Winter 12-1954

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Rose-Hulman Institute of Technology

RoseTechnic

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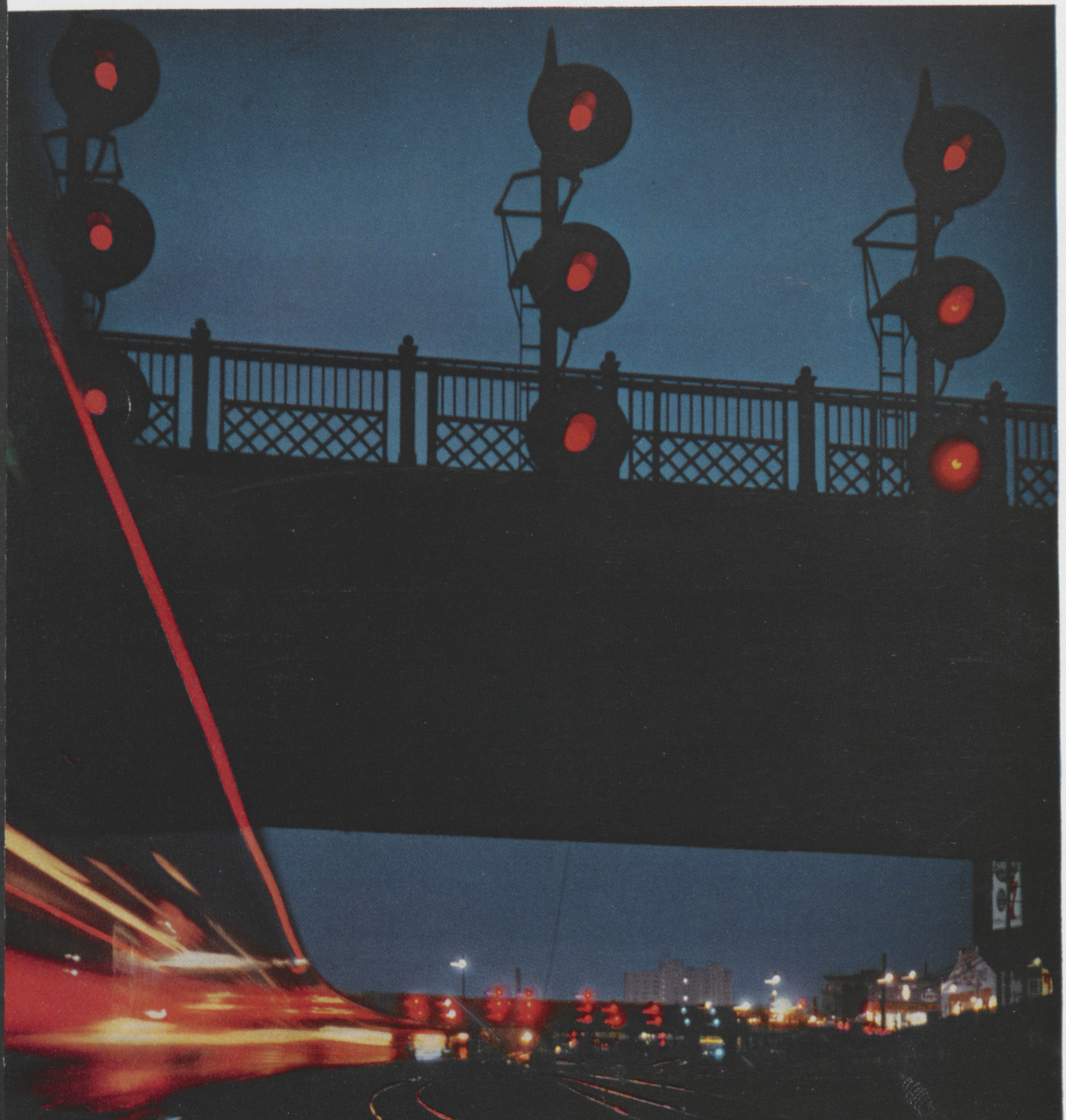

Robert L. Schneider, class of '49,
speaks from experience when he says...

"United States Steel offers unlimited opportunities covering practically all engineering fields"

IN 1949 Robert L. Schneider graduated from college with degrees in engineering and physics. After being interviewed by United States Steel, he was accepted as a trainee. Then after a year, he was advanced to a test engineer in the Maintenance Department; then to a power foreman in the Power & Fuel Division. By 1953, he had been made Power Superintendent in the Power & Fuel Division at the Carrie Furnaces.

As superintendent, he is responsible for the operation and maintenance of power producing and distributing facilities for the plant which supplies electrical power to several of our largest steel mills around Pittsburgh. Such advancement is not unusual at U.S. Steel.

As for the future, Schneider says, "Opportunities are unlimited. U.S. Steel is such a large and diversified organization that the future is not restricted to your current department or division. Transfer to equal or better positions in numerous other divisions is always possible."

To all future graduate engineers Mr. Schneider says, "U.S. Steel offers the best opportunity to get an overall picture of and experience in industry today. U.S. Steel is big enough to cover practically all engineering fields and permits a man to find the fields he wants to pursue."

If you are interested in a challenging and rewarding career with United States Steel and feel that you can qualify, you can obtain further details from your college placement director. Or we will gladly send you our informative booklet, "Paths of Opportunity," upon request. Just write to United States Steel Corporation, Personnel Division, Room 1628, 525 William Penn Place, Pittsburgh 30, Pa.

SEE THE UNITED STATES STEEL HOUR It's a full-hour TV program presented every other week by United States Steel. Consult your local newspaper for time and station.

USS TRADE MARK

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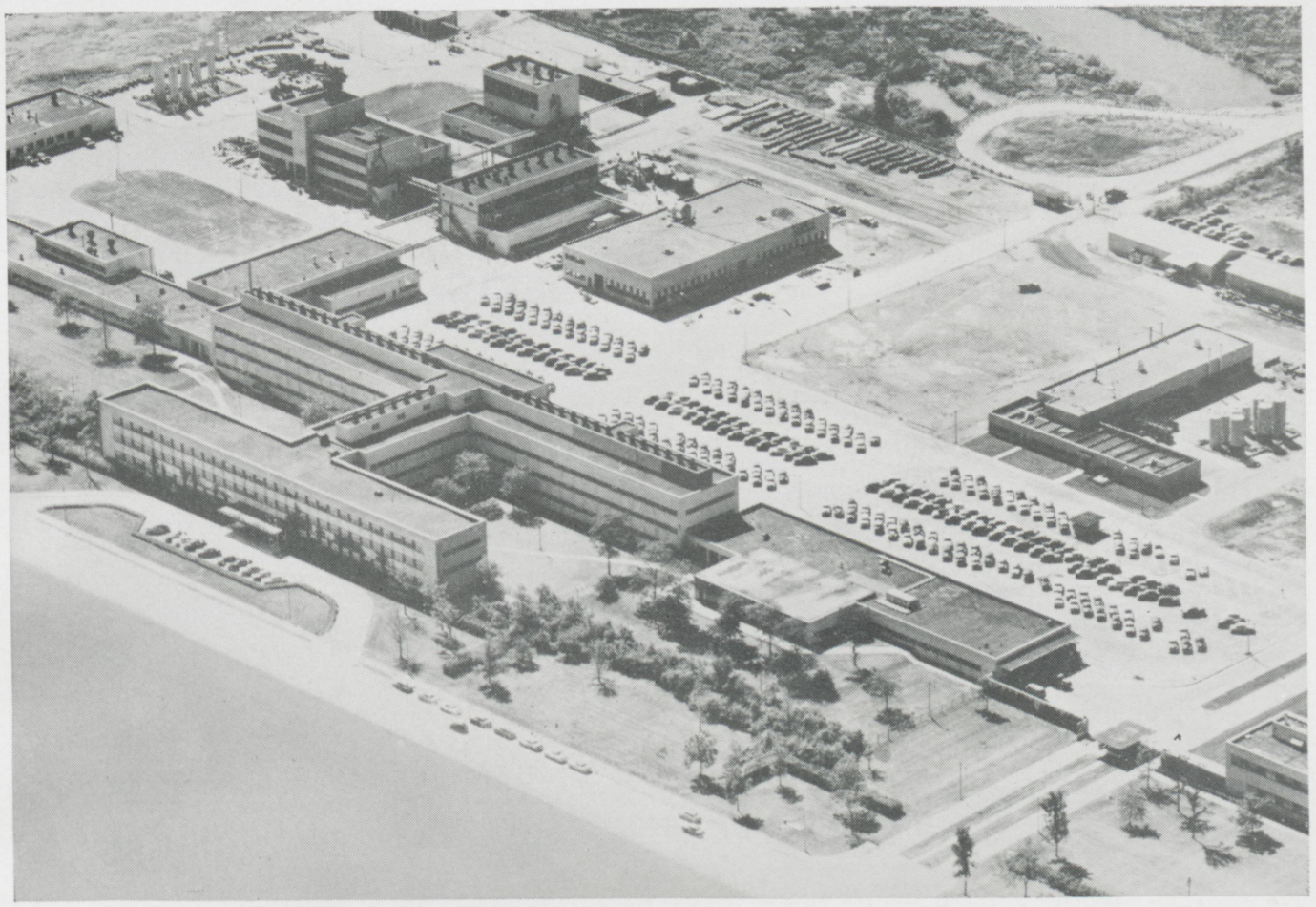
OIL WELL SUPPLY . . TENNESSEE COAL & IRON . . UNITED STATES STEEL PRODUCTS . . UNITED STATES STEEL SUPPLY . . *Divisions of* UNITED STATES STEEL CORPORATION, PITTSBURGH
UNITED STATES STEEL HOMES, INC. • UNION SUPPLY COMPANY • UNITED STATES STEEL EXPORT COMPANY • UNIVERSAL ATLAS CEMENT COMPANY

4-1892



MOST OF THE RESEARCH WORK that led to the development of Ultraforming—a more efficient and economical refining process—took place in the Whiting research laboratories of Standard Oil, above. Extensive studies in seventeen research-scale units demonstrated the merits of cyclic regeneration.

Standard Oil scientists develop **Ultraforming--** the latest in catalytic reforming

After several years of research, Standard Oil scientists have developed a new and important refining process—Ultraforming.

The process is a better way of improving the low-octane straight-run gasoline found in crude oil. To make such gasoline suitable for present day cars, refiners must change it into an entirely different material, which gives good anti-knock performance. The change is known as reforming.

Ultraforming is the last word in catalytic reforming. It gives greater yields of higher octane gasoline than were previously possible and gets good results even with poor feed stocks. In addition, it raises the yield of hydrogen, an increasingly valuable by-product of catalytic reforming.

Ultraforming units do not have to be shut down when the catalyst begins to lose activity through use. By a new technique, an improved platinum catalyst is regenerated to maintain peak performance.

The advantages of Ultraforming over previous methods are so great that Standard Oil and its subsidiary companies are building units at four refineries. They will start operating this year. The new process, of course, is available to the petroleum industry through licensing arrangements.

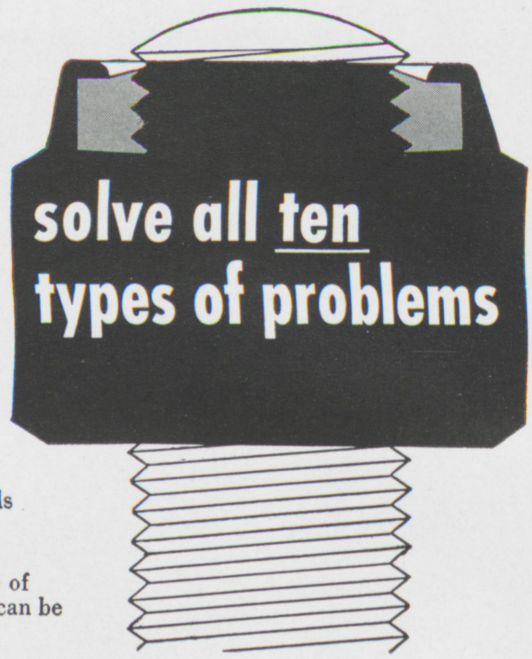
At Standard Oil, young engineers and chemists work with the stimulating knowledge that they are participating in important and lasting contributions to the oil industry and to their country.

Standard Oil Company

910 South Michigan Avenue, Chicago 80, Illinois

STANDARD

elastic stop nuts solve all ten types of problems

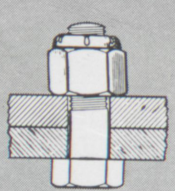


Here are ten typical fastening problems. One device, the ELASTIC STOP nut, solves them all—without additional parts or operations. Deliberately undersized in relation to bolt diameter, the red elastic collar grips the bolt with a perfect fit, exerting a continuing self-locking pressure against the threads, and holding the nut securely in place at any point on the bolt. It also provides a tight seal against the bolt threads, which prevents seepage and wear-producing axial play. And because the bolt threads are protected against moisture from without, the nuts are not "frozen" to the bolt by corrosion.

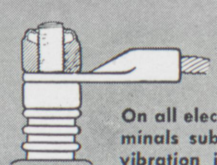
ELASTIC STOP nuts stay tight, right where you put them, in spite of vibration and stress reversals. Yet they are not jammed in place, and can be removed with a wrench and reused many times.

For further information on ESNA self-locking fasteners, mail the coupon below.

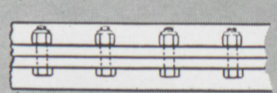
TIGHTENED AGAINST THE WORK



Wherever a vibration or impact proof bolted connection is desired.

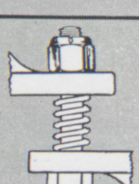


On all electrical terminals subjected to vibration in transit or operation.



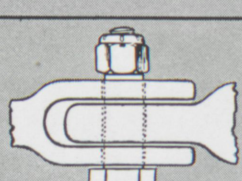
For uniform and precise prestressing of multiple bolt assemblies . . . adjusted by predetermined wrench torques.

LOCATED ANYWHERE ON THE BOLT

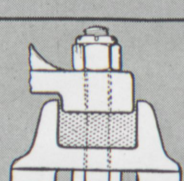


Spring-mounted connections or dynamic balancing, where nut must stay put yet be easily adjusted.

On make-and-break adjustment studs where accurate contact gaps are required.

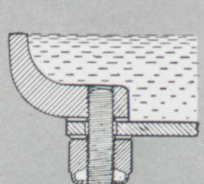


For bolted connections requiring predetermined play.

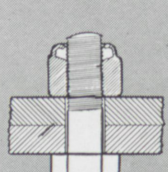


For rubber-insulated and cushion mountings where the nut must not work up or down.

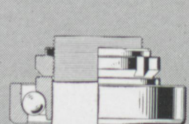
FOR MANY SPECIAL APPLICATIONS



To seal bolt threads where elimination of leakage past stud threads is necessary.



To seal bolt threads where it is necessary to protect them from corroding elements.



To obtain delicate adjustments for applications such as bearing locknuts where precise adjustment is essential.

ELASTIC STOP NUT CORPORATION OF AMERICA

ROLLPIN TRADEMARK

Dept. N40 , Elastic Stop Nut Corporation of America
2330 Vauxhall Road, Union, New Jersey

Please send the following free fastening information

☐ Elastic Stop nut bulletin
☐ Rollpin bulletin
☐ Here is a drawing of our product. What self-locking fastener would you suggest?

Name_____ Title_____

Firm_____

Street_____

City_____ Zone_____ State_____

Rose Technic

VOLUME LXVI, NO. 3 DECEMBER, 1954

Contents

Frontispiece

A power transformer is brought into the world's largest anechoic chamber of the General Electric Company's new $1,500,000 Sound Laboratory. Under construction for more than a year at Pittsfield, Mass., the laboratory was recently completed and dedicated. Courtesy of GENERAL ELECTRIC COMPANY.

The Cover

Chicago bound, the Twentieth Century Limited streaks past a signal bridge at 141st Street in New York City. Though signals have just turned red in this time exposure, shiny side of train at left still shows the reflection of yellow light — even a patch of green — from signals before they changed. Courtesy STEELWAYS, published by The American Iron and Steel Institute.

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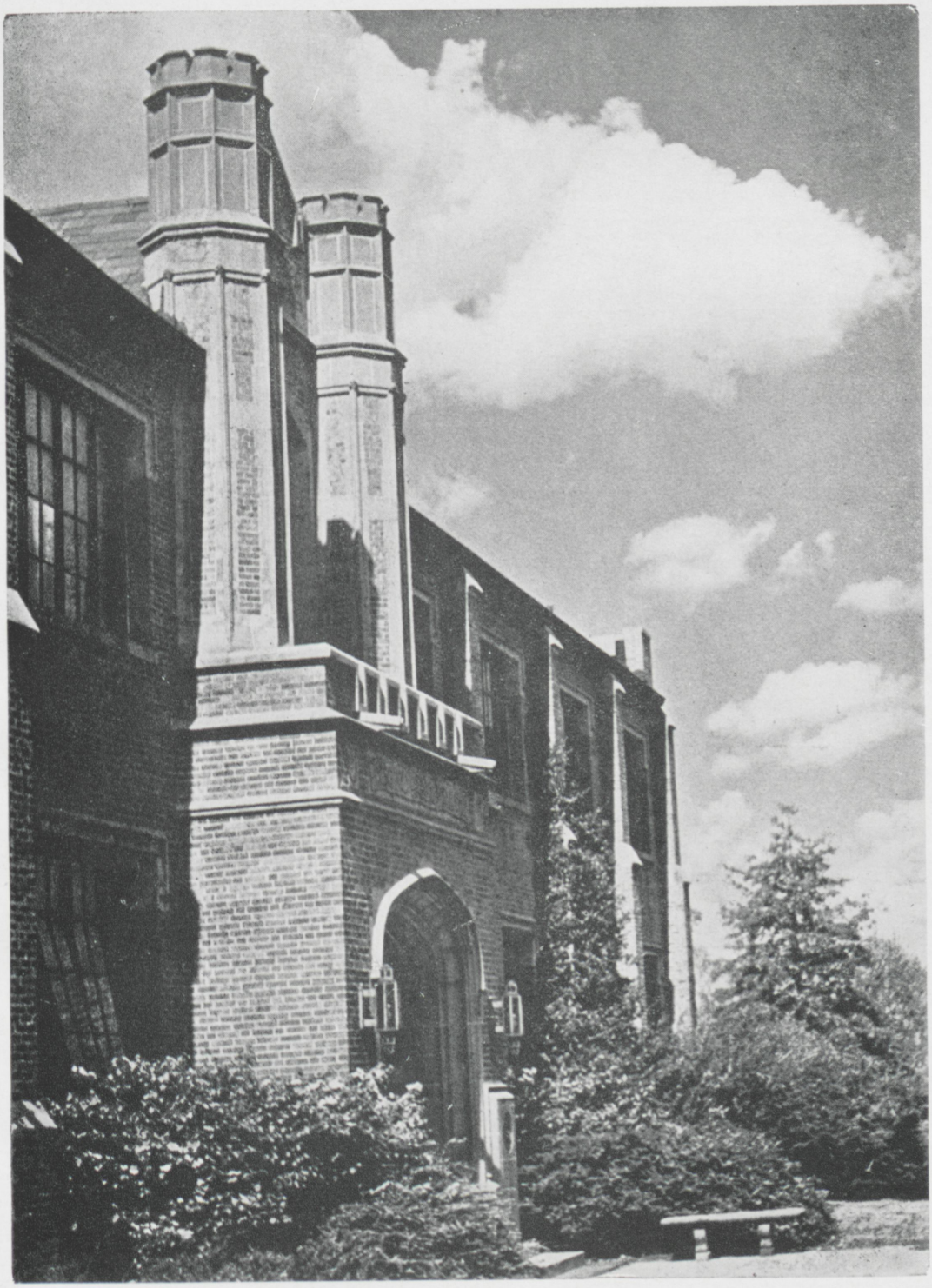


HIGH SCHOOL GRADUATES OF 1955

You are cordially invited to visit Rose Polytechnic Institute during the present school year to learn more about your college entrance and the highly accredited engineering courses available to you at Rose. The next freshman class will be admitted September 12, 1955.

OFFICE OF ADMISSIONS

ROSE POLYTECHNIC INSTITUTE

Terre Haute, Indiana

William R. Parlett, Cornell '48, Sets Sights on Executive Sales Job

BILL PARLETT has learned that helpful engineering suggestions promote good customer relations.

"Within the next ten years", says William R. Parlett, young Worthington Sales Engineer, "many of the officers of the corporation, district office sales managers and top salesmen will be retired.

"Appreciating the fact that someone must fill these jobs, our management is striving to develop capable leadership among the younger men of the corporation.

"As a prospective Worthington Sales Engineer, I received several months of classroom instruction by works managers, top sales personnel and application engineers at all of the Worthington plants. The background I obtained was a sound basis for further development and learning gained in one of the product sales divisions and then in a district sales office. After obtaining sufficient product knowledge and sales training, I was ready to sell directly to industry. As more important sales assignments are available, I feel I will progress in proportion to my own development and sales performance.

"As a Worthington salesman I contact a class of trade with which it is a pleasure to do business. The company's reputation is a key to a welcome reception by my customers.

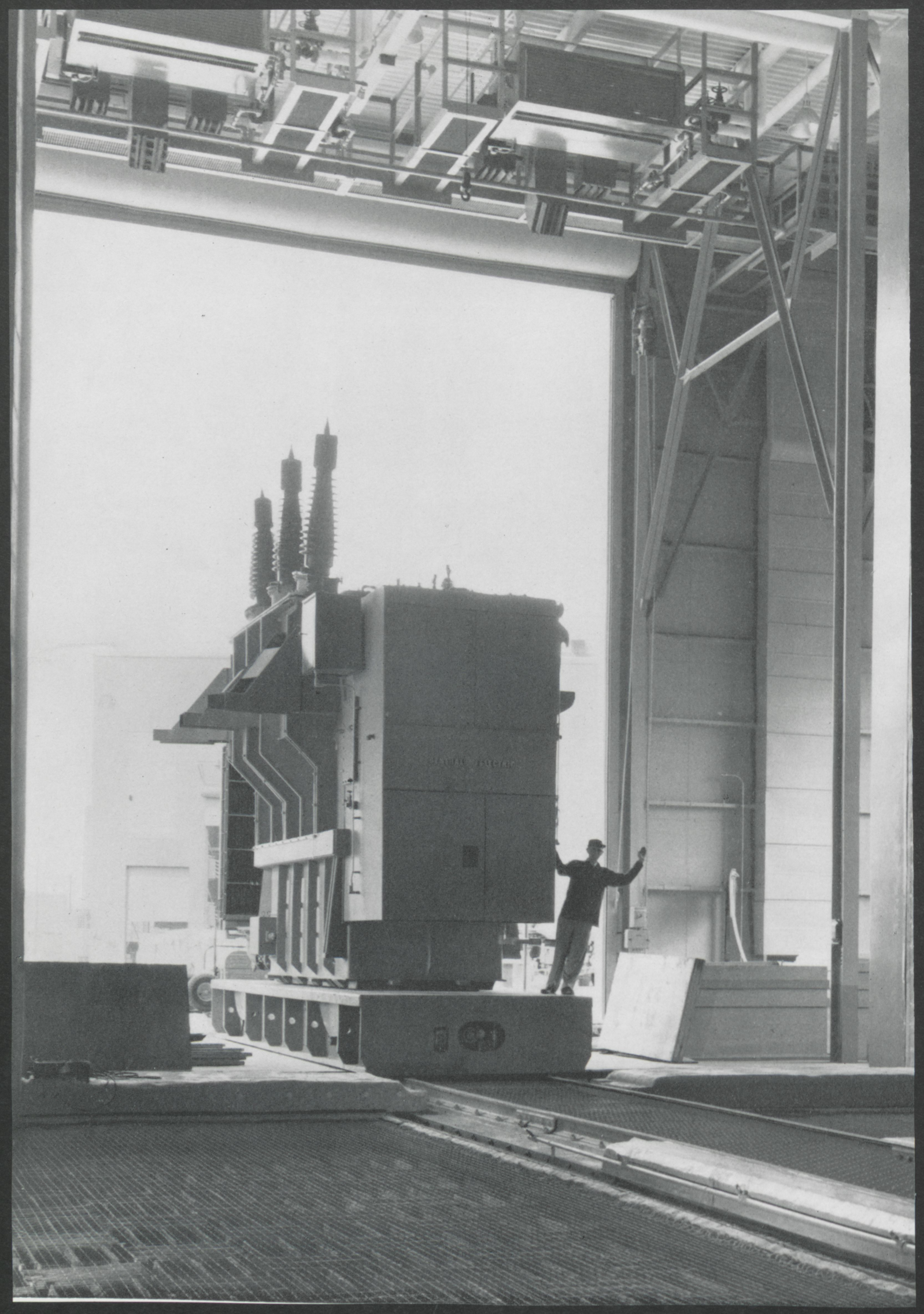
"I have found that with Worthington you have job satisfaction, adequate compensation, and unlimited opportunity."

When you're thinking of a good job, think *high*—think *Worthington.* 3.6

FOR ADDITIONAL INFORMATION, see your College Placement Bureau or write to the Personnel and Training Department, Worthington Corporation, Harrison, N. J.

WORTHINGTON

The Sign of Value Around the World



A Code For Interviewees

(Editor's Note) *In November, 1952, the Rose Technic published the following editorial. Since that time it has been reprinted by several E.C.M.A. magazines, and I'm sure the author would agree when I say it is as applicable now as it was then.*

Hardly a day passes without interviewers from several large companies visiting the Rose campus to vie for the services of the members of the Class of '53. Prospects are excellent that engineering graduates will enjoy a "sellers market" for their talents long after everyone reading this article has been graduated.

In the confusion accompanying the mad whirl of interviews, let's not lose sight of fair play in dealing with prospective employers. To Rose men seeking employment now or in the future, *The Technic* offers the following code of ethics, which was formulated by the National Electrical Manufacturers Association.

1. In anticipation of an interview with an organization, it must be the responsibility of the student to prepare himself properly by reading literature, attending meetings at which the story of that industry is being presented, organizing his own thoughts in order to ask and answer questions, and being as fully informed as possible on the type of business conducted by that organization.

2. He should be prompt in meeting interviewers and in handling his correspondence.

3. He should not accept interviews after he has signed up with a company.

4. After accepting an offer, he should promptly notify those companies whose offers are to be rejected.

5. He should use care in filling out various necessary forms.

6. He should recognize that failure to answer offers of employment is detrimental to his classmates, and therefore, he should be prepared to make his decision far enough in advance of his graduation so that industry can make its plans.

7. He should keep the placement office or faculty members intimately advised concerning his negotiations.

8. He should recognize that regardless of the number of interviews he takes he should conduct himself in a businesslike manner and not expect individual or unusual consideration or entertainment.

9. He must recognize that he must sell himself and that industry can advance him only on the basis of his performance.

Adherence to these principles will pay real dividends to the young engineer entering industry.

Robert C. Bosshardt

THEORY vs. PRACTICE

By Loyal Clarke

(Editor's Note:) *Loyal Clarke, 50, was born at Billings, Montana, and raised at Glendive, Montana. He was graduated in Chemical Engineering from Oregon State Agricultural College, and took a year's post graduate work at the University of California. His first professional assignment was with the Bureau of Mines at New Brunswick, New Jersey. Five years later he returned to school, this time to the California Institute of Technology. Following this interlude he returned to the Bureau of Mines for six years, where he worked mostly on coal hydrogenation. His next position was with Petroleum Chemicals, Inc., at Baltimore, Maryland. Here he tested a number of processes for making ethyl alcohol and other chemicals from return gas. The next year he did the same type of work for the Celanese Corporation of America. In 1946 he joined Day & Zimmerman, Inc., his present employer, where he has been active in engineering design for chemical plants.*

It has long been known that theoretical developments lead eventually to new practices in industry. This was impressed on me in my college training. Experience has strengthened this conviction.

Why eventually? Why not now? Why should there so often be such a wide gap between theoretical progress and its practical application?

Shortly after graduation I made a number of suggestions to a stubborn practical engineer. Whether the suggestion was good, bad, or indifferent, his comment was always, "That's good in theory but not in practice." So one day I replied, "if something is really good in theory, it is good in practice; if the theory is right, practice is wrong; if practice is correct, the theory is wrong. A theory that does not improve practice is useless." He replied, "Then there must be a lot of rotten theories." There are indeed a lot of incorrect or misleading theories. Even a good theory can fail because of its improper usage. A proper application cannot be made unless the theory applies to plant conditions and takes economic factors into consideration.

What are the pitfalls for application of theory? Occasionally, a theory may be entirely correct. More often it is not sufficiently complete. The ideal conditions for which it was derived may differ considerably from plant conditions and therefore not apply. Still more often good theories are manhandled, i.e., improperly used. I'll have more to say about these later. First, let's talk about the most common pitfall of all.

Failure to fully consider costs has led to countless disasters.

A classic example is the story of a tung oil pressing plant built in China back in the "twenties." For centuries the Chinese coolies had been pressing tung oil by driving wedges into logs, putting seeds into the split, and then removing the wedges. A young chemical engineer reasoned, correctly, that this was a poor method of pressing — high labor and low yield. So he built a modern hydraulic pressing plant and went broke. His power, maintenance, and capital costs far exceeded the costs of Chinese coolie labor.

Yes, this was a freak condition, but the same type of thing often happens in our modern industry. The large Fischer-Tropsh plant was recently shut down at a loss of, perhaps, $75,000,000. Just a few years ago another petro-chemical plant failed and several millions of dollars were lost.

What is efficiency? Any engineer can define the mechanical efficiency of a pump. Is a pump of the highest mechanical efficiency the most efficient to install? Probably not. The management is interested in the total cost of the operation. This total cost includes operating labor, maintenance, interest, or borrowed capital. Thus, in some instances a cheap pump would be chosen. In others an expensive pump would be chosen with special features such as mechanical seals or corrosion-resistant alloys. In any event the mechanical efficiency is only one of many factors.

A practical plant criterion is "the most for the least." This, in my opinion, is equally sound in theory. Acceptance of this philosophy means that power is frequently sacrificed to lower capital costs or to reduce maintenance. A particular type of efficiency is sacrificed to save money. What does this saving in money represent? It means less steel, fabrication labor, and operating labor: it allows better utilization of available capital. To put this another way, the average efficiency in the use of all our country's resources can be improved by tempering the desire for particular forms of efficiencies to improve others. Cost factors, properly used, afford a reasonable measure of the overall efficiency.

A theory may be correct but not sufficiently general to apply as we might wish. When I went to college we were given a formula for filtration rates, a useful formula that gave satisfactory results for most cases. The filtration of some solids (such as those removed from vegetable oils) completely ignored the theory. Why? The formula was based on an incompressible cake, but some solids form compressible cakes. Since then, theory has been extended to include allowances for the missing factor.

Shortly after marriage I told my wife not to boil the potatoes so fast. Since water boils at 212°F the potatoes would cook equally fast if

boiled slowly. She promptly demonstrated that potatoes cook faster when boiled rapidly. Agitation by rapid boiling improves the heat transfer.

It is common practice to design coolers and heaters from theoretical calculations. This acceptance is natural because the calculated rate of heat transfer is nearly always within a few per cent of that observed for new equipment. After a limited period of service, the rate may drop due to solid forming deposits on the tubes, shutting down an operation before the scheduled shutdown period. This would increase maintenance costs and upset the general maintenance shop schedules. The reduction of heat transfer by fouling is not susceptible to theoretical treatment, but empirical fouling factors have been developed from experience and accepted by theoretically minded people. Many such factors of safety are used in equipment design and specifications.

Thus before an application of theory is attempted careful consideration of a number of factors should be made. Care should be taken that the theory is applicable to the actual conditions. Proper safety factors to cover any uncertainties should be included. Finally, an overall benefit for the ultimate objective must be shown. A better product at low cost is the most common objective.

Modern industry is complex and it is seldom that one person can evaluate all the ramifications of even his own ideas. Rather, a new idea is turned over to many people. One should welcome this review even though often the idea may receive unfair treatment. More often, the reviewers will reject the idea because it has disadvantages that were not at first evident. It may be a good idea but just a little short on economic advantage and therefore be sidetracked for more promising developments.

Unfair treatment of new ideas is indeed common — some people are downright prejudiced against new ideas other than their own. Others are too conservative and very hesitant in approving new projects even after it has been demonstrated that the project looks favorable and is a good "calculated risk" for capital investment.

How can we combat this prejudice and inertia? I think it is a hazard of our trade, something that we must live with. At least, we can do much to minimize it and can make much progress, despite the inertia, through patience and understanding.

Consider an engineer who has developed a new process and had the pleasure of seeing it operate satisfactorily and make money. Of this he should be proud. Unless he is unusually broad minded, this pride may blind him to the possibilities for improvement and to the weakness of his past work. During the course of development he probably tried many ideas that failed. He knows that a new idea represents a new gamble and unless the expected benefits are very high indeed, he may be slow to take the gamble. When the plant is in trouble or a new process is to be installed, then the same man will show interest in new ideas. At those times of dire need, the men with good ideas have a good opportunity to secure the confidence of the hard-bitten administrators. At times like these a file of ideas is valuable. Then, too, there are very few so completely opposed to change as they first appear. Indeed no one can maintain a reputation by rejecting all progressive ideas.

So, by a reasonable balance between patience and impatience you, who are full of new ideas, can look forward to seeing many of them put into practice. You can best promote an idea if you give careful consideration to all competing theories, practical aspects, and weak points before advancing it and then listening eagerly to the comments. Careful listening may permit still further improvement. One who suggests an improvement should be as zealous in improving his own ideas as he is in changing another's. Most of all, keep plugging and don't allow any kidder or vicious plant engineer to destroy your initiative. All too often young engineers are "beat down" during their training period. They too follow only "the book" of standard practice and become just the type that they had earlier detested.

Sure, I know that it is discouraging to see good ideas shoved unceremoniously into the waste basket, or to be told that your idea had been rejected five years earlier. So what? You have many years ahead, and many, many more disappointments mixed with your achievements.

As a further example, permit me to reminisce over an old friend and former boss of mine, the late Mr. J. L. Schlitt. He once said in jesting "It doesn't make any difference whether we hire a chemist, a chemical engineer, or a mechanical engineer, it still takes him five years to learn that the piping costs too much." This has all the ring of a remark of a hard-bitten practical man. Yet, he was one of the most profoundly theoretical men that I have known. He designed a complete ethylene separation unit involving the closely interlocked operation of four distillation columns, two refrigeration systems, many heat exchangers and enough instruments to fill a thirty-foot panel. This was a paper design based on somewhat incomplete data. Yet, as designed, the pilot plant made 99.8% ethylene at 95% recovery, meeting design conditions. It was difficult to put the plant in operation and its control was sensitive, so he reached into his file for calculations, already prepared for such contingencies. From about twenty possible alternates, he chose two involving minor alterations. These two changes were made and no more were ever needed. Yes, Mr. Schlitt knew his theory, he knew it so well that he appreciated all its limitations and uncertainties.

During my lifetime I have seen many reconciliations of theory and practice and many failures. I believe that the competition between the two has become less bitter and more friendly.

Probably the competition will never end; but this is good, for the reconciliation of theory and practice affords a continuing challenge to engineers of all ages. Ω

Research and Development

By Bill Cade, jr., m.e.

Sandpaper Isn't Sandpaper Anymore

Latest use for sandpaper is its adoption by plastic surgeons as a tool in the operating room, E. E. Oathout, Products Engineer, Behr-Manning Corporation, Troy New York, said here today in his address to some of the nation's top production executives in Convention Center today for 1954 ASTE Industrial Exposition and the 22nd annual meeting of the 28,000-member, 113-chapter, American Society of Tool Engineers.

Spotlighted in his speech was the precision yielded in using sandpaper. Print can be shaved from a newspaper without gouging the surface, Oathout pointed out. Also cited was a machine which removed a pound of steel per minute using sandpaper.

"Use of abrasives goes back to Stone Age Man sharpening implements of warfare. But only since the turn of the century have artificial abrasives been commercially available. They are silicon carbide and aluminum oxide, man-made in electric furnaces and directly resulting from a scientific search for a way to make artificial diamonds."

G.E. Jets Take "Highballs" To Produce Extra Power

Water and alcohol "highballs" served to the six General Electric J47 jet engines powering the Air Force's Boeing B-47 bombers have provided the swift Stratojets with extra power for takeoff.

Although not the conventional-type highball, a mixture of water and alcohol is injected into the combustion chambers of each of the six jet engines as a spray. This process increases both the mass flow through the engines and the velocity of the jet gases thus providing the greater thrust.

The system was designed for the J47 jet engine by the General Electric Company's Aircraft Gas Turbine Division at Evendale, Ohio, and adapted to the B-47 bombers by the Boeing Airplane Company. This effort, in co-operation with the U.S. Air Force, has resulted in the development of a simple, reliable method of increasing thrust during takeoff.

Water injection combined with a new external rocket arrangement has provided the 600-mile-per-hour bomber with an increase in available takeoff power.

The Boeing Airplane Company announced that these and other new features have resulted in a new and standardized B-47E possessing the greatest performance and utility yet achieved with this airplane. The B-47E has a maximum gross weight of 200,000 pounds, 15,000 more than earlier models.

The collar-type rocket rack, mounted beneath the fuselage of the bomber, has positions for 33 ATO units of 1,000 pounds of thrust each — 15 more than previous arrangement — and can be dropped from the plane after power is expended.

The additional power, provided by water injection and external rockets, enables the swept-wing Boeing bomber to operate from shorter fields or to lift maximum loads from existing runways. Using both water injection and ATO units, for instance, today's production models can cut many feet off an ordinary takeoff run, depending on existing atmospheric conditions.

However, Boeing engineers point out that only under extreme conditions will both systems be used simultaneously. In fact, takeoff with a normal load calls for the use of neither water injection nor ATO units, but the value of their availability is obvious. If needed, the added power is there at the flick of a switch.

General Electric engineers explained that added thrust through the water injection system is accomplished by increasing the mass flow of the gases through the engine by adding the mass of water vapor to the normal mass of air and burned fuel in the J47 engines.

The added mass increases the thrust, which in engineering terms is the product of the mass flow multiplied by the acceleration. The alcohol, which burns like the regular fuel fed to the engines, is added to the water in sufficient quantity to completely vaporize the water. An alcohol mixture is used because it can be easily injected and does not require complicated engine control adjustments.

The "highball" must be properly mixed, as too much or too little alcohol in the mixture will influence engine operation and result in reduced augmentation, G.E. engineers explained.

The system is primarily designed to furnish additional power only during takeoff with heavier than normal loads. The existing water-alcohol system in the B-47 airplane is energized prior to the beginning of the takeoff run. This permits the pilot to have all engines at maximum thrust in advance of committing his airplane to a takeoff. The system is then in operation until the plane obtains a safe altitude.

New 3-Transistor Beltone Hearing Aid Can Be Hidden In Hair-Do

A new three-transistor hearing aid —small enough to be hidden in a woman's hair style, yet capable of delivering top performance—was introduced today (Friday, Nov. 19) by the Beltone Hearing Aid Company, Chicago.

The new instrument, called the Allegro, is 61 per cent smaller than

(*Concluded on page* 24)

Robot Professor
Wired For Sound

By Tau Beta Pi Pledge Class

Editor's Note: *This article appears through the courtesy of the recent pledge class of the Tau Beta Pi Scholastic Fraternity. It appears because these pledges have to write a report on a great and immediate need to the school in order to be initiated. Any resemblance to professors awake or sleeping is purely coincidental. Only the names have been changed to protect the writers.*

In view of the fact that professors, although they seldom admit it, all grow old sooner or later and thereby become unable to teach, causing a great loss to the school and a gap in student learning; TAU BETA PI pledges have remedied the situation in the following way.

A robot has been designed, incorporating the significant abilities of our present faculty.

This robot, necessarily, must incorporate the following basic educational operating phenomena. The robot must shorten the students time attending classes, therefore leaving more time for individual studies and extra-curricular activities. He must operate more efficiently than the present staff. He must be less tempermental, more understanding, and more humorous.

In the light of the foregoing, the completed robot will obviously bear very little resemblance to either a professor or a human. Therefore, any similarity between any of the three forementioned is purely coincidental.

To give this robot a human aspect we included some of the familiar personal characteristics of our present faculty. In order for him to serve on the administrative staff as registrar, he is supplied with the gift of gab. As an added touch, he is equipped to operate with a Southern or New England accent. A complete set of magic numbers, thermodynamic equations (including equation three B on page 51), and beam formulas have been provided as an integral part. Being heartless it is a natural for the role of dean of freshman. Rather than coin a new set of phrases, it was decided that the robot should possess those more familiar ones of his present colleagues. We suggest you take notes. Well Doc, it's this way. What would you want it to be? You got me, Chief. To the board please.

The robot is provided with four heads, each of which represents one of the engineering departments. Each head is merely symbolic and does not necessarily perform any useful function. The civil head consists of a harmonic balance of pre-stressed trusses, cantilever beams, rivets, and of course I-beams for the eyes. The chemical head is composed of a large globular glass mass appropriately shaped. The mechanical head consists of a high compression piston for a low pressure department. An oscillator and an oscilloscope make up the electrical head. It was found that the truss couldn't be trusted, the glass lacks class, the oscillator wouldn't oscillate, and the piston wouldn't—work either.

The body is a mass of dimensions. It is cubular in shape and seven cubits long. It contains various gages, indicators, and switches, all serving well defined but dubious purposes, especially the three-phase D C. switch. All tests will be graded by the robot promptly upon insertion into the proper slot and the grades will be based on the T-S curve. Crying towels are provided for the convenience of the deserving student. As an added feature, the key chain containing both church and Tau Bait Keys gives the robot that "Man of Distinction" look.

The list of materials is extensive so you shall not be bored with small details. However, the major components and costs are:

Heads

Chemical	$ 19.50
Mechanical	21.93
Electrical	72.68
Civil	4.03
Body by Fischer	20,000.63
Insides by I. B. M.	179,000.02
Total	$199,118.79

When considering the costs, one of the pledges, who incidentally wishes to remain anonymous, said "I'll donate $100,000 if it will help". We decided it would help. Another pledge offered to contribute 79 cents leaving only $99,118.00. This sum was borrowed from Allen and Steen on a long term loan. Since the robot is replacing professors and since their salaries was conservatively estimated to be $40,000 a year, this loan plus the interest could be written off in thirty years.

After much consideration and little deliberation we concluded. Ω

Locker Rumors

By George Rezek, jr. m.e., and Don Carrell, soph. m.e.

Coming up on the intramural schedule is a singles and doubles ping-pong tournament. Play will begin on or about January 6, and the winners will go home with another medal for their keychains. Also on the agenda for early January is an indoor doubles horseshoe tournament. Headquarters for this tourney will be the fieldhouse, and medals will once again be in order for the "two best." Both of these events will receive an advance buildup on the intramural bulletin board. Watch for them.

Currently basking in the campus limelight is the intramural basketball league. What else could one expect in these parts? The league is already providing as much food for conversation and debate as it is activity for some 150 previously idle minds. Few things have ever gone over as big as this years' hoop classic.

Kirk and Beck play it alone. Who said intramural football was everyone's game.

Well-dressed, uniform teams have been a feature of the volleyball league.

Already a number of this column's pre-season picks have been overrun; this is as good an indication of the overall league strength as any. The Junior Electricals, featuring Roy Kalen, Larry Rodabaugh and company, started out in keeping with their reputation by trouncing the Freshman C crew. However, a Feshman D squad, led by Tom Marks and Frank Molinaro almost dimmed their title hopes in the second game. The Junior Civils and Chemicals flopped in their first start. Among the favorites also undefeated are the Junior Mechanicals and Senior Mechanicals; it's our bet that these two clubs will be near the top for the duration of league play.

With the season already under

(*Concluded on page* 22)

QUARTZ CRYSTALS

How a 1¼ hour "gem-cutting" operation became an 8-minute mechanized job

PROBLEM: Preparing quartz crystals for use as electronic frequency controls calls for the highest degree of precision. So much so, in fact, that prior to World War II skilled gem-cutters were employed to do the job.

But during the war, there were not enough gem-cutters to keep up with the demand for crystals in radar, military communications and other applications.

Western Electric tackled the job of building into machines the skill and precision that had previously called for the most highly skilled operators.

SOLUTION: Here is how quartz crystals are made now—by semi-skilled labor in a fraction of the time formerly required:

A quartz stone is sliced into wafers on a reciprocating diamond-edged saw, after determination of optical and electrical axes by means of an oil bath and an X-ray machine. Hairline accuracy is assured by an orienting fixture.

The wafers are cut into rectangles on machines equipped with diamond saws. The human element is practically eliminated by means of adjustable stops and other semi-automatic features.

The quartz rectangles are lapped automatically to a thickness tolerance of plus or minus .0001". A timer prevents overlapping. Finally, edges are ground to specific length and width dimensions on machines with fully automatic microfeed systems.

Most of these machines were either completely or largely designed and developed by Western Electric engineers.

RESULTS: With skill built into the machines —with costly hand operations eliminated— this Western Electric mechanization program raised production of quartz crystals from a few thousand a year to nearly a million a month during the war years. This is just one of the many unusual jobs undertaken and solved by Western Electric engineers.

Quartz stones are cut into wafers on this diamond-edged saw, with orientation to optical axis controlled by fixture. This is just one of several types of machines designed and developed by Western Electric engineers to mechanize quartz cutting.

Western Electric

A UNIT OF THE BELL SYSTEM SINCE 1882

Manufacturing plants in Chicago, Ill.; Kearny, N. J.; Baltimore, Md.; Indianapolis, Ind.; Allentown and Laureldale, Pa.; Burlington, Greensboro and Winston-Salem, N. C.; Buffalo, N. Y.; Haverhill and Lawrence, Mass.; Lincoln, Neb.; St. Paul and Duluth, Minn. Distributing Centers in 29 cities and Installation headquarters in 15 cities. Company headquarters, 195 Broadway, New York City.

Alumni News

By Birt Kellam, Jr., e.e.

'92 Tinsley, Samuel B., C.E., teacher and friend to two generations of Louisville high school students, died recently at Louisville, Kentucky.

"Sammy" Tinsley, as he was affectionately known to thousands of students and co-workers, spent 46 years of his life as teacher and principal. He retired in 1940 because of poor health.

Mr. Tinsley entered the teaching field in 1894 as head of the mathematics department of the old Louisville Male High School. In 1912 he was named principal at Male until 1915, when Male and duPont Manual Training High were consolidated. In 1923, he was appointed principal of the Louisville Girls High School. He was next named principal of Halleck Hall in 1934, which position he kept until his retirement.

For many years, Mr. Tinsley was a member of the Ten Club, a group of close friends who hold monthly dinner meetings for discussion of world and current topics. Mr. Tinsley also was a member of various educational associations, the Audubon Country Club, and the Engineers and Architects Club.

Louisville will long remember this man, this molder of young citizens; for, as one Louisville newspaper editorial put it, "A community's debt to a school man as gifted, as devoted and as long in tenure as Samuel B. Tinsley cannot possibly be computed. By precept and by example, to use a venerable phase, he affected for the better a half-century's succession of young lives in Louisville. He was dignified and reserved, and rather exacting in his standards, yet he could kindle zeal in youth and instill some of his own fidelity to first principles . . . He has died full of years and honors. Not gaudy or glittering honors, for he never sought any such, but honors deeply felt and sincerely accorded in the thousands of minds and hearts he helped when they were young and gay."

'04 Touzalin, Leslie A, Ch.E., passed away at his home in Lagrange, Illinois, recently. Retired at the time of his death, Mr. Touzalin was formerly manager of raw materials, fuel and power for the Chicago District of Carnegie-Illinois Steel Company.

'14 Woody, Walton L., Ch.E., passed away on Saturday, October 30, 1954 at his home in Cleveland, Ohio. Cerebral hemorrhage was given as the cause of his death.

Upon graduation from Rose Polytechnic in 1914, Mr. Woody joined the National Malleable and Steel Castings Company as a chemist in their Indianapolis plant. At the time of his death he was not only Vice-president in charge of operations and Director of National Malleable, but also Vice-president and Director of the Capitol Foundry Company of Phoenix, Arizona.

Mr. Woody, always prominent in church, civic, and professional life, was awarded the Presidency of the American Foundrymen's Association in 1952. This tribute was just one more link in the chain of honors forged by Mr. Woody in his forty years of active professional life.

He was always prominent in the affairs of the Alumni Association and held a life membership on the Board of Managers since 1946. He was first chairman of the Rose Alumni Fund Committee and assumed the presidency of the Rose Alumni Association just one week before his death.

His great service to the Institute and his outstanding professional achievements were recognized by Rose in the award to him of the honorary degree of Doctor of Engineering in 1953. During the same year he was elected by the Rose chapter to membership in Tau Beta Pi.

Among those who survive Mr. Woody are his brother Guy, Rose '09, and his son Robert, Rose Nov. '49.

Feb. '43 Criss, Darrell E., E.E., has been promoted to the rank of Associate Professor of Electrical Engineering at Rose.

Feb. '43 Hill, Frederick J., Ch.E., has recently been appointed senior process engineer at American Viscose Corporation's Research and Development Department at Marcus Hook, Pennsylvania. In this post Mr. Hill will be responsible for the operational phases of several engineering research projects. Prior to joining the fim, he was a research section leader with the International Mineral and Chemical Corporation of Chicago.

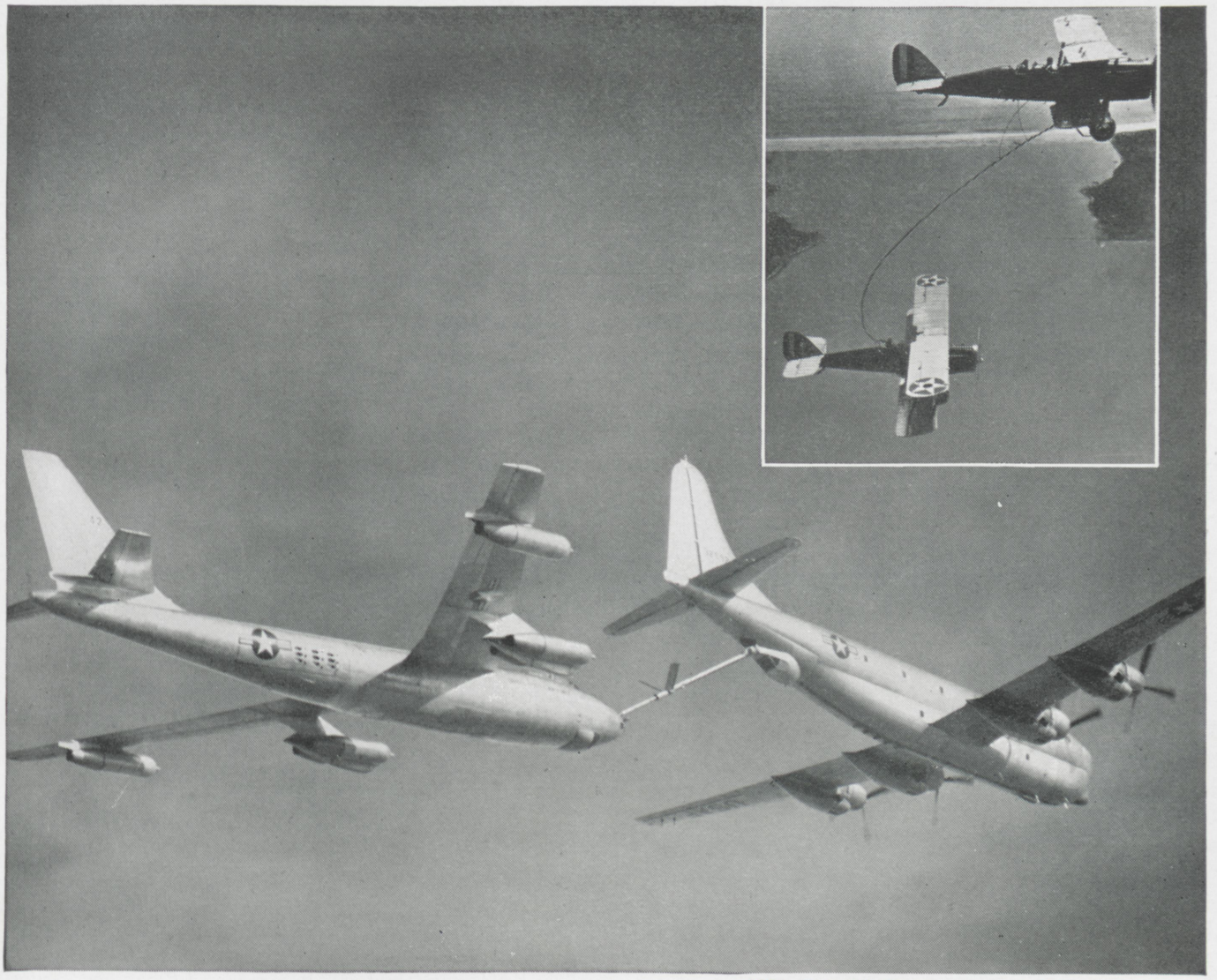
Nov. '49 Schmidt, Alfred R., M. E., Assistant Professor of Mathematics, has been granted a year's fellowship by the Institute at Purdue University, where he will complete the requirements for the Ph.D. degree in mathematics, returning to the faculty in September, 1955.

'54 Buscher, Joseph William, M.E., 22 year-old Second Lieutenant of the Army Corps of Engineers, was killed at 9:30 o'clock Monday night, November 22, when a flare exploded accidentally during a night squad training problem at Fort Belvoir Virginia.

He was a member of the 112th Engineering Officers basic course at the U. S. Army Engineering Center at Fort Belvoir and a member of the R. O. T. C. unit at Rose. He was inducted into the armed forces November 10.

Joe was also a member of the basketball team and Theta Xi Fraternity at Rose. Before his induction, he was an employee of the Toledo Edison Company, Toledo, Ohio, as an engineer. Ω

1923—first aerial refueling

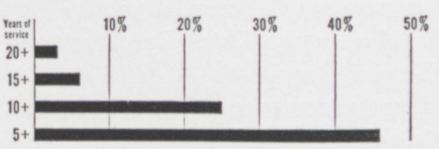


1954—Boeing KC-97 tankers completed 16,000 refuelings last year

30 years of progress in aerial refueling

The small picture shows the first aerial refueling by the Air Force. The large picture shows a Boeing KC-97, today's standard Air Force tanker, transferring 600 gallons of fuel a minute to a Boeing B-47 Stratojet bomber.

Boeing pioneered aerial refueling tankers and equipment. Further, during its 38 years, it has constantly pioneered trend-setting designs in commercial and military aircraft. This has meant such continuous growth that Boeing now employs more engineers than ever before, including the World War II peak. Boeing offers *stable* careers to engineers of virtually EVERY type: civil, mechanical, electrical and aeronautical. The company employs draftsmen and engineering aides for routine work, thus freeing engineers for more creative assignments.



Boeing engineers enjoy long-range careers—46% of them have been at Boeing 5 or more years, 25% have been here 10 years, and 6% for 15 years.

In addition to stability, Boeing offers an unusual variety of research, design and production opportunities, including work with new materials, guided missiles, jet bombers and transports, and research in nuclear-powered aircraft and supersonic flight.

Boeing makes it possible for engineers to take graduate studies while working, and reimburses them for all tuition expenses.

For further Boeing career information, consult your Placement Office, or write:

RAYMOND J. B. HOFFMAN, Admin. Engineer
Boeing Airplane Company, Wichita, Kansas

BOEING

SEATTLE, WASHINGTON WICHITA, KANSAS

Library Notes

By Carson W. Bennett and Nina J. Mahaffey

Ships, Machinery and Mossbacks, autobiography of Vice Admiral Harold G. Bowen, (Retired) *

If ever a man got his fingers into more functions of one organization than Mr. Bowen, he has yet to be found. Here is a man who went to our Naval Academy, suggested and got courses he thought were needed and was commanding a ship almost before he knew the correct procedure. Here is a man who learned about ships the hard way and actually held one together by wire and "two by fours". Once during the war he even took over ship yards and ran them at a profit, although he had had no business experience. (Some of his financial methods are being copied by large corporations today) Here is a story where you laugh and doubt and wonder, all at the same time, how one man could be so stubborn and yet so successful.

The Nature of Light and Color in the Open Air, by M. Minnaert.*

Did you ever wonder in the winter why light showing through wet tree limbs always was surrounded by circles of reflected light? Did you ever wonder why during cold weather you could see farther over bodies of water than you could during warm weather? Along with these and a hundred more phenomena of light and shadow are their explanations in simple language and elementary drawings. These are things which surround us everyday, and which any engineer will find useful, as reference, or just plain interesting reading.

No Time for Sergeants, by Mac Hyman.

When the man from the draft board arrived to take hillbilly Will Stockdale to Callvile for induction into the Army, Pa chased him off. But even hastily erected barbed wire couldn't prevent Uncle Sam from claiming a draftee and soon Will was off to Fort Thompson, Georgia. There began as wildly improbable a series of excapades as anyone can recall.

The Benchley Roundup, by Robert C. Benchley.

These ninety-odd pieces were chosen from thirty years of Robert Benchley's humorous pieces, by his son. He selected the pieces he felt had the most enduring appeal and those which he, himself, liked best.

Ideas and Opinions, by Albert Einstein.

The great thoughts of a geat man have been assembled in one volume. Letters, statements, addresses, interviews and articles have been arranged sectionally by subjects ranging from academic and intellectual freedom, to conscience, religion, education, peace, politics, government, Palestine—and the Jewish character.

In the Name of Sanity, by Lewis Mumford.

The aim of this book is to give fresh insight — and wish that insight hope and courage to those who are disquieted by the violence and irrationality of our times. Most of the chapters were originally presented as lectures.

Tomorrow Is Already Here, by Robert Jungk.

Impressions of a European reporter's trip through America in relation to its progress and achievements in science and technology. It is his contention that we are striving for omnipotence and he fears the horrors which could now result from abuse of our scientific knowledge.

The Man in the Thick Lead Suit, by Daniel Lang.

Some pieces which have appeared originally in the *New Yorker,* which bear on atomic science and scientists of our time.

Contents: A romantic urge; Something in the sky; Bombs away; Blackjack and flashes; The man in the thick lead suit; The coming thing; An A-house with garden; Camellias and bombs; Farewell to string and sealing wax; A deacon at Oak Ridge.

History of Marine Corps Aviation in World War II, by Robert Sherrod.*

Anyone interested in flying or the Marines will really get wrapped up in this one. It consists of almost a daily account of air action during the entire war, with at least a hundred actual photographs and many maps. It tells of the terrific battle our flyers had to fight, the odds they had to overcome, and the mistakes which were costly in men and planes. Many of the stories and reports are from diaries of men who will never tell them personally. I think it is one of the most authoritative and informative books to come out of the war, written by a man who was at the front in some of the bloodiest campaigns the U.S. fought.

Life Planning for College Students, by William J. Reilly.*

If there was ever a book in the Rose Library which should be read by everyone, I think this is it. Here are given sound thinking and acting procedures which will guide you successfully through any business or social venture you will ever meet. In fact I would go as far as to say if anyone could master the tactics so clearly explained in this book, he could name his pay and position from that day on, and live a life of happiness which few experience.

*Reviewed by Richard L. Fisher.

The captain of the liner was talking to his first mate about the habits of the ship's passengers.

"The passengers are very interested in sharks," the captain said. "If several whales appear on one side of the ship, and a single shark on the other side of the ship, the passengers all rush over to look at the shark."

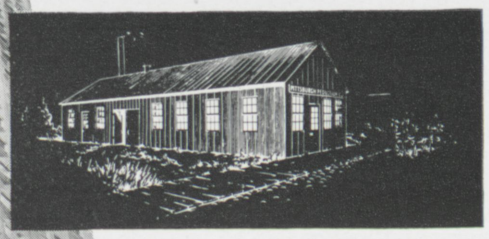
"There's nothing surprising about that," the mate replied. "Lone sharks usually draw an excessive rate of interest."

THE ALUMINUM INDUSTRY WAS BORN ON SMALLMAN STREET

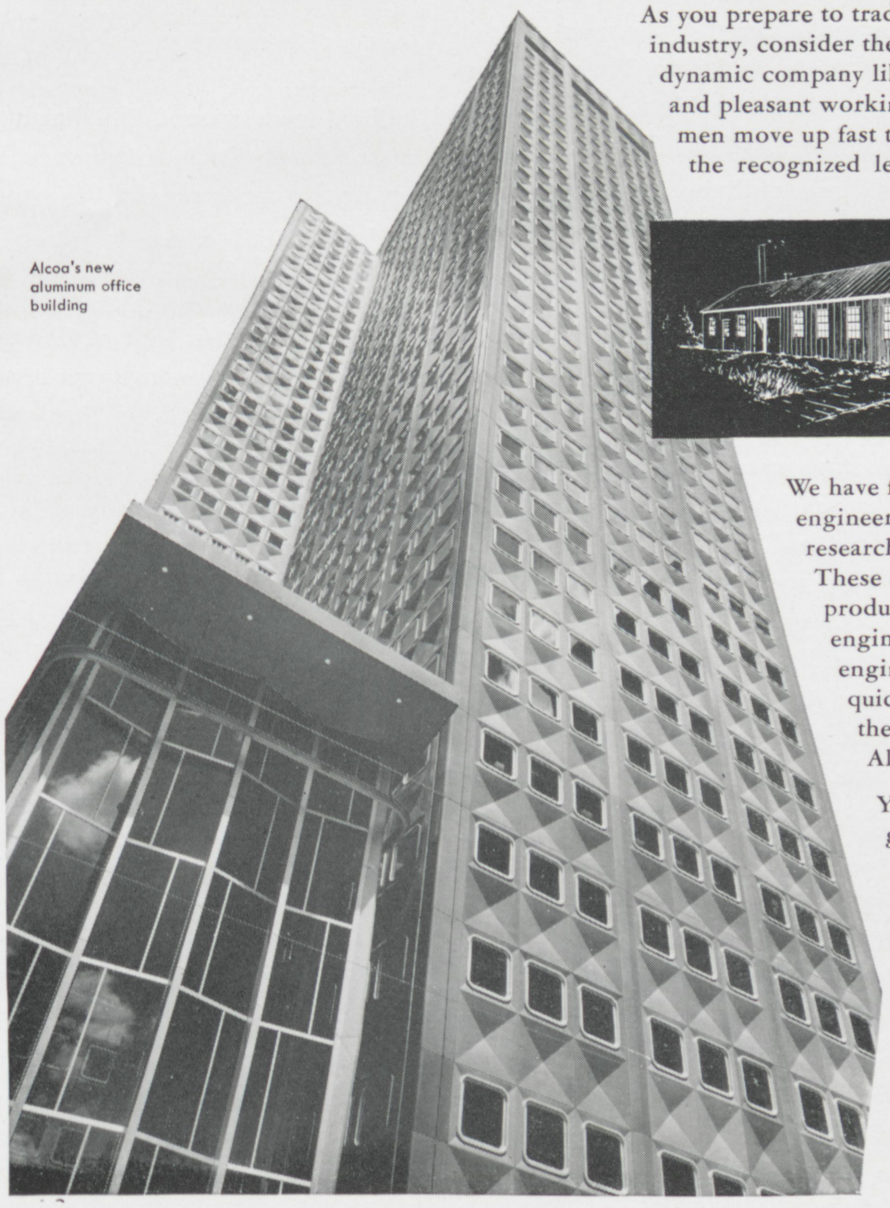
In 1888, the aluminum industry consisted of one company—located in an unimpressive little building on the east side of Pittsburgh. It was called The Pittsburgh Reduction Company. The men of this company had real engineering abilities and viewed the work to be done with an imagineering eye. But they were much more than that. They were pioneers . . . leaders . . . men of vision.

A lot has happened since 1888. The country . . . the company . . . and the industry have grown up. Ten new territories have become states, for one thing. The total industry now employs more than 1,000,000 people—and the little outfit on Smallman Street? Well, it's a lot bigger, too—and the name has been changed to Alcoa. ALUMINUM COMPANY OF AMERICA . . . but it's still the leader—still the place for engineering "firsts".

As you prepare to trade textbooks for a position in industry, consider the advantages of joining a dynamic company like Alcoa—for real job stability and pleasant working conditions—where good men move up fast through their association with the recognized leaders in the aluminum industry.



Alcoa's new aluminum office building



We have fine positions for college graduate engineers—in our plants, sales offices and research laboratories from coast to coast. These are positions of responsibility in production supervision, plant and design engineering, industrial research or sales engineering. Right now it may be quicker than you think from a seat in the classroom to your career with Alcoa. Why not find out?

Your Placement Director will be glad to make an appointment for you with our personnel representative. Or just send us an application yourself. ALUMINUM COMPANY OF AMERICA, 1825 Alcoa Bldg., Pittsburgh 19, Pa.

ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA

Fraternity Notes

Theta Xi

The freshmen parties held on Nov. 19, 1954 were a big success at Theta Xi. Light refreshments consisting of milk, coffee, and home-made cookies were served.

A large Thanksgiving dinner was held on the 22nd. Our honortd guest at the dinner was Colonel Marvin Jacobs, who recently became our new faculty advisor. Champion eater, however, was Gene "Mr. Terre Haute" Stoker, who devoured four large helpings and two quarts of milk.

Extensive labor is being exploited in the basement to build a recreation room. We hope to complete it in the spring.

The annual Christmas dance is being held on Dec. 11 in collaboration with the ATO & SN VMI dance.

Brothers Scharpenberg, Masvoka, and Elsey were members of the championship intramural football team.

Double congratulations are in order for brother Ray Fischer. He became initiated two weeks ago, and upon reception of his pin, immediately surrendered it to a member of the opposite sex.

The Thanksgiving holidays were clouded with the news that brother Joseph Buscher, June 1954 graduate, was killed in a training accident at Fort Belvoir, Virginia. May his soul rest in peace.

Gene Mrava

Alpha Tau Omega

Weddings and pinnings are the order of the day for the Taus this month. If the present trend continues this column will be titled "Society News" instead of "Fraternity Notes." Dick Bosshardt and the former Miss Dottie Tucker took the big step in Greencastle, Indiana on December 26. Bill Supp and Martha Owen plan to follow in February 12. Their wedding will be held in Indianapolis. Jim Martin has recently pinned Miss Joyce Swickard, a freshman at Indiana State; and Ron Frieburger became pinned to Miss Ann Owens, a senior at Garfield High School.

Three sophomore s who recently pledged Gamma Gamma were Ron Reeves, Bob Wilson, and Bob Trotter. Congratulations fellows.

December proved a busy month for A. T. O. First the officers conclave was held in Champaign, Illinois. Attending were John Gregory, Ken Hannum, Frank Eppert, Tom Pebworth, and Ron Frieburger. The following week the annual V. M. I. dance was held by Alpha Tau Omega, Sigma Nu, and Theta Xi. After the dance in the Rose auditorium a house party was held at the A. T. O. house.

Sunday, December 12, the annual Christmas party for the children at the Glenn Home was held at the house. Thirty children from the ages of three to eight were present. Toys and refreshments were given to the children by Santa Claus while the Delta Gamma sorority at Indiana State served as hostesses.

Art Masters

Sigma Nu

The Sigma Nu's were happy to see the large number of Freshmen who were interested in joining a fraternity. We of Sigma Nu would, however, like to clear up one point for the freshmen who visited the chapter: the girls present were unfortunately only visitors lending a helping hand —we extend our thanks to the Alpha Omicron Pi's from State for their "helping hand".

After enjoying a very successful season of interfraternity football, the Sigma Nu's have formed their basketball team around the height of center Hugh Davis in hopes of securing another trophy for the mantel.

Much credit must be given to George Rezek for his organizing and sparking of the fraternities' athletic program. It is the hope of this program to povide enough variety in interfraternity sports so that every member might find an event to his liking.

The fraternity was honored to have as a dinner guest Parker F. Enwright, who is the Executive Secretary in Charge of Chapter Operations.

As predicted, several more brothers of Sigma Nu who were poised took the semi-final step and became pinned. These Brothers were James Tatooles who became pinned to Miss Lena Kell, a student at Indiana State Teachers College; and Rich Hirst who pinned Miss Toni Konchan. This latter event received much publicity in the local paper on the DePauw campus, where Miss Konchan is a student.

John Rhodehamel

Delbert N. De Young received a B.S. in Chem. Eng. from the University of Wisconsin last June. Now he is working for an M.S. degree. By asking questions, he's learned that many excellent industrial opportunities are passed over because they're not understood by the average undergraduate.

Del De Young wants to know:

What sort of work is involved in technical sales at Du Pont?

Clarence D. Bell, B.S., Chem. Eng., Univ. of Pitts. (1937), joined Du Pont as a chemical engineer immediately after graduation. He began in the research group of the Ammonia Department, progressed steadily through assignments on nylon and a number of other products. Today he is an Assistant Director of Sales in the Polychemicals Department.

Clarence "Ding" Bell answers:

Well, if I said "All sorts," it might sound a bit vague to you, Del, but it would be very close to the truth. That's because technical sales work at Du Pont—bearing in mind the great diversity of products we have—is broader in scope than a lot of other technical assignments, and requires additional talents.

Let's suppose that one of Du Pont's customers is having technical difficulties—needs help in adapting "Teflon" to a specific gasketing application, for example. When our sales representative calls, he naturally must carry with him the engineering knowledge that's the basis for sound technical advice—data on flexural fatigue, chemical passivity, and deformation under load. The customer is receptive. He wants to make a better product, increase his sales, reduce costs—or do all three. Naturally, he's looking for reliable technical advice and intelligent actions that apply to his specific conditions. With the cooperation of the customer and help from our own research people, when necessary, the problem will sooner or later be "licked."

We have found, though, that if a technical service man is going to be *truly* effective in such a situation, he must possess certain *human* qualities in addition to his technical ability. That is, he must really *like* people and be sincerely interested in helping them solve their problems. He must—in every sense of the word—be an "ambassador" who can handle human relationships smoothly and effectively.

Take the depth suggested by this simple example, Del, and multiply it by a breadth representing all the challenging problems you'll run into with Du Pont's diversity of products. If your slide rule isn't too far out of alignment, the resulting area should give you some idea of what I meant by "all sorts" of work.

Let me emphasize one more point. The importance of effective sales work is fully understood and appreciated at Du Pont! In the past, sales work has been one of the active roads to top management jobs. There is every reason to believe that this will continue in the future.

Are you inclined toward sales work? There are four main types of sales activity in the Du Pont Company—technical sales service, sales development, market research and direct selling. Information on sales, and many other facts about working with Du Pont, are given in "The Du Pont Company and the College Graduate." Write for your copy of this free 36-page booklet to E. I. du Pont de Nemours & Co. (Inc.), 2521 Nemours Building, Wilmington, Delaware.

Locker Rumors

(*Concluded from page* 14)

way, some teams are beginning to stack up a little differently. Dick Gordon, Don Camp, and the rest of the Senior Civils are out to make it tough on the rest of the league. The Sophomore Mechanicals are also anxious to get in the act. Neither of these squads were originally considered as contenders. Few teams have displayed a better balance in their offense than the Senior Mechanicals. The Junior "Squirrels," are a constant, high-scoring threat to the undefeated teams. With a starting five averaging 6-2, the Junior Mechs will take a back seat to no one.

The all-star squad will be no cinch to pick this year. Hugh Davis and Frank Potts are leading the way for the "giants," the Junior M.E.'s. Dick Light has played real good ball for the Soph M.E.'s, while Bob Mogle and Lou Hageman have sparked the Senior Electricals. "Flip" Flanigan, Jerry Mattern, Chuck Bruner, Larry Stork, and Jack Smith have also been up with the scoring leaders.

As suspected, volley ball is also rolling along well. Teams 4 and 2 have been dominating the league play and may continue to do so for the remainder of the season. Among the standouts have been Bill Gaither and Chuck Bruner of team 4; Chalon Harris and Kent Sharp of team 6; Phil Kirk and Jerry Hebb, team 3; Dick Gordon and Jim Lott, team 2; Frank Potts, team 5; and Jack Dodson of team 1.

Interfraternity basketball got underway December 11 after several delays and a threat of having to cancel the league. 24 playing dates have been arranged after much deliberation, and each fraternity will play a twelve game schedule. Some fine basketball and a lot of rivalry can be expected in this loop.

An undefeated Sigma Nu team became the first to inscribe their name on the Interfraternity Football trophy by beating Lambda Chi in a do-or-die final, 12-6. Tremendous line play and a balanced running and passing attack by the Snakes paid off over the predominantly aerial games employed by Theta Xi, ATO, and Lambda Chi. Perhaps the team with the greatest potential was Theta Xi, but they could muster it for only one win and a tie. Lambda Chi recorded the highest single game score of the season, 33 points against ATO. Sigma Nu, the league leader in total offense, was also the stingiest on defense, yielding only 13 points in six games. And as they say in other columns, a good time was had by all.

"Allis-Chalmers Graduate Training Course Gave me a head start"

says GERALD SMART

Marquette University, BS—1948
and now Supervisor of Plant Engineering,
Allis-Chalmers, Norwood, Ohio, Works

"MOST MEN graduating from college don't have a clear idea of what they want to do. These individuals are helped by Allis-Chalmers Graduate Training Course to find the right job whether it be in design, sales, engineering, research or manufacturing.

"My case is a little different, however. I started the course with all my interest centered on tool design and 'in-plant' service. The reason is that I started getting vocational guidance from some very helpful Allis-Chalmers men back in 1940."

Served Apprenticeship

"At their suggestion I had gone to school part time while working full time. This not only gave me the chance to serve an apprenticeship as a tool and die maker, and earn money, but I learned what I wanted to do after graduation.

"Then came the war and service in the Navy. After the war I finished school. By the time I started on the course in 1948, I knew what I liked and seemed best fitted to do. As a result, my entire time as a GTC student was spent in the shops.

"The 18 months spent in the foundry, erection floor and machine shop have all proved valuable background for my present job.

"As supervisor of plant engineering at the Norwood Works, I am concerned with such problems as: Plant layout, material handling equipment and methods, new construction, new production methods to be used in building motors, centrifugal pumps, and *Texrope* drives. It's an extremely interesting job.

"From my experience, I'd say, whether you're a freshman or a senior it will pay you to talk to an Allis-Chalmers representative now. You can't start planning your future too soon. And you can't plan starting at a better place, because Allis-Chalmers builds so many different products that you'll find any type of engineering activity you could possibly want right here."

Facts You Should Know About the ALLIS-CHALMERS Graduate Training Course

1. It's well established, having been started in 1904. A large percentage of the management group are graduates of the course.

2. The course offers a maximum of 24 months' training. Length and type of training is individually planned.

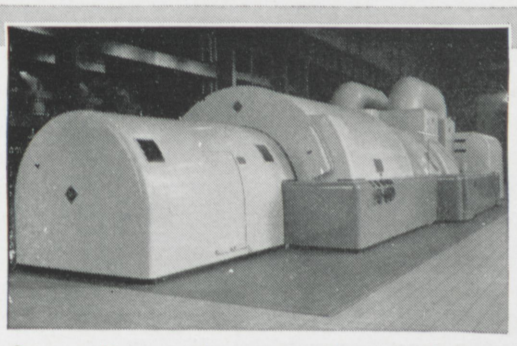
3. The graduate engineer may choose the kind of work he wants to do: design, engineering, research, production, sales, erection, service, etc.

4. He may choose the kind of power, processing, specialized equipment or industrial apparatus with which he will work, such as: steam or hydraulic, turbogenerators, circuit breakers, unit substations, transformers, motors, control pumps, kilns, coolers, rod and ball mills, crushers, vibrating screens, rectifiers, induction and dielectric heaters, grain mills, sifters, etc.

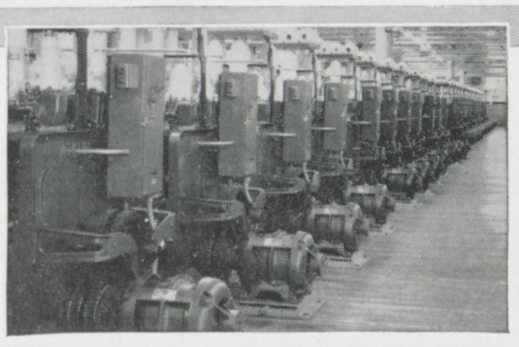
5. He will have individual attention and guidance of experienced, helpful superiors in working out his training program.

6. The program has as its objective the right job for the right man. As he gets experience in different training locations he can alter his course of training to match changing interests.

For information watch for the Allis-Chalmers representative visiting your campus, or call an Allis-Chalmers district office, or write Graduate Training Section, Allis-Chalmers, Milwaukee 1, Wisc.



Steam turbines, condensers, transformers, switchgear, regulators are built for electric power industry.



Motors, control, *Texrope* V-belt drives—all by Allis-Chalmers are used throughout industry.

A-C ALLIS-CHALMERS

ALLIS-CHALMERS

C-5678

Texrope is an Allis-Chalmers trademark.

Research and Development

(*Concluded from page* 12)

the first transistor hearing aid produced by Beltone.

David H. Barnow, executive vice president, said, "Our researchers have taken advantage of the latest developments in electronics and circuitry to perfect a hearing aid that is designed to be worn as a style item or concealed completely.

"The Allegro is the latest development aimed at overcoming any psychological resistance to wearing a hearing aid. When worn in the hair, the new instrument permits a woman to wear a strapless gown or swimming suit without revealing any cord or receiver. An man can conceal it in the folds of his necktie."

The new hearing air is fitted with watchlike precision to include three transistors, battery, microphone, and other electronic components in a styled case no larger than a cigarette lighter, said Barnow. A barrette for securing the instrument in a woman's hair is optional.

"In addition to its small size and attractive design," Barnow added, "the Allegro can be individually fitted to correct most types of hearing loss."

The Beltone instrument has 10 different kinds of super-sensitive receivers which emphasize or de-emphasize certain frequency patterns to fit the needs of high or low tone deafness, as well as intermediate types of hearing loss.

Barnow pointed out that the use of transistors makes possible a smaller, yet more flexible hearing aid.

"Fragile vacuum tubes and bulky 'B' batteries are completely eliminated," he said, "and operating costs are cut by 80 per cent—which means it will cost as little as a few cents a month to operate the Allegro."

The new Beltone utilizes the magnetic microphone, which can absorb rugged wear and resist extremes in weather and humidity.

In addition, the Allegro is equipped with a conveniently located, notched volume control knob at the upper corner of the instrument. The control is sealed to exclude dust, lint, and powder. Ω

Noise-Free Light Bulbs Improve Sound Quality Of TV And Movies

Development of "noise-free" bulbs for use in television broadcast studios, and in motion picture studios, was announced here today by General Electric's Lamp Division.

The new noiseless incandescent lamps are expected to improve noticeably the audio portion of TV programs on home receivers, and of sound movies in theaters.

Most people are not aware that light bulbs produce sound as well as light, according to Richard Blount, G-E TV lighting engineer. On the low-wattage bulbs of the type used around the house the sound is so low as to be inaudible.

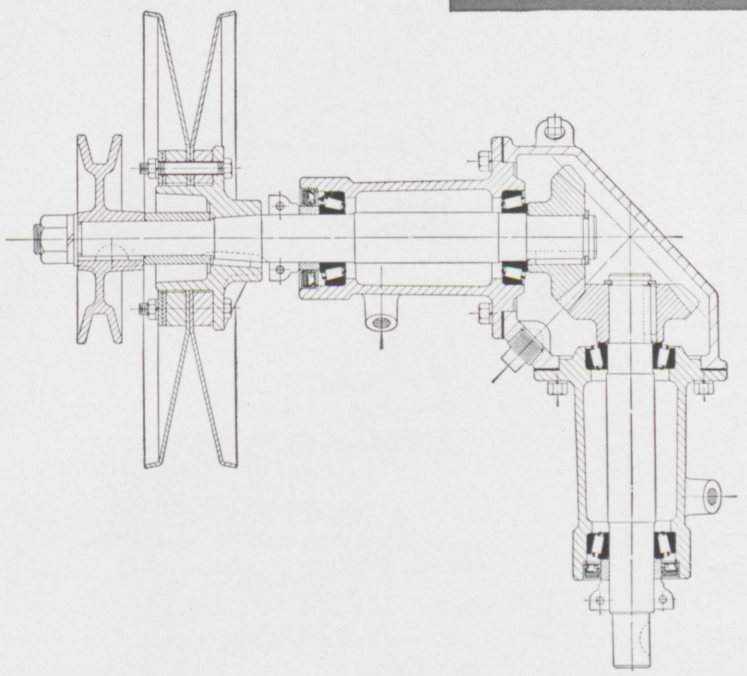
However, TV and movie studios require great quantities of light, and use many high wattage lamps. In these lamps the noise is considerably greater. In addition, the sound is amplified by the metal reflectors used to concentrate the light.

In TV and small movie studios, Blount explained, the microphone boom must often be moved close to the lamps, where the noise is picked up. It reaches the ears of the listener in the form of a hum.

To solve the problem, G-E engineers first conducted studies to discover the source of the noise. Then they devised methods of constructing the large lamps in such a way that the noise was reduced to a point where it could not be detected by sensitive instruments even in a quiet studio.

Lamps which have been sound-treated include a 1000-watt general service lamp for TV, a 2000-watt, 200-hour lamp for TV, a 1000-watt 3200° K lamp for photographic studios, and a 2000-watt spotlight for photographic studios. The improved lamps are now available to photographic and TV studios through regular channels at no change in price.

Another page for **YOUR BEARING NOTEBOOK**

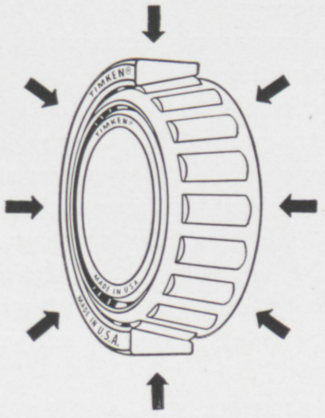


How to increase bevel gear life

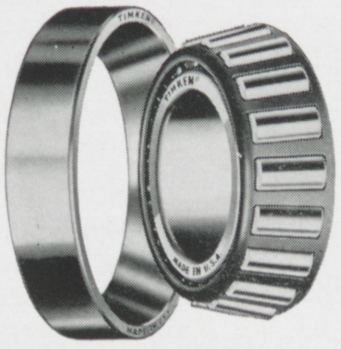
The shafts that hold the bevel gears in this farm machine gear box carry two kinds of loads. Loads from the bevel gears run 1) along the shaft and 2) at right angles to it. Timken® bearings, being *tapered,* carry both loads at once, hold gears rigidly in place. Perfect tooth-mesh is maintained; gears last longer.

How TIMKEN® bearings hold shafts rigid

The line contact between rollers and races of Timken bearings gives shafts rigid support over a wide area. Shaft deflection is minimized. And end-play is eliminated because the tapered design of Timken bearings lets them take radial and thrust loads in any combination.



TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS



Want to learn more about bearings or job opportunities?

Many of the engineering problems you'll face after graduation will involve bearing applications. For help in learning more about bearings, write for the 270-page General Information Manual on Timken bearings. And for information about the excellent job opportunities at the Timken Company, write for a copy of "This Is Timken". The Timken Roller Bearing Company, Canton 6, Ohio.

NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL ⦶ AND THRUST ⟷ LOADS OR ANY COMBINATION

ADVERTISERS' INDEX

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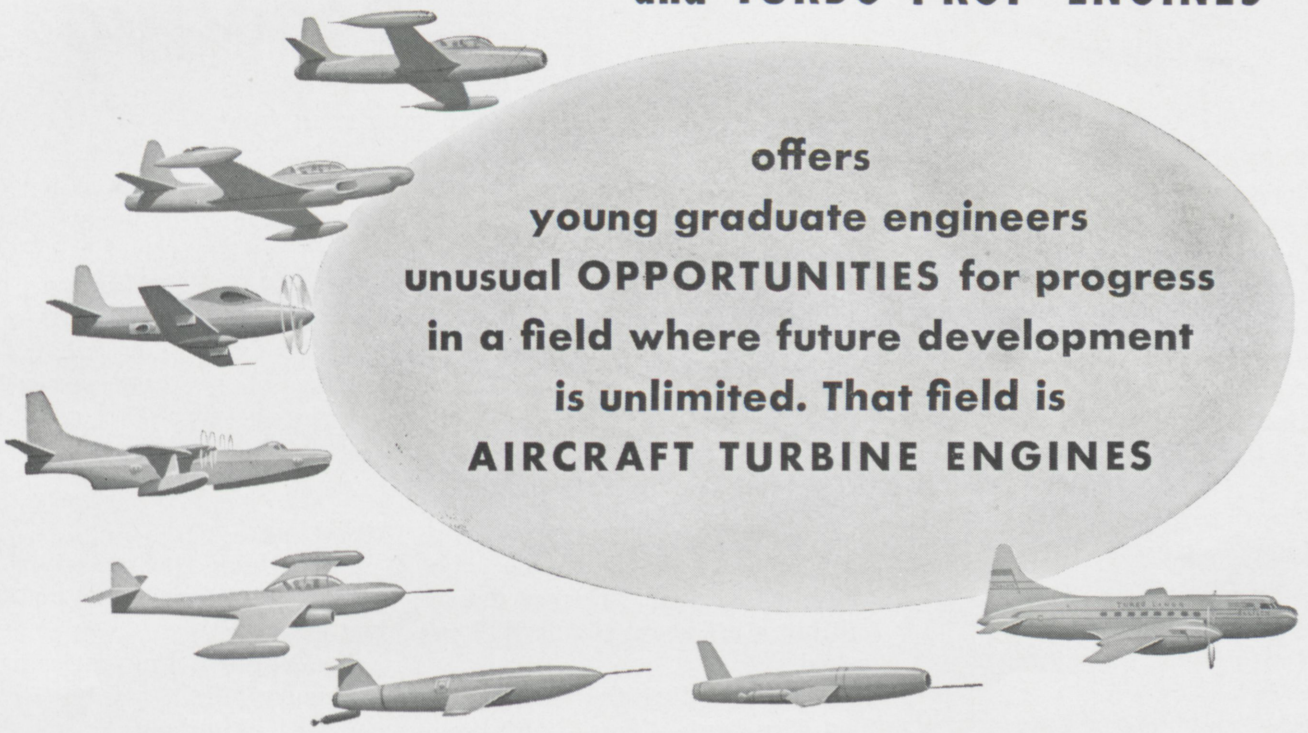

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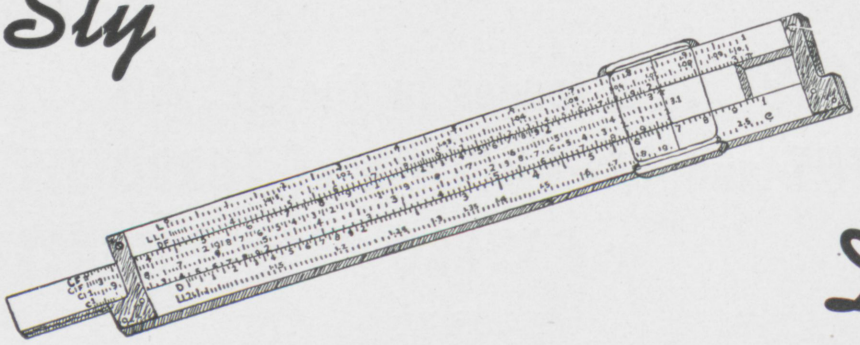
Sly



Droolings

Stolen by Frank Potts, jr., m.e. and Carter Smith, jr., m.e.

The chorus girl swept into the dressing room with a mink coat draped casually over her arm.

"Dearie," asked one of the other girls, "how did you ever get such a gorgeous mink? Why, I've been struggling for years to get one."

"Honey," replied the other, "you mustn't struggle . . . ever."

* * * * *

Daffynitions:

Meter: distance between two bars in Paris.

Brazier: A garment used to minimize the effects of flutter and vibration.

Characteristic curves: Easiest way to distinguish between a steward and a stewardess.

Mating jig: an animal husbandry accessory.

Reynold's number: ADams 7-2855.

* * * * *

Lady (holding cookie above Fido's head): "Speak, speak."

Dog: "What shall I say?"

* * * * *

A pretty young woman and a handsome farm boy were walking along a road. The farmer was carrying a large kettle over his back, holding a chicken in one hand and a cane in the other, and leading a goat. They came to a dark ravine.

Said she: "I'm afraid to walk here with you. You might try to kiss me."

Said he: "How can I with all these things to carry?"

Said she: "Well, you might stick the cane in the ground, tie the goat to it, and put the chicken under the pot."

A stenographer defines the wolf as a modern dry cleaner. He works fast and leaves no ring.

* * * * *

"Knock, knock."

"Well, who's there?"

"The traveling salesman, who. . "

"Yes."

"Come in."

* * * * *

Two boys returning from Sunday School were discussing what they had learned. "Do you believe all that stuff about the devil?" one asked.

"Naw," replied the other, "it's just like Santa Claus — it's your old man."

* * * * *

Pussy Cat: "Meowwrr, meoww me-owr mwow?"

Tom Cat: "Meo?"

Pussy Cat: "Me . . . "

Tom Cat: "Meowrff."

* * * * *

Baby: Something with a lot of noise at one end, and a complete lack of responsibility at the other.

* * * * *

I know a fellow that crossed a rabbit with a snake and got an adder that multiplies.

* * * * *

First Suzie: I said some foolish things to Robert last night.

Second Suzie: Yes?

First Suzie: That was one of them.

* * * * *

Associate Editor: Let's not have any more jokes about sex, drinking, or profanity.

Editor: O.K., I'm tired of putting out this magazine, too.

A fish out of water must feel like a moth in a nudist colony!

* * * * *

Prof of ???: "You boys of today want to make too much money. Why, do you know what I was getting when I got married?"

Voice in rear: "No, and I'll bet you didn't either.

* * * * *

Dear Pop:

Everything fine at school. I'm getting lots of sleep and am studying hard.

Incidentally, I'm enclosing my fraternity bill.

Your son,

Pudge

Dear Pudge:

Don't buy any more fraternities.

Your pop,

Pop

* * * * *

The height of bad luck—seasickness and lockjaw.

* * * * *

Little Girl: (to drugstore clerk) "Do you fit men for trusses here?"

Clerk: "Why, yes, we do."

Little Girl: "Well, wash your hands. I'd like a chocolate soda."

* * * * *

George raised his hand for permission to go out, but the teacher said, "As soon as we finish this lesson, George."

A minute later Henry, seated right in back of George, raised his hand.

"I suppose you want permission to leave the room, too," the teacher said. "No, I don't," Henry replied. "I just want to second the motion on George."

Radiograph showing how anode grows in use. From such facts, National Carbon developed a battery with the largest possible anode in a small case.

When photography peered inside... the battery shrank in size...lasted longer

In air-depolarized hearing-aid batteries, anode size determines battery life. But anodes swell in use. How big could one be for a tiny new case? National Carbon Company used x-rays and photography and found out.

NEW electronic developments were making hearing aids more effective, smaller, more convenient. What was needed was a power supply equally advantageous. Could this be had without sacrifice in battery life?

National Carbon Company thought so—put x-ray photography to work—and came up with a mighty midget "Eveready" with unusually long life.

Checking internal conditions like this—proving the soundness of castings and welds—inspecting the inside of "sealed-in" assemblies—are all in the day's work for photography.

In fact, graduates in the physical sciences and in engineering find photography an increasingly valuable tool in their new occupations. Its expanding use has also created many challenging opportunities at Kodak, especially in the development of large-scale chemical processes and the design of complex precision mechanical-electronic equipment. Whether you are a recent graduate or a qualified returning serviceman, if you are interested in these opportunities, write to Business & Technical Personnel Dept., Eastman Kodak Company, Rochester 4, N. Y.

Eastman Kodak Company, Rochester 4, N. Y.

Looking ahead with General Electric

How do you measure up in leadership qualities?

A young man who can lead has always had a good chance of success, but his prospects were never better than now. There's a steadily growing demand in industry for men to fill top professional and management jobs . . . fellows with a special ability to work well with other people and inspire their best work. At General Electric, we're constantly on the lookout for them.

Ten traits we look for, above, add up to a pretty good indication of potential success in business. Not everyone has them all to a top degree, but the basic characteristics are always present and can be developed in the men we pick to help lead General Electric. We hope you can rate yourself very high on the list and find it helpful.

EDUCATIONAL RELATIONS, GENERAL ELECTRIC CO., SCHENECTADY, N. Y.

DID YOU KNOW? Opportunities for G-E leadership jobs are expected to double in the next 10 years. The need: technical and non-technical professionals and managers.

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