED STATES STEEL SUPPLY COMPANY • UNIVERSAL ATLAS CEMENT COMPANY • VIRGINIA BRIDGE COMPANY

ENGINEERS

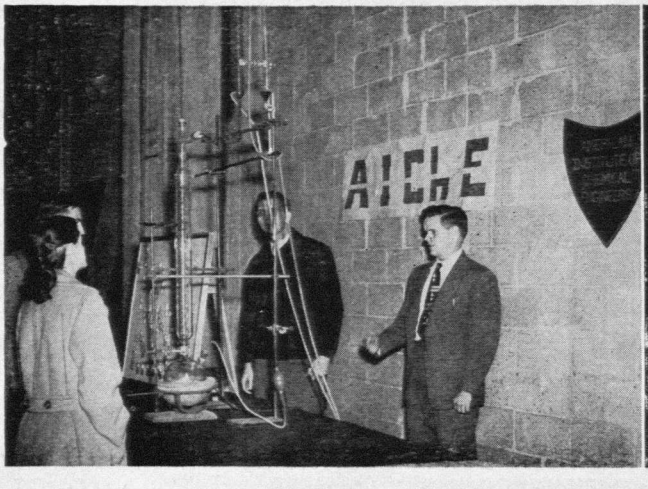


Making Souvenirs for A.F.S. Banquet

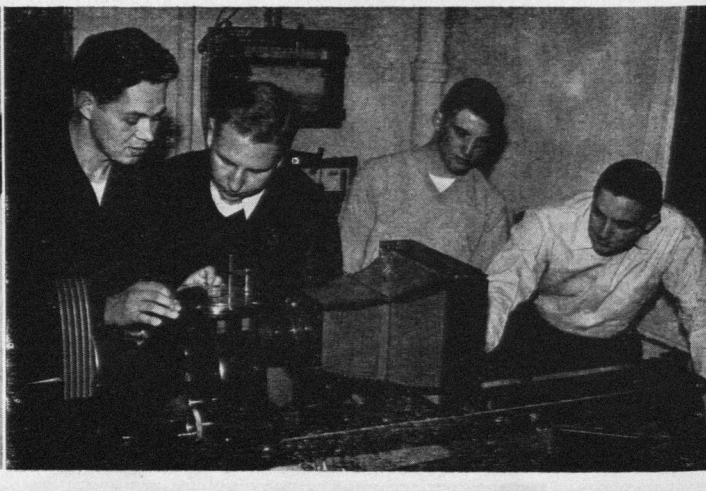
A.S.A.E. Exhibit at Activities Carnival



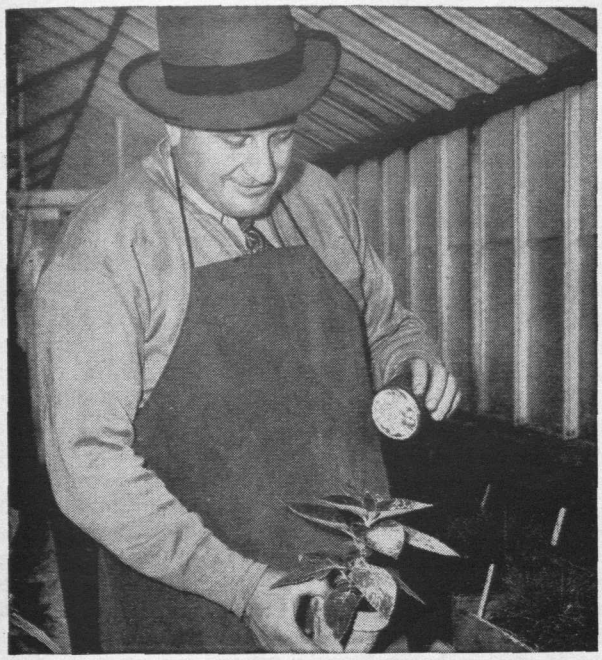
A.S.M.E. Recruiting Members in Olds Hall



A.I.Ch.E. Display at Activities Carnival



A.S.M. Making Photo-Micro Graphs



AL ENDRES IS ONE of a team of Standard research men engaged in testing the effectiveness of a new powder against plant fungi in the greenhouses at Whiting. Men at Standard Oil's Whiting laboratories often work in close conjunction with research projects at university centers.

AL CHECKS EFFECTS of a spray on an apple tree with Lloyd Boyd. This is part of another project being carried on in our Whiting greenhouses. Al also worked on control, and corroborative tests that led to development of petroleum fractions to kill weeds.

How chemistry is winning the War on Weeds

AGRICULTURAL weed control has for a long time presented chemistry with one of its most interesting problems. Recent successes in this field by petroleum scientists demonstrate the broad scope of activity to which research men in Standard Oil's Whiting laboratories are daily exposed.

The story of weed control begins with wartime manpower shortages on truck farms. Vegetable crop failures increased because weeding could not be done by hand. Scientists discovered that certain petroleum cuts would rid carrot crops of weeds without harm to flavor.

This led to further experiments on the weed-killing possibilities of petroleum fractions by Dr. B. H. Grigsby and his assistants at Michigan State College—cooperating with groups of scientists at other agricultural colleges. Great progress was made on weed-control in the cultivation of celery, asparagus, caraway, dill, parsnips, and cranberries.

Another tough weed-elimination problem was crab grass. To do the job, it was necessary to find a killing agent which would knock out the crab grass, yet leave other grasses unharmed. Recently, Standard Oil has been able to announce successful test results on the petroleum fraction which is today's miracle crab grass killer.

These are just a few of the many problems that give young Standard Oil research men the satisfaction of knowing they have contributed to an advance in our way of living through new uses for petroleum and petroleum products.

Standard Oil Company

910 South Michigan Avenue, Chicago 80, Illinois

STANDARD

RADIOACTIVE WASTE

(Concluded from Page 7)

and activated sludge processes. The treatment by ion exchange is founded on a chemical basis, while the activated sludge process employs sewage disposal practices.

The common purpose of the activated sludge process is to remove organic material from suspension and solution. As applied to the treatment of radioactive waste the purpose is rather to remove inorganic isotopes from very dilute waste water solutions. The inorganic isotopes only have very minor nutritional value for microbiological systems. Consequently, for application to radioactive waste treatment, activated sludge requires supplemental organic food for the excess production of zoogloea growths which can be removed when the radioactivity is concentrated in the biological floc.

Any specific statements about the disposal of radioactive waste is dependent on the particular radioscope concerned. Acceptable disposal practices depend upon such inherent characteristics as half life, biological toxicity, presence of stable isotopes in nature, solubility, and type and quantity of radiation and its function in a biological system.

Ideal solution of waste disposal problems involves the establishment of practices that will prevent the exposure of man to radiation greater than to which he has been exposed since the beginning of time. To prevent his exposure to all radiation is impossible, of course, but much will have to be done to keep his exposure to the minimum. Towards this aim the modern sanitary engineer will have to change many of the accepted standards to meet these new requirements.

MET. FIELDS

(Continued from Page 15)

foundry practices. Probably the most important aspect is that the student is given a well-rounded education so that he does not become a narrow-minded, one-track specialist who lives in an ivory tower, but a broad-minded, intelligent citizen with a good acquaintance of the social and political problems of the country.

When a metallurgical engineer obtains a job upon graduation, he first serves an internship, just as a fledging doctor must serve as an interm. He is basically well-trained, but must now get training in practice; thus begins the most interesting part of his career for it is in industry that amazing problems arise, for metals are needed to withstand heat, cold, pressure, shock, wear, and corrosion. Yet these metals must be sufficiently ductile and workable enough to be formed into the shape of bars, plates, forgings, tubes, etc. Above all, these metals must be cheap.

A good example of how one problem was conquered was the dream of light weight helmets for our G.I.'s in the second World War. The required properties were astounding for the material required had to be ductile so that it could be pressed into a helmet shape on a mass production basis, yet so hard and tough that the helmet would stop a bullet from a service revolver in close range and light enough so the soldier could wear it. Metallurgists neatly solved this problem. They developed a heavy alloy and the intricate process of manufacturing it into thin sheets, less than 0.05 inches thick. This alloy was sufficiently ductile and tough to be formed into the helmet, sufficiently hard and strong to protect its wearer and light enough to wear.

Undoubtedly there are no greater expanding oppor-

(Continued on Page 24)

For engineers who like challenging work

Meeting this country's civilian and military production needs is providing an endless variety of problems to challenge the best of engineering brains.

Here at Western Electric, as in all big manufacturing concerns, the job calls for the pooling of special skills by mechanical, electrical, industrial, chemical, metallurgical and other engineers—to come up with the right answers.

The primary job at Western Electric—the manufacturing unit of the Bell System—is to make the thousands of kinds of telephone equipment needed to keep this country's telephone service going and growing. Many of these products are so tiny or so unbelievably complex—calling for such precision—that you'd think they could be made only by skilled technicians working under closely controlled *laboratory* conditions. Yet Western Electric engineers devise machines and techniques which enable workers, after a short training period, to turn these things out under *factory* conditions. There's a real kick in doing work like that!

And, because of the specialized experience gained in our regular telephone job, Western Electric is also working on many important communications and electronic equipment projects for the Armed Forces. Such things as radar fire control systems for the Navy's biggest guns and for anti-aircraft guns—radar bombing systems for America's largest planes—multi-channel radio sets for all types of military aircraft—electronic marvels to launch, guide, and explode the latest guided missiles—provide opportunities galore for creative production planning.

Both of Western Electric's jobs—telephone and military—are vital to this country's present and future strength. Both are filled with challenges for the best engineers of today and tomorrow.

Western Electric

A UNIT OF THE BELL SYSTEM SYSTEM SINCE 1882

MET. FIELDS

(Continued from Page 22)

tunities than within the metallurgical fields. For example, the metals and alloys which perform satisfactorily in 1951 automobiles cannot be used in the engines of jet propelled airplanes. New alloys must be utilized, having some of the properties of the conventional alloys, but with superior strength, stiffness, and toughness to withstand the erosion of hellish gases emitted, the high temperature which varies anywhere from 300-2000° F. as well as the high, concentrated stresses in rotating and stationary parts.

There is also a tremendous demand for the use of finely divided metals in explosives, a field which has come into its own since the last war. This demand is due principally to the satisfactory results obtained by the increase in penetration and in blast by the use of powdered metals as projectile beads as well as internal ingredients.

There has also been great expansion in the use of powdered metals in flares, invaluable for night fighting, in colored signals and smokes for communication and rescue, in airport landing lights for foggy atmospheres, and in photoflash bombs, up to a half-million candlepower. These are just a few of the possibilities that exist in powder metallurgy and where considerable progress is necessary for improvement in application, utility, and research.

Another good example of wonderful opportunity is the field of the radio metallurgists who conduct research with tracer atoms and help production control through their utilization. Since 76 of the well-known elements are metals and all of them have radio-isotopes (either naturally or artificially excited), these metallurgists have a wide open frontier for interesting and profitable work.

MET. FIELDS

Not to be overlooked is the consideration that approximately 8000 alloys and 45 of the 76 metallic elements are used commercially. It would seem that the combinations of alloys and proportions of metals had reached its zenith. However, the number of alloys that might be made commercially is astounding. For example, 148,995 alloys, each containing only four metals, are possible if only one per cent of each of the 45 metals is investigated. Here lies a task for metallurgical pioneers of many future generations—a test of combining and proportioning alloys of commercial significance.

The possibilities can only be dreamed of. For example, "Will these metals lead to alloys that are transparent and tough, replacing brittle glass?" "Will they lead to wear proof alloys that do not expand or contract over a wide range of temperature?" or perhaps for jet propelled rockets flying at supersonic speeds in frigid temperature and changing stratospheres. Not even sound clues can be given to these answers now, but certainly they will require materials with unique combinations of properties.

In fact, to the solution of every current problem confronting America, the metallurgist or metallurgical engineer can make a substantial contribution. For instance, improving sanitation, developing better housing, creating labor saving machinery as well as conserving mineral resources and metals, especially since critical shortages of steel, copper, aluminum, nickel, magnesium, and tungsten exist.

These and similar problems will challenge the metallurgist and metallurgical engineers of this generation, the coming generation and generations to come. So let's outshine the grizzled prospector of the past and raise our voice to sound and re-sound the modern gold cry throughout the country that "Thar's gold in them metallurgical fields." There is gold all right and plenty of it for all that desire it, but it is a rare type, for this gold is "golden opportunity."

A lovely co-ed named Loretta
Loved wearing a very tight sweater.
Three reasons she had:
Keeping warm wasn't bad,
But the other two reasons were better.

CLUBS AND SOCIETIES

(Continued from Page 13)

The first meeting of fall term was held on October 2, in room 405 Olds Hall. Professor M. F. Obrecht was elected as the second faculty advisor to assist Dr. R. W. Ludt.

After the business meeting, Mr. Harry Henderson of the Carrier Stephens Co. of Lansing, spoke on "Containers for Transporting and Marketing Chemicals."

AMERICAN SOCIETY OF CIVIL ENGINEERS

An organization meeting of the American Society of Civil Engineers was held on October 4. Officers are:

Peter Stukkie, president
Don Emory, vice president
James Hunter, secretary
Richard Zolnick, treasurer

"The Advantage of ASCE After Graduation," was the title of a speech given by Harry Conrad, president of the Christman Building Company.

Regularly scheduled meetings are held on the first and third Thursdays of each month. ASCE wishes to extend a special invitation to all sophomore civil engineers.

★ ★ ★

AMERICAN FOUNDRYMEN'S SOCIETY

The first regular meeting of the American Foundryman's Society met in early October. Members received news both interesting and valuable to the engineer in a talk given by Carter Collins of Albion Malleable Iron Company. Mr. Carter spoke on "Opportunities for the Engineer in the Metal Casting Industry."

AFS officers for the coming year are:

Wesley Hauchildt, president
Ashley Sinnett, vice president
Gene Rundell, corresponding secretary
Herb Schlacter, treasurer

★ ★ ★

AMERICAN SOCIETY FOR METALS

The American Society for Metals has as a primary objective the promotion of the treatment, manufacture and fabrication of metal products.

Meetings are held monthly in Olds Hall and all interested metallurgical engineering students are eligible for membership.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS

The MSC chapter of ASME has recently been invited by the Jackson chapter to attend a Jackson meeting, a dinner and a tour of the Clarke Equipment Company.

Meetings of the mechanical engineering society are held in 113 Olds Hall on alternate Tuesdays.

★ ★ ★

ETA KAPPA NU

Eta Kappa Nu officers for the coming year are:

Barret Hargreaves, president
Bruce Miller, vice president
Robert L. Lucas, record secretary
Al Ueberroth, treasurer

EKN is the electrical engineering honorary, composed of members in the upper third of the senior class. On October 20, seniors were made members. This winter term, students from the upper fourth of the junior class

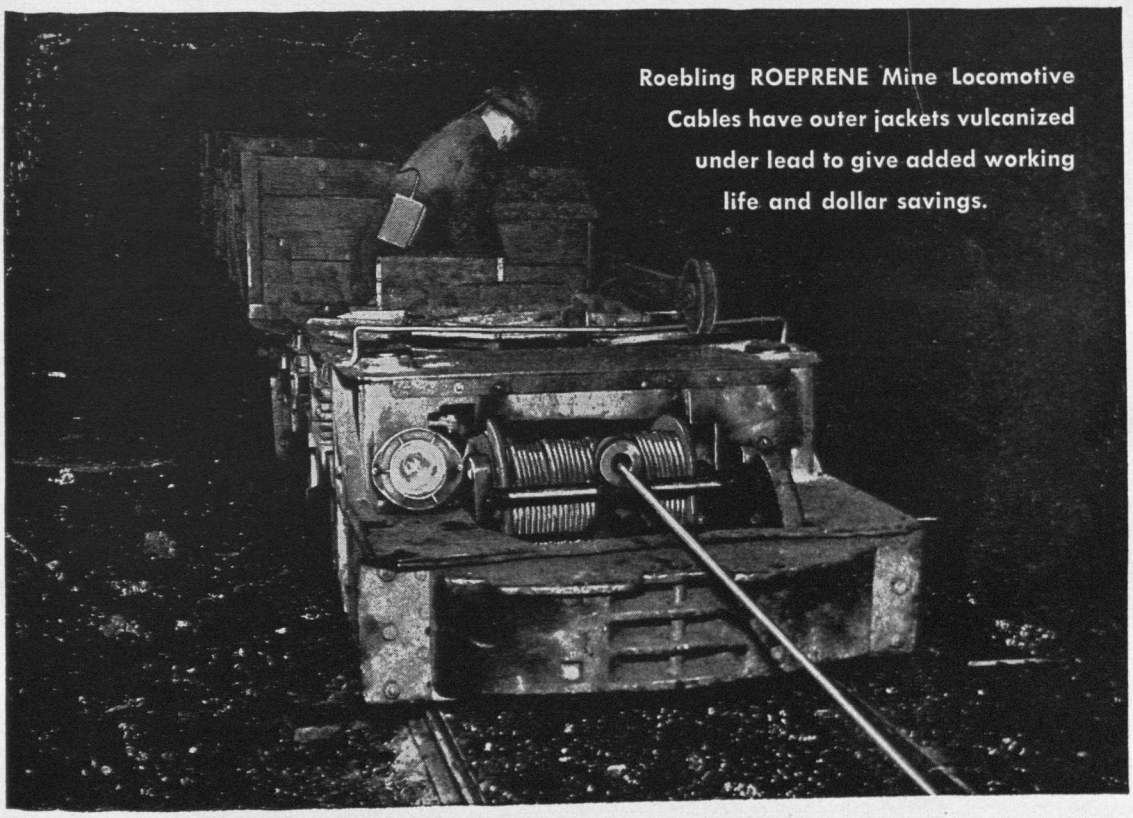
(Continued on Page 28)

ELECTRICAL WIRE AND CABLE

The complete Roebling line meets every transmission, distribution and service need

ROEBLING is the best-known name in the whole field of wire and wire products . . . and from their copper conductors to their protective jackets, Roebling electrical wires and cables are produced entirely in Roebling plants. There's a complete line, too . . . more than sixty standard types representing the best that is known today in materials and construction . . . assuring maximum dependability and utmost economy on the job.

And here's another important fact: many Roebling electrical wires and cables afford *special* advantages to users. One type of cable, for example, brings substantial savings in installation costs. Another type, due to extras built into it, lasts longer and saves replacement dollars . . . Outstanding today, the staff of Roebling's research laboratory works continually to assure even better products tomorrow. John A. Roebling's Sons Company, Trenton 2, New Jersey.



Roebling ROEPRENE Mine Locomotive Cables have outer jackets vulcanized under lead to give added working life and dollar savings.

ROEBLING

Atlanta, 934 Avon Ave ★ **Boston,** 51 Sleeper St ★ **Chicago,** 5525 W. Roosevelt Rd ★ **Cincinnati,** 3253 Fredonia Ave ★ **Cleveland,** 701 St. Clair Ave, N.E. ★ **Denver,** 4801 Jackson St ★ **Detroit,** 915 Fisher Building ★ **Houston,** 6216 Navigation Blvd ★ **Los Angeles,** 216 S. Alameda St ★ **New York,** 19 Rector St ★ **Odessa, Texas,** 1920 E. 2nd St ★ **Philadelphia,** 230 Vine St ★ **San Francisco,** 1740 17th St ★ **Seattle,** 900 1st Ave, S. ★ **Tulsa,** 321 N. Cheyenne St ★ Export Sales Office, **Trenton, N. J.**

CLUBS AND SOCIETIES

(Concluded from Page 26)

will be admitted.

"The Bridge," Eta Kappa Nu national publication, recently carried an article and photographs covering the MSC chapter.

Meetings are held on Tuesdays from 1 to 2 P.M. in room 211 of the E. E. Building.

★ ★ ★

SOCIETY OF AUTOMOTIVE ENGINEERS

The Society of Automotive Engineers endeavors through the use of lectures and publications to promote technical skill and social usefulness of students looking forward to a career in the automotive and aeronautical industries.

Officers for SAE for the coming year are:

James Albrecht, chairman
Jerry Colby, vice chairman
Sharman Siam, secretary-treasurer
Professor G. W. Hobbs and
Professor L. L. Otto, tentative faculty advisors

All regularly enrolled students expressing an interest in automotive or aeronautical engineering management or education are eligible for membership in the society.

M.S.C. AMATEUR RADIO CLUB

One of the main activities of the MSC Radio club is to introduce interested students to amateur radio through code and theory classes conducted by the members. Those members who have their licenses participate in traffic nets, receiving and sending radiograms for students as well as casual conversation with fellow amateurs throughout the world. Other activities include picnics, hamfests, field days and "get-to-gethers" with other clubs.

Membership is open to any member of the student body or faculty and may be had by attending the meetings in room 602 in the E. E. Building.

NEW DEVELOPMENTS

(Concluded from Page 17)

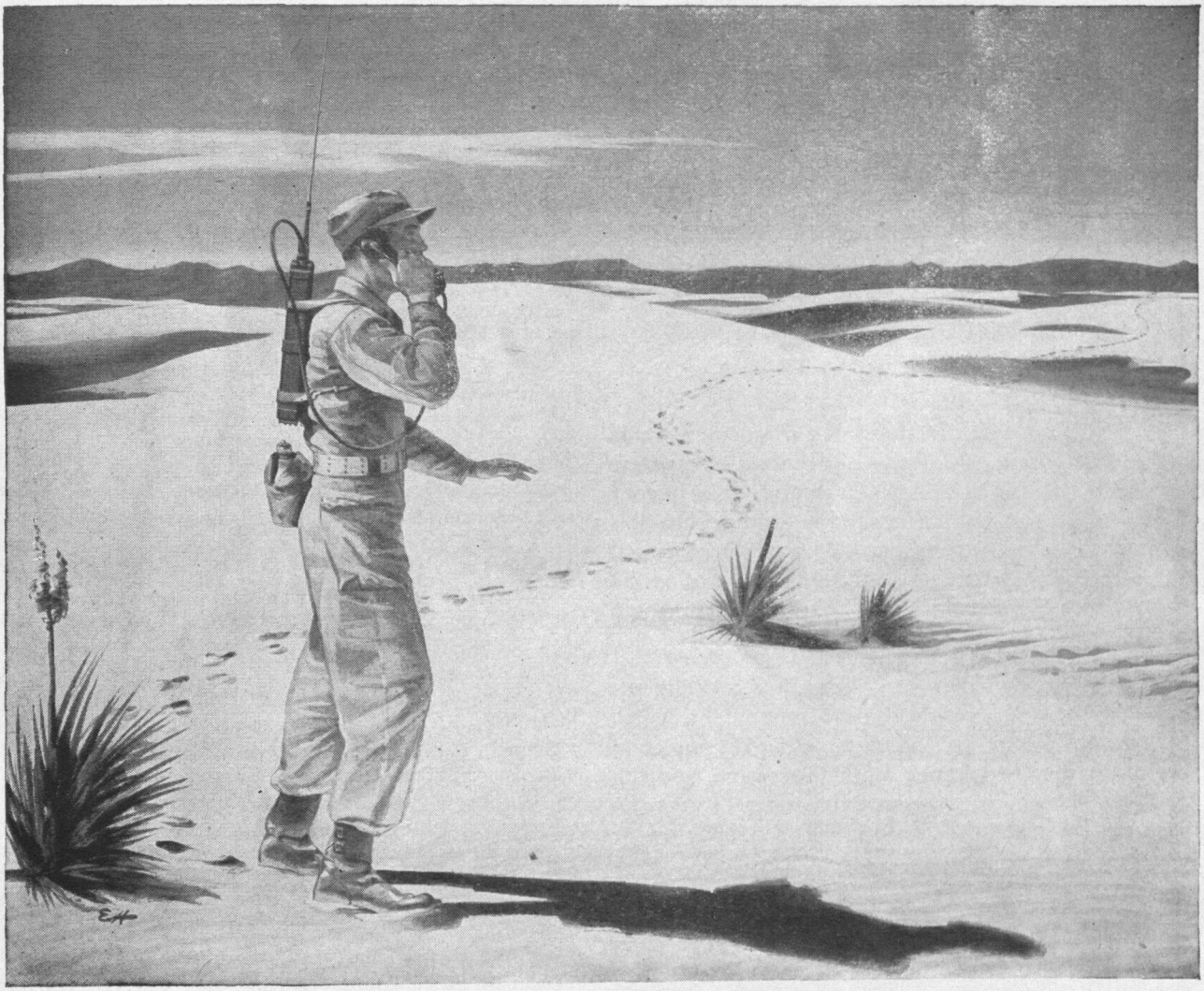
has heavier wall thickness and new increased thickness of the cylinder top deck.

Cylinder sleeve counterbores in the top of the block are deeper and carry steel inserts for seating the sleeves, thus providing service advantages.

Further improvements to lengthen engine life include a stronger crankshaft, a Houde viscous damper, and heavy-duty copper lead bearing for the crankshaft and connecting rods. The crankshaft is a heat-treated steel forging, has Tocco-hardened journals and pins, roll-burnished fillets after grinding and peened oil holes, all of which increase durability. Torsional vibration will be controlled by the new damper, which functions over a greater speed range than the old type, giving longer shaft and bearing life.

Valves in the new engine are seated at an angle of 30 degrees, as opposed to 45 degrees in earlier models. This reduces pounding of the valve face at higher speeds.

Injector rocker arms are of the new one-piece "pallet" type to improve contact and durability, and both the No. 1 and 2 piston rings are now chromeplated to increase life and minimize the possibility of stuck rings. Oil control rings are of a new heavy-duty type and are expected to reduce oil consumption to one-third of previous experience.



New portable radiotelephone, of less weight but longer range, designed and built by RCA engineers.

Longer range, but lighter weight for the "Take-along Radiophone"

You've undoubtedly read how useful our Armed Forces found their portable radiotelephones. Now this indispensable military instrument has become even more efficient.

At the Signal Corps' request, RCA engineers undertook to streamline the older, heavier model—which many a soldier of World War II called "the backie-breakie." Following principles of sub-miniaturization—pioneered at RCA Laboratories—every one of its hundreds of parts was redesigned. Models were built, tested, rebuilt, and finally RCA came up with an instrument weighing only 29 pounds. Its range is double that of the World War II model.

Even more important, under present conditions of pressing need, RCA was able to beat the most optimistic estimate of the time needed to design such an instrument *by nearly three months.* Signal Corps engineers have called this "A major engineering and production achievement."

* * *

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

Continue your education with pay—at RCA

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

ENGINEERS IN SERVICE

(Continued from Page 14)

John A. Cronander, '50, is in the U. S. Army but not yet permanently stationed.

Donald Dean, '50, is in the U. S. Air Force, according to reports, but no first-hand information has been received.

Edward Dold, '50, is stationed at Camp Roberts, California, with the 507 Repl. Co.

Donald M. Endres, '50, is in the field art. at Fort Sill, Oklahoma.

Lt. Mark M. Frimodig, '50, is stationed in Korea with the infantry. He may be reached by mail at 1219 N. Genesee Drive, Lansing, Michigan.

Lt. John R. Gibbs, '50, is located at AFF Board No. 2, Ft. Knox, Kentucky, as a project officer. Lt. Gibbs was previously with Fisher Body of Flint.

George P. Groner, '50, was employed with D. T. Randall Co. of Detroit until he was called into the service. Last notification noted him as being in Korea.

Lt. Thomas M. Grost, '50, is in pilot training with the U. S. Air Force. His address is Box 754, Goodfellow AFB, Texas.

Milton H. Heywood, '50, is with the U. S. Army, H/S Co., 656 Lopo, Bn., c/o Post Master, APO 403, New York, N. Y.

Lt. DeVille H. Hubbard, '50, is communications officer, HQ Batry., 887th F. A. Bn., APO 746, c/o Post Master, New York, N. Y.

Kenneth M. Johnson, '50, is on an active tour of duty with the U. S. Air Force. He has been employed by the Consumers Power Company of Jackson.

Robert D. Kinny, '50, was recalled to duty with the U. S. Army in February. He is now stationed in Beppu, Japan, after having spent April-plus in Korea.

Louis Klump, '50, has returned to his "old home," the U. S. Army. A card recently mailed to the Dean's Office was postmarked Manhattan, California.

Dean N. McLaughlin, '50, Sec. B-2 U.S.N.S. O.C.S., Newport, R. I. Preparing for Commission as Ensign U.S.N.R. Finished school Sept. 21, 1951. Expects to be stationed at a Naval Shipyard working as a Mechanical Engineer.

Bart McGraw III, '50, Air Force Field Engineer. On a card mailed to the Dean's Office on August 17, he stated he was stationed in the isolated areas of Alaska, but expected to return to the States soon.

Lt. Jack R. Marsh, '50, Hq. Co., 76th T. K. Bn., Fort Campbell, Ky. Expects to go to Korea sometime in the Fall.

Lt. Dennis Marko, '50, 044775 U.S.M.C.K., "C" 11th Replacement Draft, F.M.F.P.A.C., c/o F.P.O., San Francisco, California. He now is stationed in Korea.

Jack E. Morningstac, '50. A card mailed to the Dean's Office August 9, 1951, stated he was in the Army but gave no Army address.

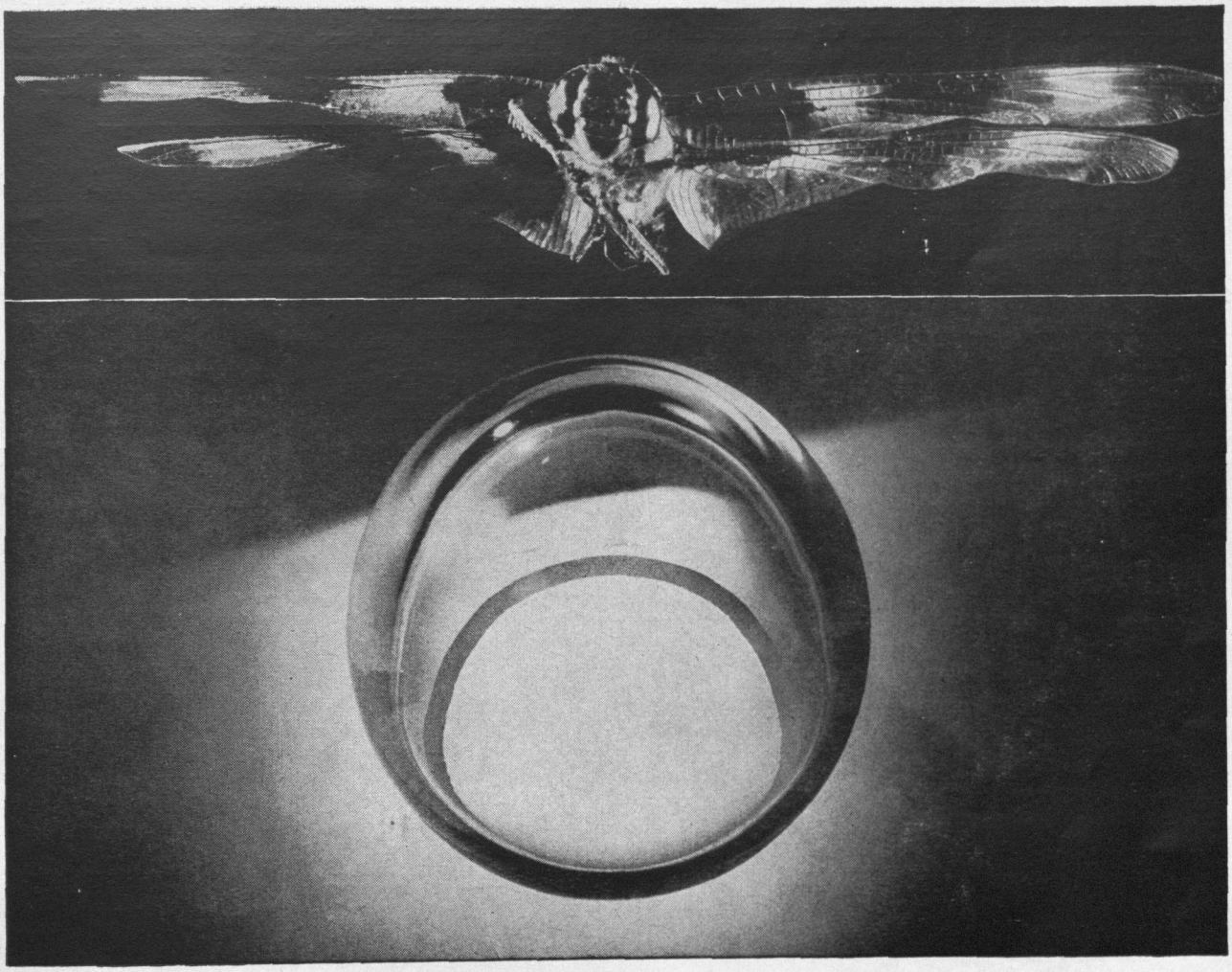
Donald A. Munyan, '50, Camp McCoy, Wisconsin, A.U.S. He is in the Artillery and expects to be in for 10 months.

Lt. Carleton H. Musson, '50, Stucoll Str., TSESS, Camp Gordon, Ga. He is doing Administrative work in the Signal Corps.

Pvt. P. L. Palmer, '50, U. S. 55054159, 244th Ordnance Depot Co., Camp Atterbury, Ind.

William E. Patrick, '50, was recalled into the Navy for a period of one year. He is stationed at Quonset Pt., Rhode Island.

(Continued on Page 32)



Dragonfly eye for a war plane—blown of optical glass

As any naturalist can tell you, the dragonfly has one of the best eyes there is for seeing.

His eye is a button, set well out from his head. It lets the dragonfly see in all directions without craning his neck.

Now war-plane pilots aloft have just such a convenient eye to see with—the glass bubble shown above. Set in the skin of a plane—and fitted with an optical system—it gives a clear, horizon-sweeping view.

This new kind of eye for war planes marks the *first time* in the history of glass-making that perfect optical glass has been mass-produced by blowing. And because the blowing is so accurate, the bubble needs a minimum of grinding and polishing to meet exact optical specifications.

Before such a bubble could be blown, Corning had first to develop ways of forming optical glass shapes directly from the molten glass. This was accomplished during World War II, when Corning devised a method of manufacturing lens blanks of perfect optical glass by machinery.

Today, shaping optical glass by blowing greatly extends the usefulness of optical glass for industry as well as the Armed forces.

Making optical glass more useful is just *one* way that Corning, in a full century of glass-making, has helped glass become one of today's most versatile engineering materials. Corning has developed more than 50,000 formulas for making glass, and they are being added to, day by day.

Throughout industry, *Corning means research in glass*—research that is constantly turning up new ways to make glass do countless jobs better than they've ever been done before.

So after you're out of college and are planning new products or improved processes, it will pay you to call on Corning before you reach the blueprint stage *Corning Glass Works, Corning, N. Y.*

CORNING
means research in glass

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

ENGINEERS IN SERVICE

(Concluded from Page 30)

Patrick J. Perry, Lt. U.S.A.F., '50, was recalled to active duty in May. A card sent to the Dean's Office in August was postmarked Springfield, Ohio.

Pvt. Lewis W. Post, '50, was drafted in the U. S. Army on Nov. 10, 1950. A card recently received at the Dean's Office stated he was stationed at the Pentagon.

Captain Lehn J. Potter, '50, U. S. Marine Corps, Eltoro, California. Recalled for active duty as a pilot to serve in the Orient.

Cpl. Alexander Radzibon, '50, called to active duty with the Air Force Reserve, April 1, 1951. He is stationed at the U. S. Air Force, Chanute A.F.B., Ill.

2nd Lt. Donald F. Redman, '50. A card recently received at the Dean's Office gave his address HQ. U.S.A.F. Directorate of Intelligence, Pentagon, Washington, D. C.

2nd Lt. Raymond C. Renner, '50. A card received at the Dean's office states he is 2nd Lt. in charge of repair work and utilities at Air Base, Dobbins Air Force.

Pvt. Thomas R. Rohner, '50, is Chem. Eng. Research Assistant in the Ordnance Corps, U. S. Army. He is stationed at Picatinny Arsenal, Dover, New Jersey.

2nd Lt. Richard J. Travers, '50, was recalled to active duty July 27, 1951. Now stationed at Ft. Monmouth, New Jersey.

2nd Lt. Donald H. Tuscher, '50, called into Sig. Corps July 1, 1951. A card recently received at the Dean's Office stated he was attending a 13 weeks Officer's Refresher Course. He is stationed at Sec. 424, O.D.T.S.S., Fort Monmouth, New Jersey.

2nd Lt. Howard D. Wilson, '50,. A recent card sent to the Dean's Office tells us he is working in Experimental Electronics. Stationed at 1st A—Gp. 4055 ASU, Ft. Bliss, Texas.

2nd Lt. Wallace W. Woods, '50, is stationed at Ft. Knox, Ky., with Co. C, 7th M Tk. BN. "CCB", 3rd Armored Division.

Pfc. Bernard A. Yemc, '50, was drafted in December of 1950. His recent address US 55072000, 9710 TSU. Chem. C. Det. No. 2 RST., Army Chem. Center, Md.

Filling station attendant: "Boss, your doctor's in here with a flat tire.

Station owner: "Good. Diagnose the trouble as puncture wounds resulting in a prolapsed perimeter. Prescribe plastic surgery followed by a complete treatment with INFLATUS WINDUS. Then charge him accordingly. That'll get even with him!"

★ ★ ★

Moron—That which, in the wintertime, women wouldn't have so many colds if they put.

★ ★ ★

Daddy: "What was all that noise?"

Snooks: "I was playing bridge with little Robespierre."

Daddy: "Playing bridge?"

Snooks: "Yeah. I stretched him between two chairs and walked across him."

★ ★ ★

The little Missus put her arms around her hubby's neck, smiled sweetly and delivered this bit of female financial logic?

"Honey, will you lend me twenty dollars but only give me ten of it? Then I'll owe you ten and you'll owe me ten, and we'll be even."

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.

A business built on co-operation

ALCOA®

ALCOA

ALUMINUM COMPANY OF AMERICA

How Honeywell Controls help the World's Largest Bomber "thread a needle" from 45,000 feet

Speeding 45,000 feet above enemy territory, the B-36 makes a tough target for anti-aircraft gunners and interceptor pilots.

But—at this altitude accurate bombing is difficult. Nearly nine miles up, the slightest pitch, roll or yaw during the plane's bomb run can cause the bombardier to miss by hundreds of vital yards.

To help solve this critical problem, Honeywell's Aeronautical Division engineered a special adaptation of the Honeywell Electronic Autopilot. Coupled with the bombsight, the Autopilot flies the plane truer than any human pilot. No wonder it's said the B-36 can "thread a needle" 45,000 feet below!

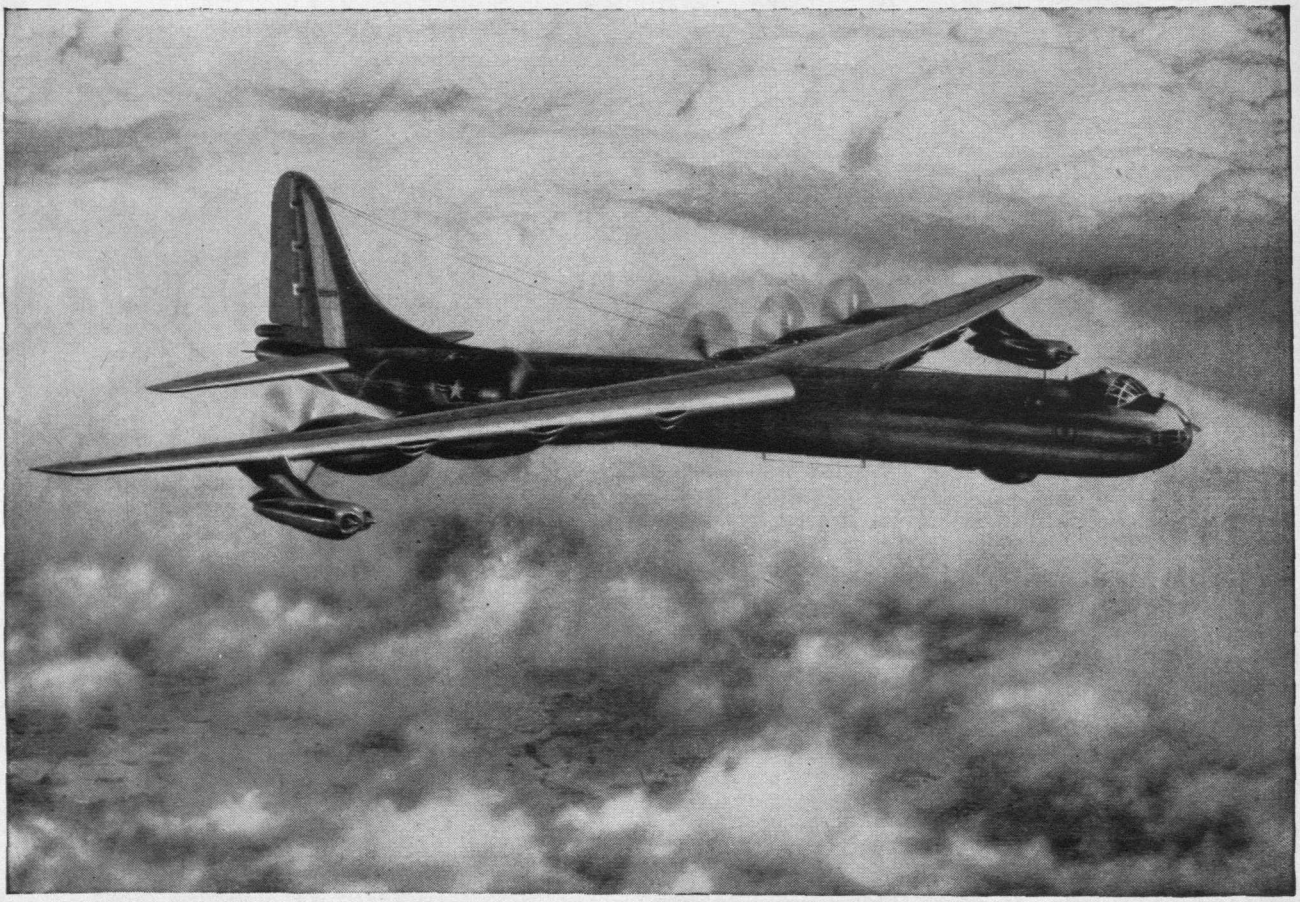
That's only one of many vital functions Honeywell controls perform in the all-important fields of aviation, guided missiles and atomic energy.

Today, fabulous new control devices in these and other fields are being developed by the men in our expanding engineering and research sections. Many of these workers are keen-minded young men only recently graduated from the universities.

Equipped with the latest scientific instruments, they find their work at Honeywell often calls for fascinating research in the realm of pure science.

There's real opportunity for engineers at Honeywell—for this is the age of Automatic Control—everywhere you turn.

And Honeywell has been the recognized leader in *controls* for more than 60 years!

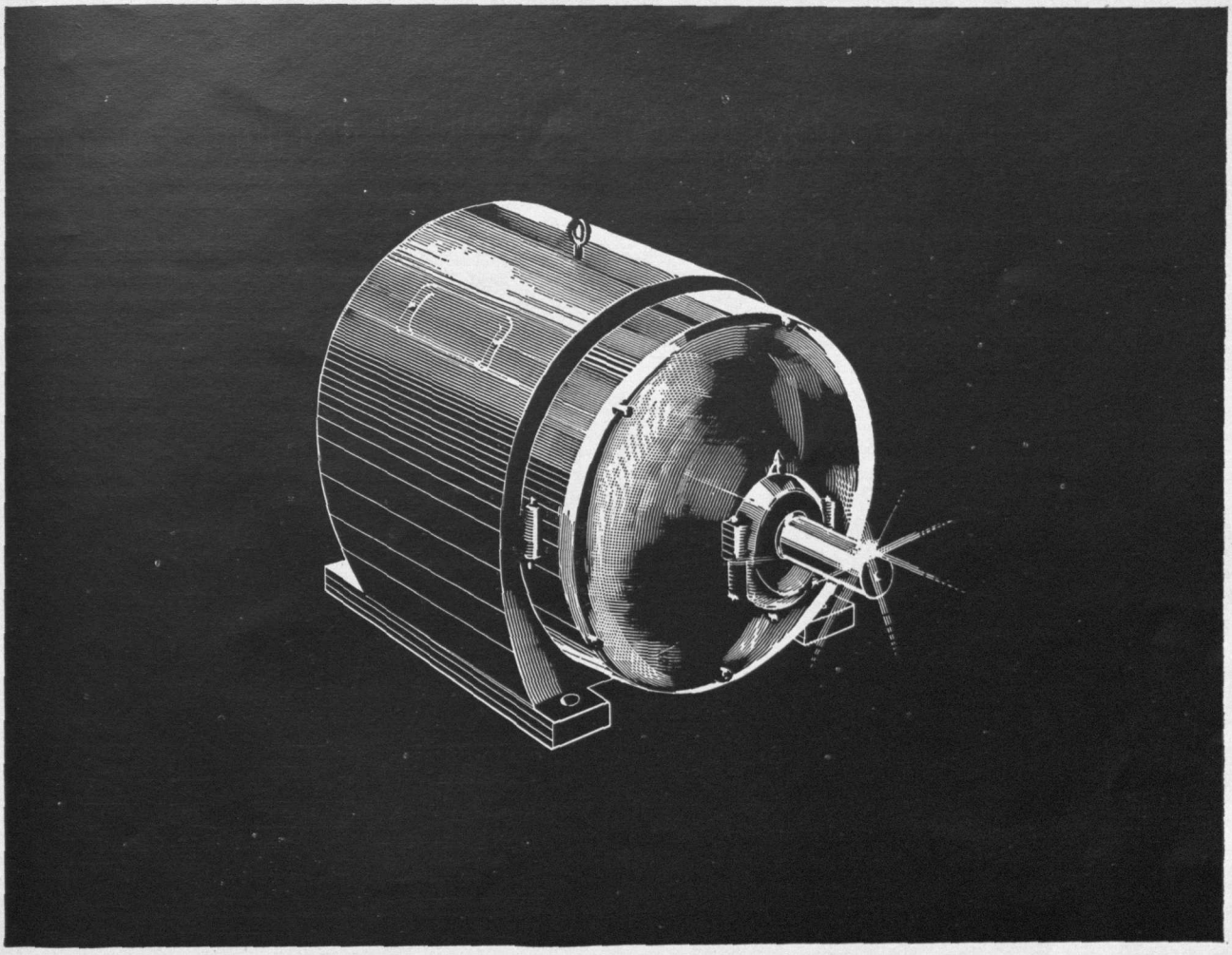


America lives better—works better with Honeywell Controls

MINNEAPOLIS **Honeywell**

First in Controls

For information about opportunities in our engineering and research departments write us, stating your qualifications. Depending on the location you prefer, send your letter to Personnel Dept., Minneapolis-Honeywell, Minneapolis 8, Minn.; Personnel Dept., Minneapolis-Honeywell, Brown Instruments Division, Philadelphia 44, Pa.; or Personnel Dept., Minneapolis-Honeywell, Micro Switch Division, Freeport, Ill.



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.

AMERICA WORKS LIKE THAT . . .

Pulling together toward a worth-while goal is a work method uniquely American. Here, every art, every science, every human skill has the incentive and the opportunity to add its bit of invention or insight to the greater whole.

America can work like that because it has an all-seeing, all-hearing and reporting Inter-Communications System.

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Complete communications is the function, is the unique contribution of the American business press . . . a great company of specially edited magazines devoted to the specialized work areas of men who want to manage better, design better, manufacture better, research better, sell better.

WHY WE HAPPEN TO KNOW . . .

The McGraw-Hill business publications are a part of this American Inter-Com System.

As publishers, we know the consuming insistence of editors on analyzing, interpreting, reporting . . . on making sure that every worth-while idea reaches interested people quickly and regularly.

As publishers, we know that people subscribe to business publications to keep abreast of what's new in ideas, methods and processes as reported by the editors and in products, materials and services provided by the advertisers.

McGRAW-HILL PUBLISHING COMPANY, INC.

330 WEST 42nd STREET, NEW YORK 18, N. Y.

HEADQUARTERS FOR BUSINESS INFORMATION

Side - Tracked

Arguing about evolution, one fellow said, "I can't see what difference it would make to me whether or not my grandfather was an ape."

Said the other fellow, "It might not make any difference to you, but it would have made a big difference to your grandmother!"

★ ★ ★

Super Salesman: One who sells a prefabricated garage to a purchaser of a raffle ticket for a new car.

★ ★ ★

Some of the new cars have scarcely enough clearance to pass over a pedestrian.

★ ★ ★

"Yes, I heard a noise and saw a leg under the bed."
"The burglar's leg?"
"No—my husband's. He heard the noise, too."

★ ★ ★

Wife, to husband coming in late: "Is that you John?"
John: "It had better be!"

★ ★ ★

"What's your cat's name, little boy?"
"Ben Hur."
"How come you gave him an unusual name like that?"
"We first called him Ben—and then he had kittens."

Then there was the Army wife during the war whose husband had been in the South Pacific for three years. She started receiving letters from him in which he told of the beautiful South Sea Island belles, and of their growing fascination for him.

Worried at this, she went to her physician for advice. "Well," said the doctor, "There is a chemical that can be introduced into a man's food to lessen his natural emotions. Here's a prescription; get some of this and put it into some cookies or candy, then send them to him and see what happens." The wife got the chemical and, wishing to be certain, put a triple dose of it into some cookies, which she sent to her husband.

She didn't get another letter from him for seven months. When a letter finally arrived, she opened it hurriedly with trembling fingers. The letter began: "Dear Friend . . ."

★ ★ ★

"Safety Note!"

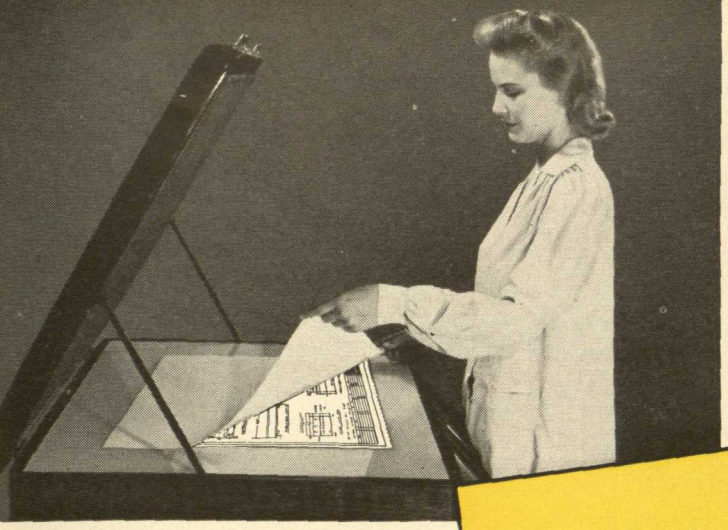
It may take longer to stop than you think it will. Start stopping in plenty of time.

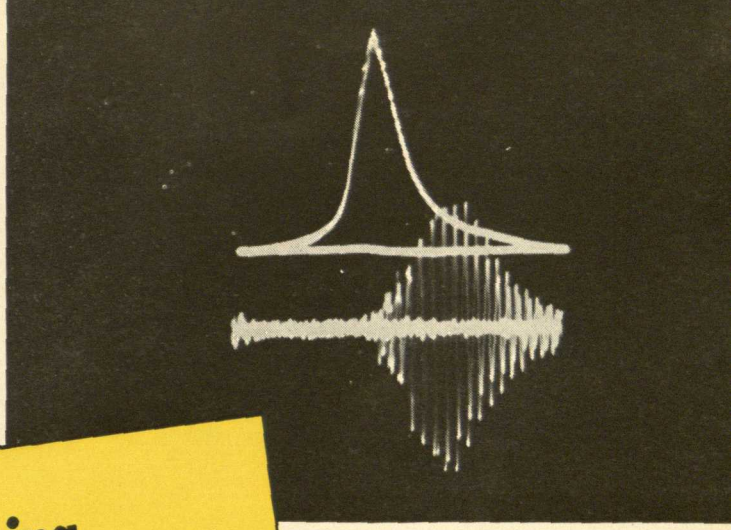
★ ★ ★

She: "What are you thinking about?"
He: "The same thing you're thinking about, I imagine."
She: "If you do, I'll scream."

★ ★ ★

"The boss just hung himself!"
"Omigosh! Have you cut him down?"
"No. He isn't dead yet."

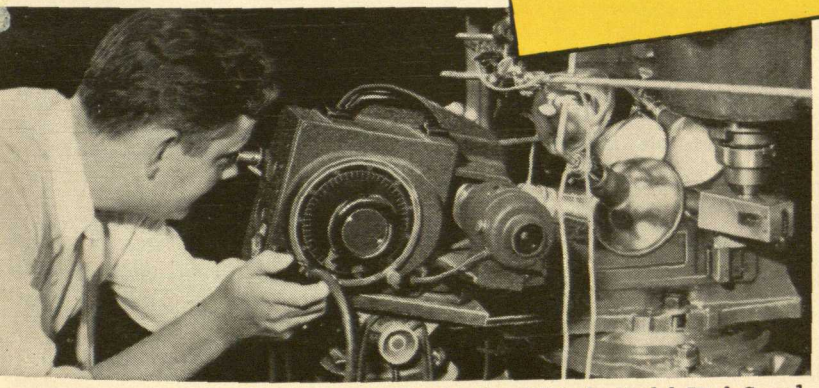


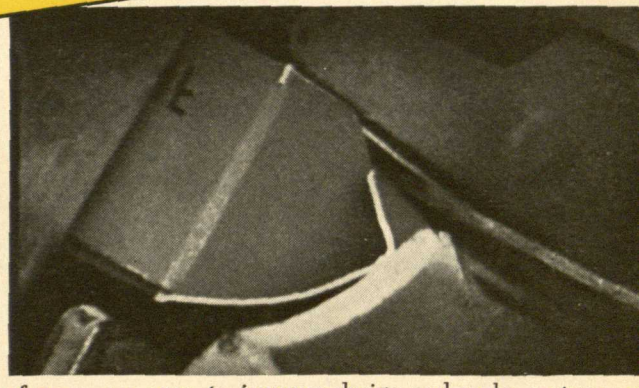


Engineering makes good use of photography's flashing speed

Reproduces Drawings In Seconds. Data, drawings, shop orders, specifications—all can be photocopied fast and accurately. Kodagraph papers, cloth, and film save time, protect originals from wear and tear—even produce legible copies from faded and worn material.

Captures The Flick of Instruments. The flash of the cathode-tube beam and the swift swing of the galvanometer mirror are not too fast for photography. It captures and records readings so that they can be analyzed and reveal all the information they contain.





Records Motion Far Too Fast To See. With the Kodak High Speed Camera a second of motion is spread over three minutes. You can analyze rapid movement, detect faulty action, spot points of wear, see ways to improve design and make a stronger, better product. (Illustration above shows part of a box carton sealing machine in action.)

All through his work, the engineer finds photography an important aid. Its speed saves him time everywhere from learning the strength of materials to improving design and reproducing his drawings. Its accuracy and its ability to enlarge and reduce permit him to have data, plans, and specifications in any size—in any quantity. And with microfilming he can record and keep important material ready for instant reference in about 2% of the usual filing space.

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Send for this Free Book

It tells how photography is used to:
Speed production • Cut engineering time • Assure quality maintenance • Train more workers faster • Bring new horizons to research

College graduates in the physical sciences, engineering, and business administration regularly find employment with Kodak. Interested students should consult their placement office or write direct to Business and Technical Personnel Department, Eastman Kodak Company, 343 State Street, Rochester 4, N. Y.

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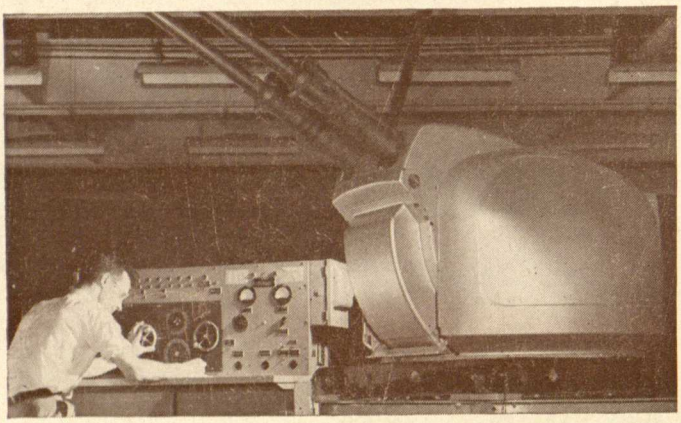
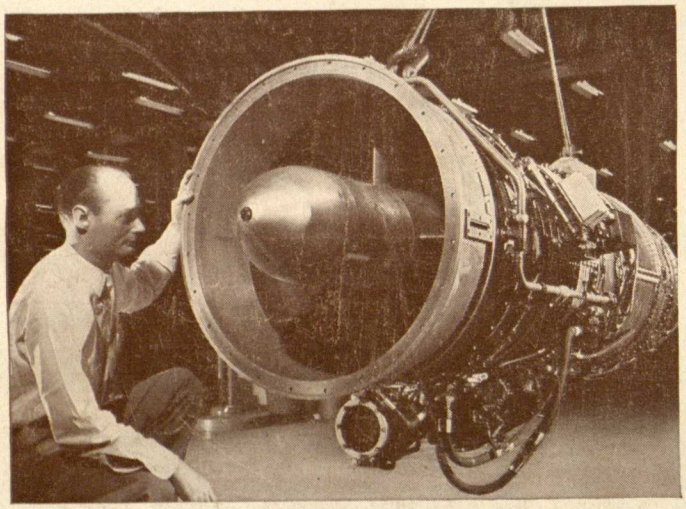


A gun turret for the B-36 bomber undergoes test as it comes off the assembly line at a General Electric plant.



An advanced model of General Electric's J-47 turbojet engine packs far more power within the same size.

G-E engineers developed this portable steering unit which enables Navy ships to be steered from any of several widely separated strategic positions.

Ideas from college graduates at General Electric are helping U. S. mobilization

Add to the above the nuclear-powered aircraft engine that General Electric is developing for the Air Force . . . turbosuperchargers . . . guided missiles . . . radar . . . the plutonium-producing reactors which the Company operates at Hanford, Washington for the Atomic Energy Commission.

Into vital national projects like these are going the efforts of hundreds of scientists, engineers, chemists, physicists and other college graduates who are making their careers at General Electric.

There's a major reason why General Electric is asked to contribute to so many of these projects. The Company has prided itself on building an outstanding engineering, technical and business organization, one that can take the toughest problems and master them, one that can be a steady source of new ideas.

Young people from American colleges and universities, their skills and talents further developed through G-E training courses and rotational job programs, are forming the core of that organization and are the source of the ideas that are standing the nation in good stead.

You can put your confidence in—

GENERAL ELECTRIC