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# Volume 57 - Issue 8 - March, 1947

Rose Technic Staff
*Rose-Hulman Institute of Technology*

# ROSE TECHNIC


MARCH, 1947

MEMBER ENGINEERING COLLEGE MAGAZINES ASSOCIATED

FOR

PENNYWEIGHTS

OR

# HEAVYWEIGHTS

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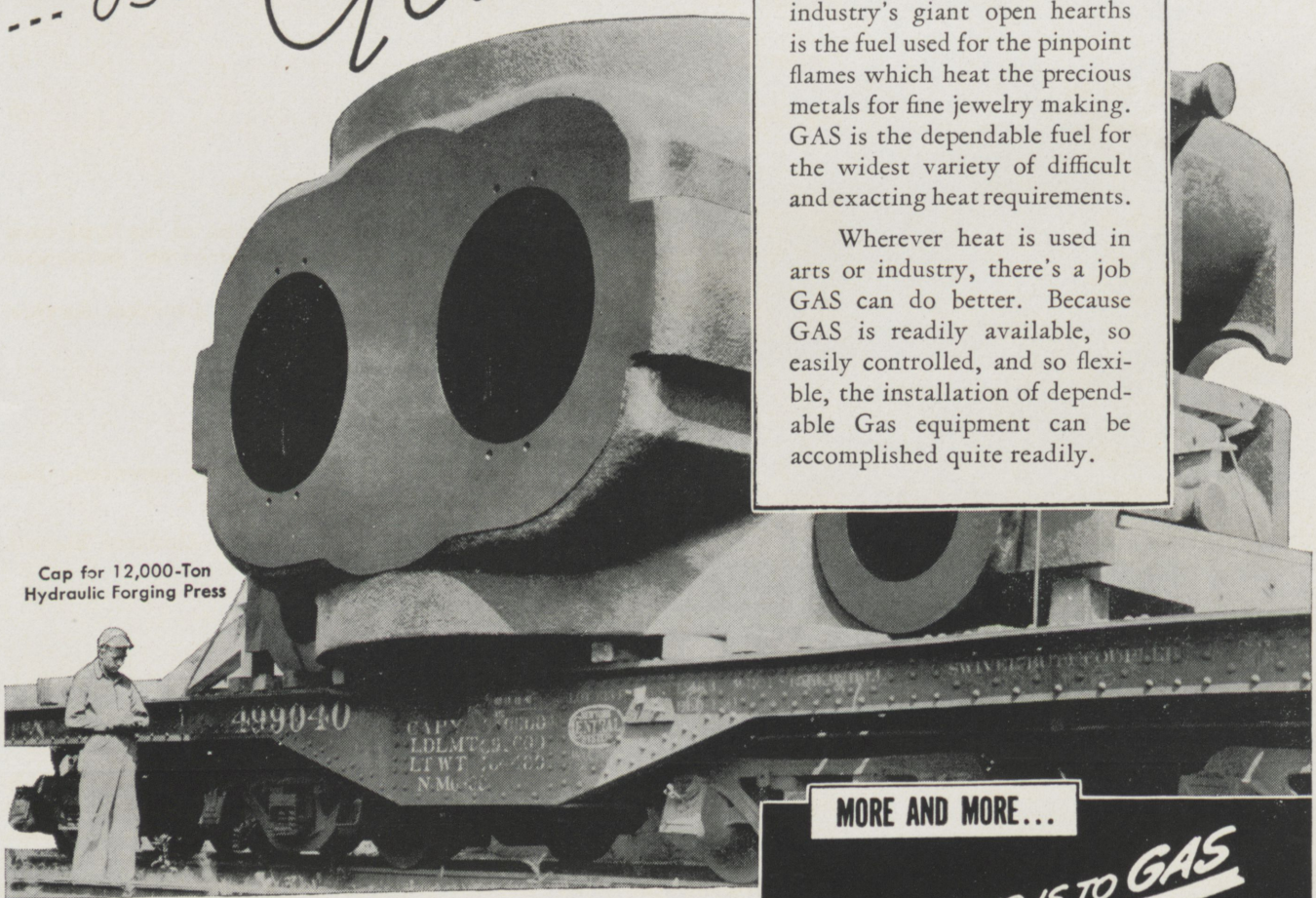

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# THE ROSE TECHNIC

VOLUME LXII, NO. 8 MARCH, 1947



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**An Army transport plane of the type now being converted for peacetime passenger service.**

—Cuts Courtesy **Douglas Airview**

### FRONTISPIECE

**A worker butt-flash welds a rotor ring for a huge generator. See page 6 for a discussion of new welding techniques.**

—Cut Courtesy **General Electric**

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DEMING HALL

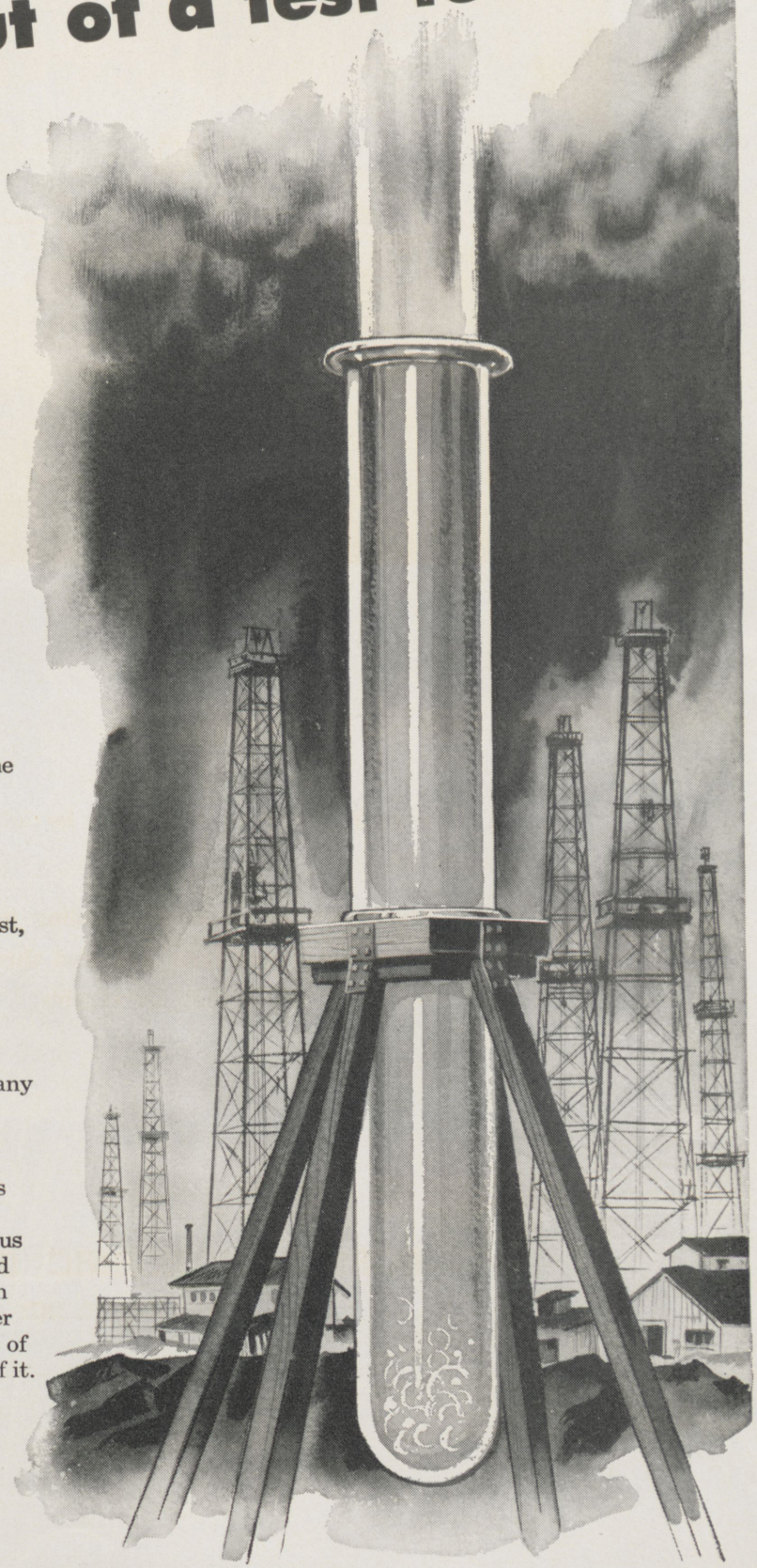
**The next freshman class will be admitted to Rose on June 30.**

**Students with advanced standing may be admitted at the beginning of any term provided there are vacancies in the classes for which they are eligible.**

## ROSE POLYTECHNIC INSTITUTE

TERRE HAUTE, IND.

# A "Gusher" out of a test tube!



You have heard much about petroleum reserves and their vital importance to America's future. It is good to know that reserves already discovered are ample for many years to come and that explorations can be relied upon to find great new reservoirs under ground.

It is good to know, too, that petroleum chemists and engineers have been taking a long-range view of the future in motor fuels, have been seeking a new source, and have developed a method of using it. A "gusher" out of a test tube!

The new source is natural gas. And the new method is the Synthol process. This will utilize America's vast reserves of natural gas—will turn gas into gasoline . . . at a cost-per-gallon comparable to that of gasoline made from crude oil. In the development of this process, the Standard Oil Company (Indiana), through its subsidiary, the Stanolind Oil and Gas Company, is playing a leading role.

Fundamentally, the Synthol process uses oxygen to convert natural gas to a mixture of carbon monoxide and hydrogen. The carbon monoxide and hydrogen, passing over a catalyst, react to produce hydrocarbons in the gasoline and distillate fuel range, plus oxygenated compounds which have uses as chemicals.

And now, after intensive research—exploratory, pilot plant, process design, engineering—the Stanolind Oil and Gas Company is planning a full-size Synthol plant designed to convert natural gas into 6,000 barrels a day of high quality gasoline.

Here is applied science indeed! And—what's more—a modification of the Synthol process would produce liquid fuels from our tremendous reserves of coal . . . fuel enough for a thousand years and more. So there's big-league research ahead . . . research devoted to producing power from every possible source. And the scientists of Standard of Indiana will be right in the thick of it.

**STANDARD OIL COMPANY**
**(INDIANA)**
**910 South Michigan Avenue**
**Chicago 80, Illinois**

# Labor and Democracy

SINCE the dawn of American history the average American has been more or less independent in his thinking and his mode of life. He has always cherished the Constitutional freedoms of worship, speech, and the press. He has regarded these freedoms so highly that, on several historical occasions, he has gone into battle in the defense of these typically American principles.

The average American wants comfort for his family, health, the opportunity to build his own security, the leisure to relax, friends to enjoy, and time to live. He doesn't want to be "pushed" around nor to "push" anyone else around. He isn't afraid of any future he has a hand in shaping—he is willing to take a hand, do his part.

Within the last decade, turmoil of fear, doubt, and suspicion have arisen on the American horizon. The workingmen commenced banding themselves together into various and numerous trade unions and organizations as a means of stabilizing their future security. These free unions are characteristic of a free democratic society. They persist in no other sort of society. They require democracy for their survival. Democracy is based on free persuasion; it tolerates social and economic pressures, but the pressures must be of a peaceful nature.

Today a somewhat different scene is portrayed on the American front. Some of these unions have grown into monstrous uncontrollable organizations which are greatly feared by industrial management, government, and the general public. The organization which was once the servant of the working class has become the master of the workingman. Ruthless autocrats operate these prodigious machines. These pitiless moguls are exploiting the future security of the laboring man. These unions are undermining the very foundation of the democratic process; they are opening the way for the repressive totalitarian state. And yet, no element in our society should be firmer against facism and violence than our unions.

Recently, throughout this nation of ours, riots and sanguinary violence prevailed. Production had been slowed considerably, making the task of reconversion doubly difficult. We have won the war but we may readily lose the fruits of our victory if we bog down in reconverting to peacetime production. Work stoppages mean a definite loss to the workingman from the standpoint of wages. Some of these recent strikes have been of several months duration. The average workingman cannot afford to lose too many paychecks because current prices of commodities are bordering on the brink of inflation. Suppose that an employee has been out of work for two months and that he receives a 20-cent per hour wage boost upon his return—it will take from five to six years' time for the workman to earn sufficient money to compensate for the financial setback incurred during his layoff period. There is no gain in such practice since no one can guarantee the future value of the dollar.

Consequently, it behooves each and every individual to take stock of himself and his immediate environment. He should seek out that which is good and cling to it. He should voice his opinions regarding that which is right and proper. He should and must decry subversive activities and avoid sanguinary violence.

In conclusion, unions, managements, legislatures, courts, the general public, and the law enforcement authorities—all should work together to make this country not only law-professing but law-abiding.

PAUL MELLIS MILLER

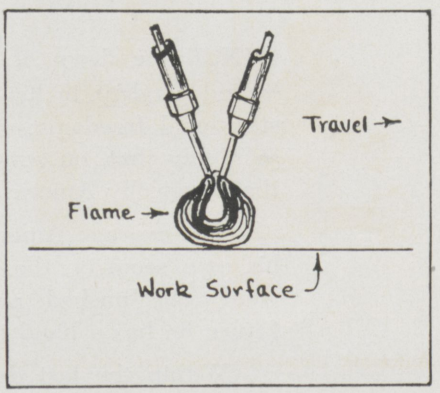
# Atomic-Hydrogen Arc Welding

By J. W. Price, jr., m.e.

Some thirty odd years ago Dr. Irwin Langmuir discovered that hydrogen changed from the molecular to the atomic form at high temperatures. The discovery was made during a study of the loss of heat from incandescent tungsten filaments in an atmosphere of hydrogen gas. A mathematical investigation showed that the heat carried away from the filament by the gas far exceeded what was possible by the ordinary process of convection and conduction. The study suggested, and further experiment proved, that some of the $H_2$ molecules split into atoms at the filament, absorbing large quantities of energy in the process, and then moved out, coming together again and releasing this heat.

In continuing the theoretical investigation it was found that more atomic hydrogen was formed by passing powerful electric arcs between two tungsten electrodes at atmospheric pressure. By directing a jet of hydrogen from a small tube into the arc, the atmic hydrogen could be blown out of the arc, forming an intensely hot flame of atomic hydrogen burning to the molecular form. In this flame molybdenum, one of the most refractory metals, melts with ease. Quartz, however, melts less easily, in spite of its lower melting point. This indicates that the metal acts as a catalytic in assisting the action.

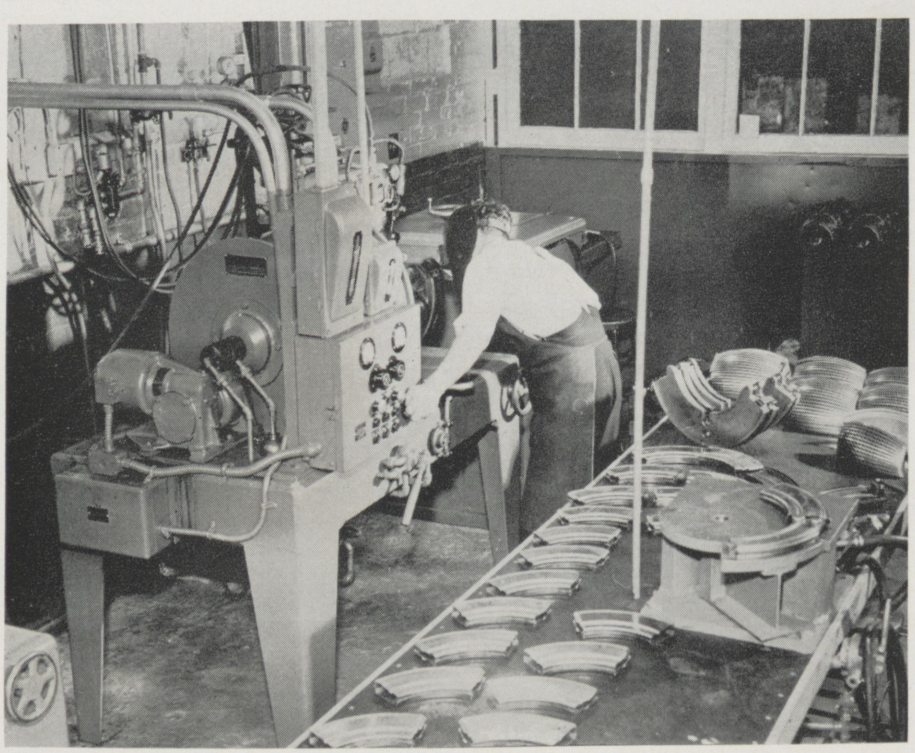
Experiments carried on by other men have led to the development of special torches built on this principle which have produced welds for which consistent ductility is claimed. The torch now in common use consists of a holder into which the insulated leads enter through the handle. The head of the holder mounts two tungsten wires set at an angle of approximately 50 degrees. The tungsten wires may be obtained in various diameters for welding metals of different gage. These wires or electrodes are enclosed in a hollow sleeve through which pure hydrogen is forced under small pressures, usually from one to five pounds. The higher hydrogen pressures are used in tacking while the lower are used for welding. The hollow sleeve serves as a handle and is insulated against heat. The electrode clamps are adjustable; one of them is movable by means of a grip lever. As hydrogen is introduced through the tube its flow is controlled by a small valve and manifold in the handle, and it is brought to the arc through annular openings at the end of each electrode clamp. When the electrode holder is not in use the electrodes are touching; the arc is established by separating them by the grip lever. If after the arc is once established, it goes out, the line contactor will open, disconnecting the electrode holder electrically from the transformer.




**Sketch of an atomic-hydrogen welding head in operation.**

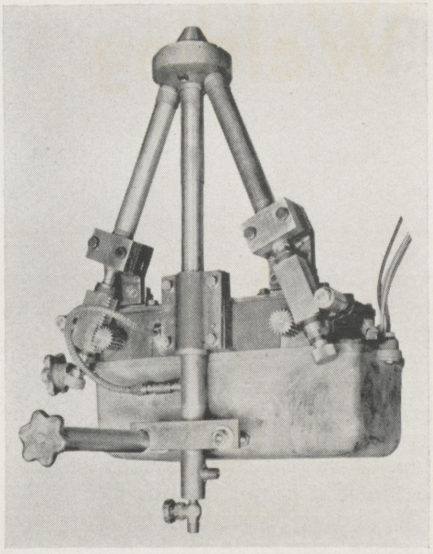
Automatic welding machines have been developed for welding joints which are regular in shape. Obviously straight line seams and perfectly circular work lend themselves to automatic welding much better than joints which have to be followed in irregular paths. Irregular shapes can be handled, however, in cases where it is desirable. For instance, gasoline tanks of very irregular shape have been welded automatically using a template to guide the work, supported on a castered dolly, so that the joint stayed always under the arc. Typical of automatic atomic hydrogen production welding is such work as the welding of the seam of stainless steel tubing, or the fabrication of pressure accumulators, or the welding of thin sheets of stainless steel.

The hydrogen gas serves a threefold purpose. In addition to protecting the twin tungsten electrodes between which the arc is established, it acts as a heat transmitter and as a shield and reducing agent to prevent the formation of axides and nitrides during the welding process. The shield of hydrogen gas excludes



**This atomic-hydrogen arc welding machine was used in a Canadian munitions plant for welding Bren-gun magazines.**

*—All Photographs Courtesy General Electric*



Automatic atomic-hydrogen arc welding head.

the air from the weld puddle and reduces some metallic oxides that might be on the base metal. The actual welding is done where the heat is most intense, at the fringe of the fan-shaped flame formed by the hydrogen stream. The temperature of this flame is between 6000 and 7000 degrees Centigrade, sufficiently high to raise any metal above its melting point.

Either alternating or direct current may be used in the arc; however, the former is usually more convenient and equalizes heat distribution and electrode consumption. Smaller electrodes may be employed when alternating current is used, resulting in a saving on this item. In the welding transformer the current is controlled by a variable reactance built into the transformer. The arc voltage varies from 65 to 90 volts for manual welding, and from 65 to 110 volts for automatic welding. The number of amperes used varies from 6 to 150 depending on the type and gage of metal being welded. The transformer has a sufficiently high open circuit voltage, about 300 volts, to permit easy starting of the arc.

In general, all varieties of steel, including alloys with nickel, chromium, manganese, molybdenum, columbium, and titanium, are readily weldable by this process. Steel with a carbon content as high as 1.25% has been welded successfully also. It must be kept in mind, however, that atomic-hydrogen welding does not replace the metallic arc in the welding of steel; it simply extends the welding field into the thin sheet metals and alloy steels. Metals as thin as a wafer razor blade, as well as 18 gage sheets, have been welded successfully by this process. A good example of this class of work is a refrigerator wall-condenser ball fabricated of 12 gage steel drawn into half globes and welded at the equator. Hollow spheres of this sort stood under test a pressure of 2700 lb. per sq. in.

In the construction of jet engines, which supply power for the latest type military planes, it was found that heat-resistant alloys were required for the combustion chamber and exhaust units because the intense heat of combustion creates temperatures as high as 1500 degrees Fahrenheit. In order to keep the weight of the engine down, these heat-resistant alloys had to be used in sheet form, some as light as 0.022 in. in thickness. These austenitic stainless alloys give high strength and good corrosion resistance at these high temperatures. It was found that by welding the parts the engineers were able to design for minimum weight and maximum joint efficiency, both in thermal and physical strengths. The longitudinal seams, in some instances, were designed for a flush joint without the necessity of grinding. These were made by clamping the pieces to be welded in a special fixture and backing it with hydrogen or natural gas, and then welding it by the atomic-hydrogen process. The gaseous backing was provided by burning hydrogen or natural gas in a groove milled in the backing bar of the fixture. This formed a reducing atmosphere on the bottom side of the weld, resulting in a smooth lower bead.

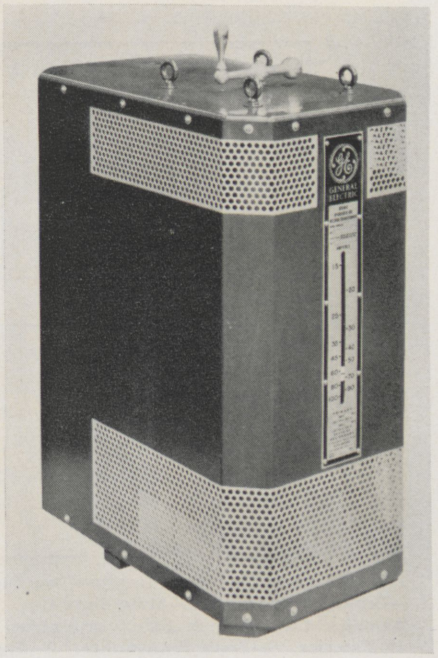
On thicknesses up to 1/16 in., it proved possible to butt the edges up square and, using the fixture as mentioned, weld the seam without the addition of filler or the use of flux. The use of filler was eliminated by clamping both sides of the joint tightly and squarely within 1/4 in. of the joint. The heat of the arc expanded the metal and forced it to come together and to hump at the joint. This hump was melted down, giving a flush weld. As the metal cooled, a little elongation occured between the clamps, but this was so slight that it had little effect upon the strength of the joint. The result was a nearly flush joint that did not require cleaning and had excellent physical strength.

A recent investigation was made on the weldability of type 321 titanium-stabilized and type 347 columbium-stabilized stainless steels. Variations of these types, two of the most commonly used types of stainless steel, were rated as to their relative weldability and the results were correlated against their chemical composition and other data. The results of the investigation indicated that the cost of welding stabilized stainless steel by atomic-hydrogen may be materially reduced by slight changes in the chemical composition within the existing specifications.

The primary difficulty with the heats of stainless steel which showed poor weldability was the evolution of gas on the cooling side of the weld puddle. The gas seemed to evolve either at the moment of solidification or immediately preceding it. The amount of gas evolved and the ease with which it was eliminated from the steel seemed to be the controlling factors in limiting the speed at which the material may be welded in production. It was assumed in the investigation that any gas porosity represented an unacceptable defect and that the finished product must be free of wormholes and pinholes. No attempt was made to collect the evolved gas, but it was assumed that it was composed almost entirely of CO generated by compounds originally in the metal. Results showed that if the metal contained a minimum of 0.50% silicon the amount of gas evolved was materially reduced and satisfactory welds were possible. Apparently the extreme effectiveness of silicon in decreasing the amount of gas trouble encountered may be due to its action as a de-oxidizer and slagging element and preventing these oxides from reacting with carbon to form CO.

As in most other welding processes, the atomic-hydrogen method

(*Continued on Page 20*)



A General Electric atomic-hydrogen arc welding transformer.

# Precision Casting

By George M. Staples, sr., ch.e.

*All sketches courtesy of Whip-Mix Corporation*

Author's Note: The sources of information used for this article are as follows: "Precision Casting by the Investment Molding Process" by Robert Neiman, Whip-Mix Corporation, Louisville, Kentucky, from Vol. 52, 1944; "Transactions", American Foundrymen's Association; and conversation and correspondence with Robert Neiman, F. S. Badger, Haynes Stellite Company, Kokomo, Indiana, and A. W. Merrick, Austenal Laboratories, New York, New York.

This "new" process of precision casting is known also as the lost wax or investment casting process. In reality, it has been used for many years for dental inlays, dentures, and jewelry. The process (as Robert Neiman, Whip-Mix Corporation, told the author) "involves the casting of any alloy or metal into a one-piece refractory mold from which a dissipatable pattern or cluster of patterns has been removed, generally by heat, and into which the molten alloy is cast, usually under pressure." World War II hastened the development of this casting process for the production of certain important articles—the stationary and moving blades for gas turbines, for instance.

The process will be described chronologically, as follows: patterns, molds, charge for mold, and casting.

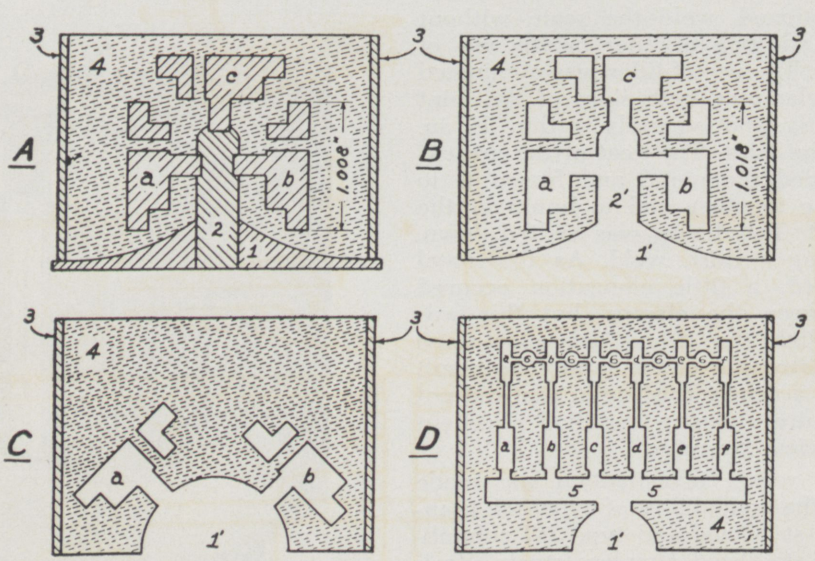
Patterns are made of a wax, or plastic, which must melt, vaporize, or burn away without any residue upon the application of heat. They are usually prepared by injection into dies. Special considerations which must be made in the preparation of the pattern dies are (1) wax pattern shrinkage, (2) the metal casting shrinkage, (3) mold expansion during preparation, and (4) mold expansion on heating. For example:

| | |
|---|---|
| Wax pattern shrinkage | -1.0% |
| Metal casting shrinkage | -1.8% |
| | -2.8% Total |
| Mold expansion during preparation | 0.3% |
| Mold expansion on heating | 1.0% |
| | 1.3% Total |

$$-2.8\% + 1.3\% = -1.5\%$$

Therefore, to compensate for this total 1.5% shrinkage, the pattern die must be 1.5% larger than the desired size. Differences in the shape and size of the casting, and variations of cross-section cause added variations in shrinkages and expansions.

The patterns are assembled with wax gates and risers for convenient mounting and proper feeding of the molten metal into the mold cavities.



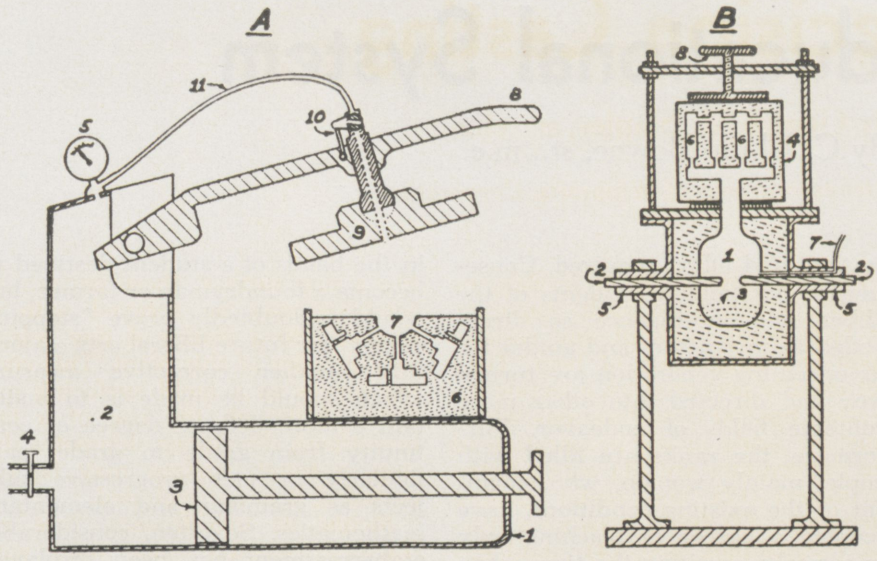

Pattern Mounting, Investing and Dissipating. A and B—Typical Pattern Assembly. A—Before Burn-Out. B—After Burn-Out. C—Two-Pattern Assembly. D—Type of Pattern Assembly Configuration Especially Adapted to Thin-Sectioned Castings. 1—Crucible Former. 1¹—Crucible. 2—Sprue Forming Rod. 2¹—Sprue. 3—Metal Ring Forming Flask. 4—Investment. 5—Main Gate. 6—Blind Risers. "a-b-c-d-e-f" Pattern Cavities.

For a fine surface, these pattern assemblies may be sprayed with or dipped into a slurry of fine refractory powder at this point. This coating serves as a mold surfacing material. Although the use of a fine investment sometimes eliminates this step, a rough surface may be expected if it is not included.

Molds, or investments, "are refractory cements made fluid with water and poured around the patterns in a confining metal ring or flash, which upon standing, will set to form a hard, heat-resisting mold." (Quoting Robert Neiman, Whip-Mix Corporation.) Before setting, the mold is vibrated to pack the solid and to release air bubbles. Vacuum methods are also sometimes used to eliminate the likelihood of bubbles. The packing process helps to eliminate roughness and nodules on the castings. Investments for casting non-ferrous alloys which melt below 2000° F. are usually composed of plaster of Paris used as a binder for silica or some other refractory. For alloys with melting points above 2000° F., silica generally forms the base of the mold and the binding agent is frequently organic silica (obtained by the hydrolysis of ethyl silicate).

After curing, certain processes indicate that the molds be placed in low temperature ovens to melt out the major portion of the pattern wax for reclamation. All processes include higher temperature ovens, which operate at temperatures up to 2000° F. (depending on the investment material) and melt, or burn out the wax (or plastic) pattern, leaving the mold cavity clean. The molten metallic charge may be cast into the hot mold or the mold may be cooled to any desired temperature.

The charge (molten metal or alloy) is usually prepared in induction, indirect arc, or gas fired furnaces. As clean melts mean sound castings, every precaution is taken toward this end. Commercial ingots of the desired analysis are convenient. Contamination and gassing are usually prevented by quick meltings. Commercial fluxes and deoxidizers can be used to advantage with certain alloys. Atmosphere of neutral or re-




Line Sketch of Pressure Type Casting Machine. 1—Machine Base. 2—Air Pressure Tank. 3—Piston Pump. 4—Compressed Air Valve. 5—Pressure Gage. 6—Mold. 7—Crucible. 8—Handle. 9—Head. 10—Air Valve Mechanism. 11—Air Hose. B—Arc Furnace Pressure Casting Machine. 1—Enclosed Arc Furnace. 2—Electrodes. 3—Molten Metal. 4—Mold. 5—Trunnions for Inverting Assembly. 6—Mold Cavity. 7—Air Pressure Line. 8—Mold Clamp.

ducing gases are sometimes maintained above the charge to prevent contamination.

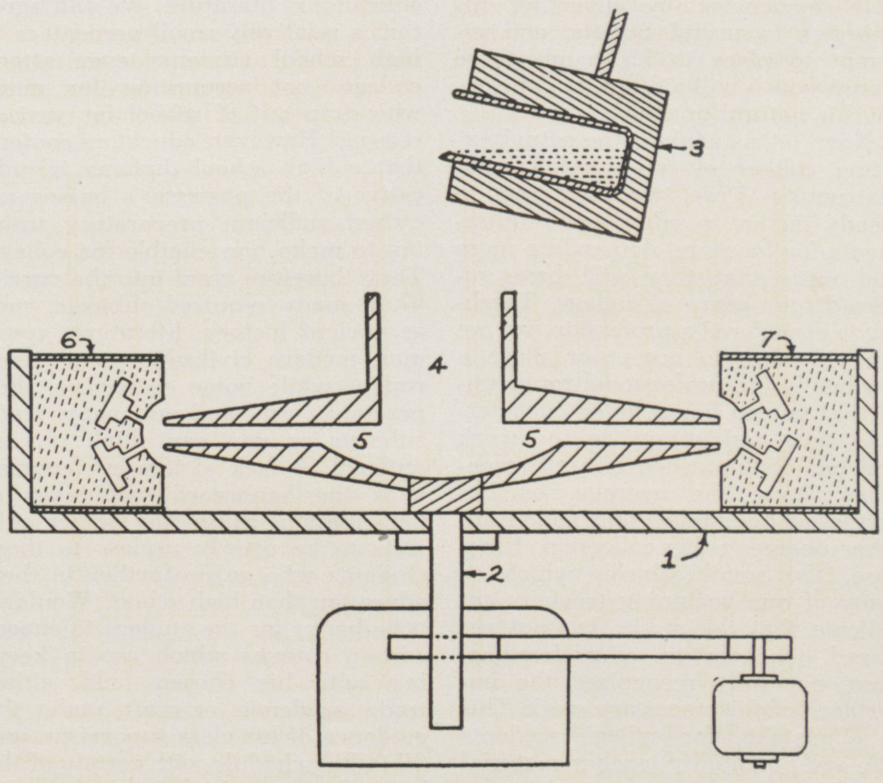
The charge is poured either statically or contrifugally from the melting crucible, or a ladle, or by pressure casting directly from patented melting furnaces, (such machines include the pressure type casting machine, the arc furnace pressure casting machine, the dental type centrifugal casting machine, and the multiple mold centrifugal casting machine) using air pressure to insure the filling of all the details of the mold. This pressure is usually approximately 10-30 pounds per square inch, but pressures as high as 500 psi are used. (These necessitate special investments, for Standard investments cannot withstand too high pressure, as their hot compressive strength is about 400 psi, and the tensile strength about 100 psi.) This careful attention to detail is necessary because of the smooth surface requirements of most of the castings. There are no particular limitations as to metals or alloys which can be used, but investments must be selected after considering the characteristics of the metallic charge.

Precision casting finds application where intricate shapes, small size, close tolerances, and small runs are involved. The ability of this process to produce intricate shapes is its outstanding feature. The elimination of from 75% to 95% of the machining operations necessary to produce a complicated part can usually be accomplished. Dies to be used for plastic holding, powder metallurgy, and even precision casting can be produced.

This investment molding process is best suited for the production of small castings of weights ranging from an ounce to several pounds, three inches maximum dimension, and one-half inch maximum extensive cross-sectional thickness. Minimum dimensions of as low as 0.0005 inch sectional thickness can be attained (though castings eighteen inches long and weighing as much as 100 pounds have been made).

Tolerances of —0.005 inches per inch are possible for most dimensions with careful control. Certain dimensions can be held to —0.002 inches per inch and small dimensions, such as 0.25 inch, make possible tolerances down to —0.0005 inches per inch.

The design engineer will find that a new avenue is open to him. Designers have dreamed of many things that this process can make economically possible—keyways, holes, splines, square and odd-shaped holes, keystones, cams, stops, bevels, numerals, graduations, etc. Sometimes as many as fifty machine operations can be eliminated in one part and also, certain multi-part assemblies can be united and cast as a single precision casting. For best service, the designer must supply the precision caster with detailed blueprints and specifications, giving all allowable tolerances for dimensions and finish. This will facilitate quicker estimates of cost, time necessary for production, and whether or not the precision caster recommends the utilization of secondary machining wherever economy and accuracy indicate.




Multiple-Mold Centrifugal Casting Machine. 1—Base. 2—Central Shaft. 3—Ladle or Furnace. 4—Central Pouring Pit. 5—Side Gates or Runners. 6 and 7—Molds.

# Our Educational System

By C. Philip Bowne, sr., m.e.

Our Education begins at the time we are born and progresses in varying degrees throughout our lifetime. As the saying goes, we are never too old to learn. It seems evident that the paths which we choose to follow are influenced primarily by inherent tendencies, characteristics, and aptitudes; and secondarily, they are influenced by the pressures brought to bear upon us by environmental factors. The most impressionable age is in early childhood, say up to the age of six, when the average child is subject only to parental care. During this period we formulate and bring to light our basic characters and natures, which change very slightly through the ensuing years. It is a very important stage in our life, and must not be overlooked nor taken lightly, but calls for strict attention, understanding, and the proper applied psychology on the part of the parents. During this period parents must analyze their child's physical and mental make-up, determine to the best of their abilities what is needed to strengthen his weaknesses, tone down his undesirable tendencies by diverting his energies to useful outlets, and attempt to place in his hands those things which will aid him in developing his natural aptitudes.

Now, let us analyze the actual existing caliber of our teachers and instructors. True, we have seen a steady incline in education requirements for teachers, demanding more and more that they will have received four years of college. Teaching is considered a profession, yet we are reluctant to accept or place a teacher in the professional ranks until that person has devoted considerable time and energy to the work and has distinguished himself somewhat above the average, or has furthered his studies and added another degree to his collection. Likewise, the small salaries which so many of our beginning teachers get indicate that the public has not yet placed teachers in a professional class, nor fully recognized the importance of this necessary work. This is a mistake, for college students who are potentially teacher material are discouraged from entering the teaching field, feeling that the low salaries are poor compensation for the time and effort required. Consequently, outstanding students of the caliber and intelligence so direly needed as instructors and guides for our oncoming generation are turned away and directed into other more profitable fields of endeavor. Furthermore, the ranks are filled with people, mainly women, who, cognizant of the existing conditions, have accepted a career of teaching only temporarily, awaiting the time when they may pursue other phases of life. Therefore, it seems opportune to state that a large percentage of our teachers are people who do not have the interests of the students at heart, but are simply passing the time by teaching. Are these the kind of people we want to teach our children? Moreover, there are an excessive number of reports of high schools having an utter lack of discipline. This is a direct reflection upon the caliber of our teachers and school officials.

Now we are prepared to make a constructive attack upon high school curricula, textbooks, and other educational literature. We will agree that a relatively small percentage of high school students ever attend college, not accounting for many who drop out of school for various reasons. However, educators contend that a high school diploma is indicative of the possessor's having acquired sufficient preparatory training to make him eligible for college. They therefore cram into the curriculum many required subjects, such as ancient history, literature, grammar, modern civilization, and geography; while home economics, shop practices, art, and as many trade subjects as you can think of, are optional. A lack of interest, coupled with the haphazard techniques of presentation, cause the former subjects to be utterly useless to those students who go no further in their education than high school. Wouldn't it be better for the student to choose certain courses which are in keeping with his chosen field, either trade, academic, or craft, under the guidance of his class supervisor, and fill in his schedule with certain of the heretofore required subjects, with regard to his needs? Knowledge of history or literature are not "tools" in the hands of a student destined to become a foundryman or farmer, but would undoubtedly prove "stepping stones" for future liberal arts majors. Still another corrective measure which should be made is to maintain a more definite degree of continuity from grade to grade, particularly in such progressive subjects as grammar and elementary mathematics. So often, considerable embarrassment has been displayed on the part of a high school senior or college student of no small intelligence, because of his insufficient knowledge of grammar. This sort of thing can be attributed only to a sketchy and incomplete series of English instruction.

Lower caliber teachers and schools are more prevalent among rural districts and small villages. Where the student body is large, representing more families, teachers and facilities can be expected to be better; moreover, the faculty-student ratio is usually larger than that of a smaller school, and more varied courses are available. As a partial solution, the consolidation of all non-consolidated schools and even of small consolidated schools into larger more compact schools would enable a more economical utilization of school funds, provide for a better teaching staff, and warrant the addition of needed trade subjects, laboratories, and equipment.

Thus far, nothing has been said concerning any changes needed in college curricula. It should suffice to say that in technical colleges, most energies are directed to the pursuit of an intensified, specialized course, giving as much available time as can be spared to the so-called humanities and to grammar and English composition. Although greater importance is being placed upon a more balanced course, considerable time is spent here picking up the loose ends of a sketchy grammar preparatory course and re-establishing, in a more usable form, the fundamentsal of the course. With regard to non-technical colleges and those having to do with the training and education of future teachers, the conversion of ideas and methods of teaching can well begin with them as the initial step.

# Great Men of Science

## III GEORGE ELLERY HALE

By Mark J. Orelup, soph., e.e.

"Like buried treasure, the outposts of the Universe have beckoned to the adventurous from immemorial times. Princes and potentates, political or industrial, equally with men of science, have felt the lure of the uncharted seas of space. If the cost of gathering celestial treasure exceeds that of searching for the buried chests of a Morgan or a Flint, the expectation of rich return is surely greater and the route no less attractive."

G. H. Hale

The struggle to learn the secrets of the universe that surrounds us with its immensity has indeed held men's attention from the beginning of time. In the many centuries past, man could do little more than speculate upon the size, origin, and composition of the heavens that glittered so enticingly before him. Newton, with a prism, made the first step toward the solution of this problem and the names of the men who have followed him and his work read like the honor roll of science. Yet the man who was to lead the frontal attack upon the stronghold of the sun was not born until 1868. In that year on June 29, in the city of Chicago, Illinois, a son was born to Mary Scranton Brown Hale and William Ellery Hale.

The story of that son, George Ellery Hale, is not the traditional one of a rise from gutter to glory, for William Hale was a man of more than moderate means and was able to raise his son in comfort. The elder Hale was quick to realize that his son possessed a rare scientific talent and encouraged Ellery in his early experiments. Few indeed are the fathers that will finance a telescope and allow his son to turn the top of his house into an observatory.

The twin riddles of Solar Prominences and Sun Spots had baffled men of science for centuries, but to Hale they were an irresistible attraction. What were they? How were they formed? What was their effect on the earth? All of these questions demanded answers. Hale intended to provide them. Solar prominences were to come first. These flame giants that rose thousands of miles from the surface of the sun could then be observed directly during the brief moments of a total eclipse when the moon acted as a shield

George Ellery Hale
—*Science Service*

against the glare of the sun. Obviously some method of direct observation was necessary. In his junior year at M. I. T. Hale found the answer to direct observation in an instrument of his construction. The spectroheliograph, as he called it, was able to produce photographs of a prominence by building on a photograpphic plate countless adjoining images of the narrow spectrum line of a single element picked from the glare of nearly a hundred others burning in the sun. In 1890 Hale packed his spectroheliograph and college degree for the trip to Chicago where he planned to continue his research. Even now his fame had begun to spread. The astronomers at the Lick and Princeton observatories offered the use of their large telescopes to aid in his experiments, but Hale decided that he needed an instrument or if possible an entire observatory of his own. Once again William Hale came to his son's aid, this time to finance the Kenwood observatory. In these new surroundings the studies that were to last nearly twenty years and culminate in the establishment of the magnetic character of sun spots, were begun in earnest. Hale soon found that the twelve inch telescope in the Kenwood Observatory was not powerful enough. It served its purpose as an instrument for preliminary study, but it did not gather enough light to give the great detail he needed.

The young astronomer now held the post of associate professorship in astrophysics at the University of Chicago. President Harper of the University recognized in Hale the beginnings of scientific greatness and soon he and George Hale were deep in plans for an observatory large enough to carry Hale's researches to the logical conclusion, but at each turn the question that has confronted every scientist since Archimides rose to mock them. From where was the money to come? The University of Chicago, then in its infancy, could not begin to finance such an undertaking. Hale then showed that he had a gift even more rare than scientific genius. He possessed an amazing ability to wangle large sums of money for scientific purposes.

The man selected to finance the new telescope was Charles T. Yerkes who was one of Chicago's richest and most influential men. Hale had himself invited to a dinner Yerkes was to attend and then managed to sit next to him. During the entire meal Hale kept astronomy flowing at his objective. Yerkes, inattentive at first, became fascinated and soon made the mistake of admitting that he had always dreamed of building the greatest of all telescopes. Hale left the dinner with a check for twenty thousand dollars in his pocket, and a promise for enough money to build the lenses for a forty inch telescope. In 1897 the entire observatory was ready and as the Earth turned to a new century the Yerkes observatory began to make astronomical history.

The brilliant staff Hale had gathered around him at Yerkes was doing notable work among the stars, but his own researches on the sun lagged badly. It was not lack of zeal on his part, but simply, it was too soon. Photographic plates sensitive enough to meet his demands were not available. It was an impasse, and Hale was forced to turn his attention elsewhere.

(*Continued on Page* 22)

# Sorry, No Cokes!

By John R. White, sr., m.e.
and
William Tingley, sr., m.e.

Editor's note: The editors of the Rose Technic, after considerable expense, are proud to announce that they have secured the services of two world famous book store statisticians to analyze the existing conditions in college book stores. As a result of their investigation, these two experts of inhuman relations have submitted the following report. Since, after years of collaboration, these two geniuses think as one, the report is given in first person singular.

Upon discovering that the average college student spends 67.28% of his scholastic career in the campus book store, I decided to personally investigate in order to substantiate the facts and determine the veracity of this report. (Reference, Webster's Collegiate Dictionary, $4.63, Vets. Admin.)

Bounding out of bed one morning, only to be brought up short by my clanking chains (G. I. students are encouraged to stay close to their books), and glancing at the calendar, courtesy of Esquire, I decided that this would be the day to complete my long-awaited investigation.

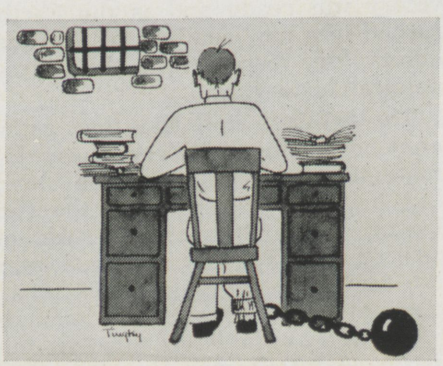
As I entered the hallowed portals of dear old Violet Polytechnic Institute, an agonized scream shattered the silence. Disregarding this plaintive call for aid, I proceeded directly to the bookstore, only to discover, to my utmost horrer, that this signal of distress was emanating from that very spot. The upper portion of a man was protruding from the door of the bookstore, as though he had been trapped by the sudden closing of the door. Had my name been Richard, I would have opened the door, but as it were, I merely silenced his outbursts with a well-placed tourniquet. Slowly piecing together his story (a tourniquet is released for a only a few seconds every fifteen minutes) I discovered the cardinal rule for all bookstore customers to know: *A Book Store always closes on time.* I also learned that the bookstore would re-open in ten minutes—fifteen minutes late. Within a few minutes, a fair sized crowd had gathered. Suddenly a loud voice roared, "Long live the Civils," and amidst a fanfare of trumpets, a huge, hulking form of a man—Big Jim Waite—forced his way through the throng. Waite, noticing the trapped victim, snarled to a few insignificant chemicals, electricals and mechanicals who has been kneeling in homage to this maestro of the merchandise, "Hang him on the bulletin board to serve as a warning to future loiterers."


How did he know I was a mechanical?

By this time, I had battled my way to within shouting distance of the counter. Summoning my vocal facilities (taking a hell of a deep breath), and reaching for a V. A. order pad, I shouted, "Give me a Coke, a Milky Way and a Contract Bridge Analysis by Ely Culbertson." Big Jim glared at me and demanded my identification card, discharge papers and blood type. Upon discovering that I possessed none of these precious items, he sneered, 'Oh, a Mechanical, huh?" I was amazed at his perceptive power, since I had previously slipped my oil can and screw driver into a hip pocket and had carefully draped a shawl over the turbine embroidered on my T-shirt.

"Sorry, Bub," he said, "we ain't got no Cokes, we ain't got no Milky Ways and we ain't got the book. The only book we got is 'Chess Analysis' by F. A. Tigue." Just then another student entered, whistling "A.S.C.E. Forever", faced the Civil lab, saluted, and then ordered a Coke, Milky Way and Contract-Bridge Analysis by Ely Culbertson, all three of which he received immediately. Unable to understand this procedure, I turned to another clerk, namely Jack Fahrenheit. Unmindful of his department, I again order the three previously mentioned items, and as before, my attempts were thwarted. Fahrenheit refused my order flatly when he discovered that I flinched when subjected to a slight current of 500 amps. Defeated and despondent, I retraced my steps to the rec-

(*Continued on Page* 24)

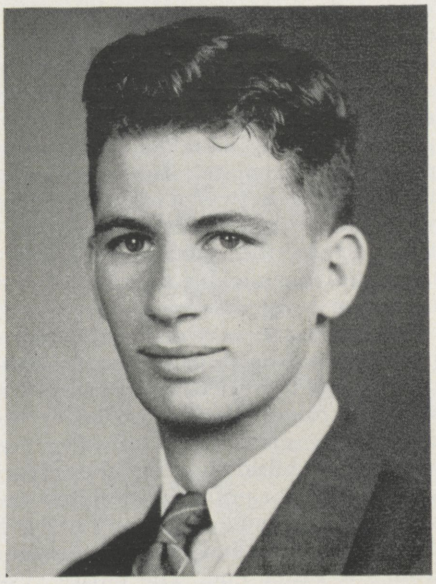


Students are encouraged to stay with their books.

I flinched.

# Alumni News

By James A. Milner
and William Backes



Charles B. Butts

Charles B. Butts, instructor in Physics lab and late addition to the Rose faculty, began his days at Rose back in September of 1941, a member of the class of '45. Although the war started soon after, "Burt" managed to stick it out at Rose until June of '43. Then he, along with thousands of other college men who couldn't quite see wearing olive drab and who thought they knew a good thing when they saw it, joined the Navy V-12 program. (After we all got in, I used to wonder whether all those characters had all their bolts tight—I knew I didn't). Chuck was sent to the unit at Purdue where hefinished the required undergraduate work for a degree. However, he thought alot of Dear Old Rose and instead of taking his degree at Purdue, he had his credits transferred back to Rose and was given a Rose degree in M.E. Chuck finished out his Navy training at Midshipman's school at Annapolis.

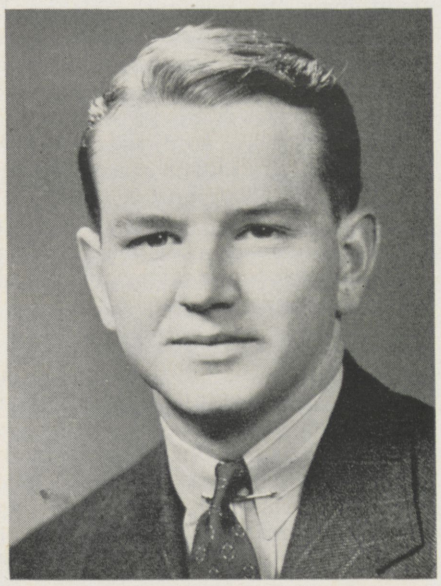
Finishing at Annapolis in the spring of '45, he went up to Boston where he went aboard a DE. After a shakedown cruise in the Carribbean, Chuck and the DE headed into the Pacific where they saw duty escorting small minesweepers—VJ Day found them off the coast of Japan. Chuck got back to the States in time to be discharged in June, '46.

After an appropriate period of loafing, during which time he spent hour after hour in the shower trying to get rid of all the salt he picked up while on that ship, he returned to Rose for a refresher during the Oct. term. The school decided he was duly refreshed, and signed him on as a lab instructor. Although Chuck enjoys his work here, he doesn't intend to stay for more than a year or two, and has no definite plans for the future.

Maybe the strains of "South America, Take It Away" were too full of the richness and color of a tropical paradise to prevent a certain Rose graduate from refusing an offer to visit this land of adventure, or perhaps the opportunity of continuing an interesting career in his own profession of engineering under a blanket of South American stars was the contributing factor in Dave Demaree's opinion when he decided to take a position with the W. R. Grace and Company.

Future Rose student, Dave Demeree, started his life in Bloomington, Indiana, November 29, 1920 where he grew up with a stern interest, made obvious by long hours of arduous study) in the sport of boyhood pranks. With this understanding knowledge as a good foundation he went through the local grade and high school with apparent ease and then entered this school of books and brains in the fall of 1933. Dave was marked for achievement when he sauntered for the first time through the portals of Rose Polytechnic Institute and after his first year he was acclaimed to have taken one of the coldest swims on record in Deming Lake. December was the month, and it was a cold winter. All credit for this episode is to the class of '41, which took part in helping Dave to come to this decision. The rifle club, and camera club helped to round out his interests while in school and during his senior year the job of class secretary-treasurer was bestowed upon him.

Graduating in May of 1942, a month previous to the usual time, because of the start of the intensified courses at Rose due to the war, Dave went immediately to work for the



Dave Demaree

General Electric Company at Fort Wayne, Indiana. As a student engineer on the "test course" sponsored by G.E. he was with them for two years working in five different plants. Following this position the Goodyear Aircraft Corporation offered him a means of living as an electrical engineer down in Phoenix, Arizona (Dave graduated as a mechanical engineer). While in Arizona Dave found out where "Salome Danced" and on a slow fox trot asked her to marry him. During the intermission the said yes! Her full name was Salome Ross from Bennington, Vermont and Dave first met her in Schenectady, New York. The world traveler!

After the howling crowds had subsided due to the announcement of V.E. Day, contract terminations brought about a general reduction of personnel at the Goodyear Aircraft Plant replacing Dave with the parent company located at Akron, Ohio. (Finally Dave settles down to a good part of the United States.) At the Akron plant he was a member of the engineering staff, a group which engineers the plant layout and construction for all the plants of the factory.

While at Rose one of Dave's classmates, Antonio Bogram, was con-

(*Continued on Page* 26)

# Research and Development

By the Editors

**Bearing Design**

In order to accomplish its purpose, a bearing for any type of machine must properly distribute the lubricant over the moving surfaces. By means of a transparent plastic model of the bearing under study, engineers can now obtain visually the information needed in design. Oil colored red is admitted into the bearing of the plastic model, and its motion and distribution are easily followed by the observer. This invention has made possible the design of bearings for heavier loads and more powerful motors.

**The Chemistry of Rust**

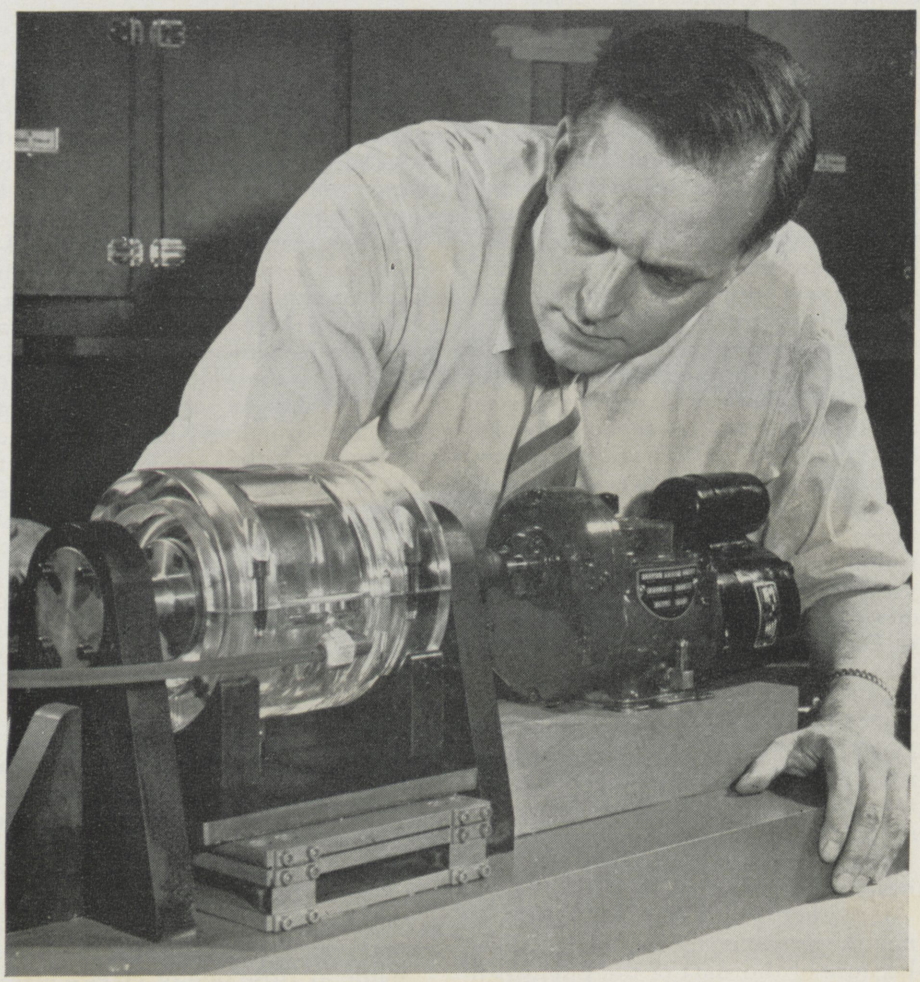
The problem of making metals and alloys resistant to all kinds of rust, corrosion, and tarnish has proven a tremendous obstacle in the deveopment of stainless steels, blading for gas turbines, engine bearings, and innumerable other products in high industrial demand. Dr. Earl A. Gulbransen of the Westinghouse Research Laboratories is tackling the corrosion problem with the aid of three of the most up-to-date instruments known to industry: the electron microscope, the electronic diffraction camera, and the vacuum micro-balance.

Dr. Gulbransen has confined his research to a study of the chemical action which takes place on the surface of various metals when they are exposed to air, or any other gas, at different temperatures and pressures. A physical picture of this surface layer (which is first stripped from the metal by a chemical process) is obtained by use of the electron microscope. A magnification of as high as fifty thousand times can be obtained with this instrument. The accompanying micrograph shows an oxide film of aluminum formed at 500° Centigrade by 0.1 atmosphere of oxygen during five minutes of exposure. The magnification of this electron micrograph is about thirty thousand times.

The next step in the study of the corroded surface is the diffraction test. The electronic diffraction camera fires a beam of electrons at the surface of the metal from an angle, and the electrons are allowed to glance off the metal and strike a photographic plate. By measuring the distance between the black and white rings in the resulting diffraction pattern, the scientist can determine the chemical structure of the corrosion layer.

The increase in weight of a sample of metal as it oxidizes is measured in millionths of a gram by the vacuum microbalance, in order to determine just how quickly the oxide coat builds up on the given sample. The sample under test is suspended from one end of the balance beam, and counterweights from the other end. The entire system is enclosed in a vacuum chamber, and measured amounts of oxygen are admitted to the chamber at intervals, giving an accurate idea of the sensitivity of the metal to corrosion.

It is expected that the result of all this research will be the elimination of costly trial-and-error methods of producing alloys and the development of scientific methods.

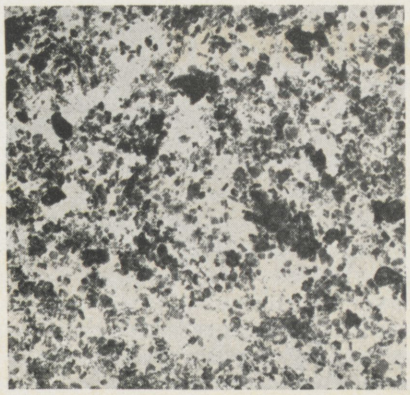


**A visual aid in machine bearing design.**
*—All Cuts Courtesy Westinghouse*

**Plastics and Wood**

The year-by-year increase in the plastics production of this country is no real cause for alarm in the lumber industry. While it is true that plastics are replacing wood in many applications in the building industry, the development of new plastics and techniques in lightweight construction is more likely to increase the demand for lumber than to decrease it. The reason for this is that many of the new plastics are, themselves, wood products; and the increase in their production will merely dictate the more efficient use of waste wood chips, shavings and sawdust. The development of resin-bonded plywoods, also, has made great strides in the war years.

These advances have been hastened by the perfection of a low-pressure molding process for plastic sheets, using new resins, called polyesters, which cure without giving off water. It will be remembered that at the beginning of the war the



Electron micrograph of oxide film of aluminum.

common method of molding plastic sheets for prefabricated construction was to form the sheets over expensive steel molds at extremely high pressures. The new techniques use temperatures at which the material becomes thermoplastic, and the sheets are now formed over low-cost wood or concrete forms.

One method of forming is to lay several layers of plywood, bounded with phenolic resin, upon the mold. On top of the plywood is placed a huge rubber bag, and mold, plywood, and bag are enclosed in a tight compartment. The bag is then inflated with steam at high pressure, forcing the plywood into the form of the mold.

### Lighter Automobiles

Your automobile of the future may be lighter than the present trend would seem to indicate. This, at least, is the opinion of one group of American automobile manufacturers, who believe that in order to cope with the problem introduced by the influx of foreign-built cars, and to meet the requirements of the foreign automobile purchaser, radical decreases in the weight of our cars will have to take place. Most manufacturers agree that the body of the average car can be lightened considerably, and that more widespread use of light metal alloys may solve the problem.

### Ionosphere

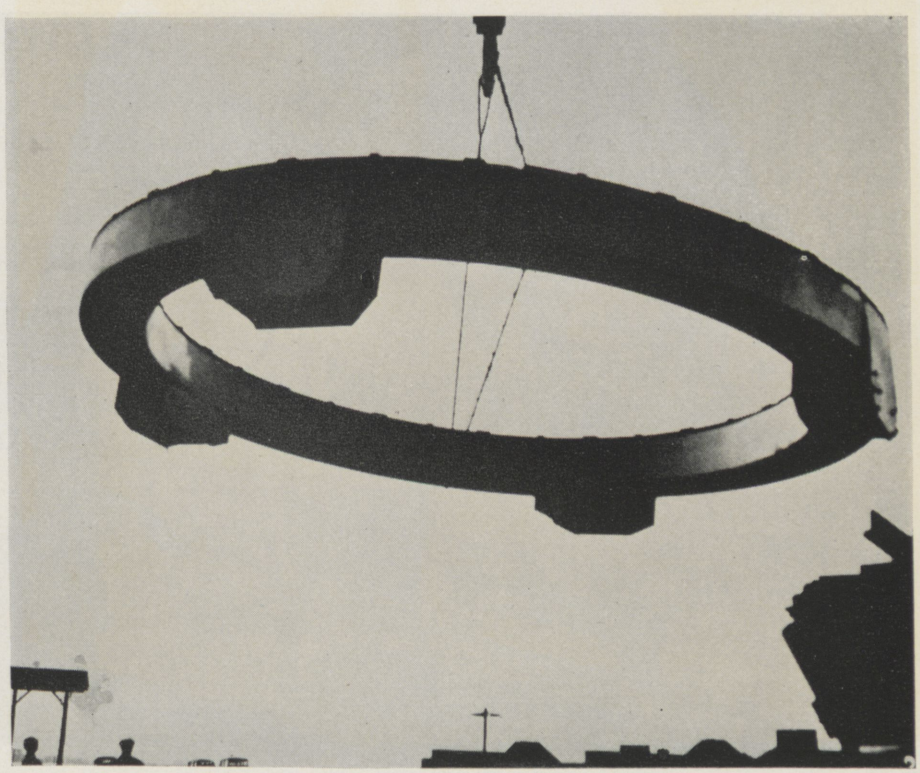
Another report to come out of the much-publicized tests on the German V-2 rockets over the desert at White Sands, New Mexico, is that concerning the ionosphere. This is the electrically conducting stratum about 50 miles above the surface of the earth, which plays such a tremendous part in the propagation of radio waves. The radio waves reaching your home, if you live more than about 100 miles from the broadcasting station, may be the sum of several reflections from the ionosphere to the earth, back to the ionosphere, and so on. As long as the waves reaching your antenna are nearly in phase, the words and music reproduced by your radio will be clear and intelligible. If, however, the ionosphere rises or falls fairly rapidly, waves which were formerly in phase will reach your antenna distorted, or will cancel each other out entirely; the result is the momentary fading of radio signals which is often noticed.

In the V-2 rocket test a point-by-point exploration of the ionosphere is being undertaken. Radio signals are sent between the rocket and the earth at two frequencies, one of which is not affected by the ionosphere and the other is shifted in phase. In this way the effect of the ionosphere upon transmission at different frequencies is expected to be determined fairly accurately.

### World's Largest Telescope

Scientists of the California Institute of Technology are again working on the 200-inch giant telescope at Mt. Palomar, California, after an interruption during the war. Completion of the instrument is now in sight, more than 15 years after the idea was first conceived and funds provided. With this telescope astronomers expect to be able to see one billion light years into space. The instrument has so much work cut out for it that problems now planned for it will be uncompleted a hundred years from now. The telescope will be used mainly to study distant galaxies and radiations from the planets, and scientists are hopeful that it may be the means of shedding new light on thories of the nature of the universe.

The building of the instrument has involved many exacting engineering problems. The 200-inch reflecting mirror is made of hard pyrex glass, and must be such a precise parabolic shape that no part of the surface may deviate from perfection by as much as one millionth of an inch. While polishing the mirror it was found that when placed in a vertical position it sagged out of shape under the force of gravity. A system of levers around the rim of the mirror surmounted that difficulty. The machining of the 300,000-pound steel bearing upon which the telescope will ride required a special boring mill with a diameter of 44 feet. The engineers had but .005th of an inch to work with, but temperature fluctuations sometimes caused expansions and contractions of as much as .013th of an inch. Then the bearing had to be bent out of shape so that the weight of its one-million-pound load would bend it back into a perfect circle. The bearing will run on oil pads and have such a small coefficient of friction that the whole structure, comparable in size to a six-story building, could be turned by a motor having less than half a horsepower.



This giant ring is shown as it started its trip to Mt. Palomar, California.

# Campus Survey

C. Gordon Hayes
and
Howard P. Freers

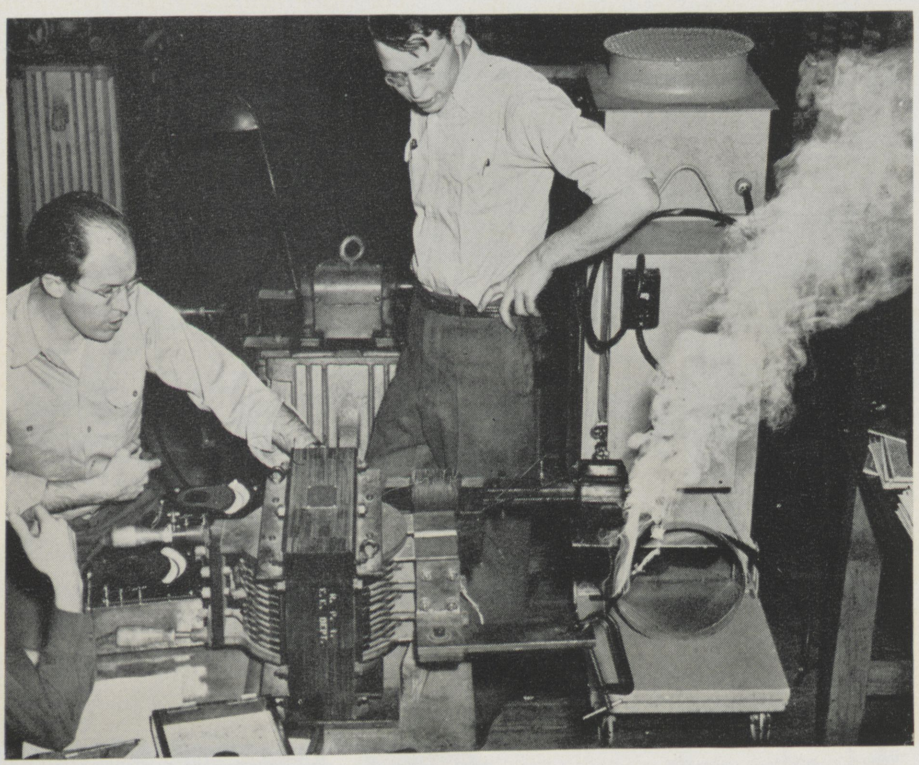
### Rifle Club

The Rose Poly Rifle Club was re-activated on December 18, 1946 with an election of officers. Those elected were: President, Casper W. Haupt; Vice President, Charles G. Weibel; Secretary-Treasurer, Ned Koonmen. Proceeds for re-affiliation to the National Rifle Association have been raised and the charter is expected to arrive in a short time.

Three matches have been fired so far this season. The first was with the University of Wisconsin which Rose won by default. The second with Carnegie Institute of Technology which Rose lost by a score of 1357 to 1228, and the third match was fired with the University of Pittsburgh which Rose lost by a score of 1367 to 1177. A match was fired on the 15th of February but the final results are not yet known.

### Glee Club

The Rose Tech Glee Club, like most other organizations on the campus, suffered from lack of man power during the war. However, it did manage to carry on each year with a few members and every term at least one concert was given. At the present time the Glee Club is approaching its pre-war strength. The boys are rendering their selections to the people of Terre Haute and the Wabash Valley. Mr. Emil Taflinger, the Club's able director, has assumed command again this year and Mrs. C. Bennett is again providing excellent piano accompanyment. The present officers of the club are President, Keith Sutton; and business manager, William Stutz. The club has given two concerts to date this season. The first of these was held in the middle of January at Davis Park School. The second which was held on February 11, 1947, was for the Terre Haute Rotary Club. The Glee Club has a full season of engagements ahead of them this spring. Some of the organizations to be honored include the Woman's Department Club, all of the high schools in Terre Haute, and several other clubs in the city. The season will be climaxed by a concert in June which will be open to the public.



John Lichtenwalter and Lester Folsom test the current-carrying capacity of wire (right) in the Elecrical Lab. The insulaion is here seen blazing. At extreme left is Julian Furness.

### Campus Conditions

Since we call this Campus Survey, we should bring a little notice to the condition of the campus proper.

We realize that the overflow of students at Rose has caused a paralleling overflow of cars, but the utter disregard for the condition of the grass is unnecessary. Near the flag pole will be found a pair of deep ruts cut through the grass by someone with little regard for the distruction he caused. Any morning you can see cars parked all over the lawns. In cold weather these cars don't cause too much damage to the grass, but with the advent of spring and damp weather it won't be long until tracks will be covering the campus. This is a trying situation and it are to keep a presentable campus.

We realize that there is little the students themselves can do, but some consideration for the appearance of the campus by the students would help. A little care in the parking of cars and especially in driving them around the campus would help. As the campus is surrounded with several excellent roads, surely it is unnecessary to drive across the grass. If you don't want to be ashamed of your campus, students, do your share to keep a presentable appearance.

### Radio Culb

With the election of Al Strickland as President for the winter term, the "Dial Twisters" are again moving along. The planning committee, consisting of Don Tyler, Eugene Glass, Leo Piotrowski, and Al Strickland have several new ideas they are willing to make use of for the good of the club. A letter has been sent to the Purdue Radio Club suggesting that the two clubs maintain a radio schedule. This will give the new and old members alike a chance to "chew the fat" on the air and see if they are allergic to mike fright.

But the "Static Chasers" are not resting until "R" day. Phil Krantz gave a talk on schematic symbols; Leo Piotrowski discussed Ohm's law; and Dave Jarrett took some of the mystery from the mysterious vacuum tube.

The Wabash Valley Amateur Radio Association, a semi-local organization of radio enthusiasts, held their monthly meeting in the Rose EE lecture room. Representatives of the Indiana State Police radio system gave a very interesting and informative talk on the history of the police radio. There was also a demonstration of resonant circuits.

Dr. Howlett gave the club a fascinating demonstration of high voltage, high frequency phenomena at the January meeting. As a tribute to two deceased members, Jack and Bill Brentlinger the Brentlinger achievement award was established to be awarded annually to the most deserving member of the WVARA.

The WVARA meetings, held the first Friday of every month, should be of interest to many Rose students because the programs are highly instructive and cover both technical and non-technical subjects. The club is anxious to help all would be amateurs and code lessons are held from 7:00 to 8:00 p.m. prior to each meeting.

**A. S. C. E.**

At their February 10th meeting the Student Chapter of the American Society of Civil Engineers invited the A.S.M.E., the A.S.Ch.E., and the A.I.E.E. to be their guests for the lecure given by F. W. Tat-

(*Continued on Page* 20)

# Student Life

By Alex J. Vogl

February's cold waves certainly brought about some of the oddest sights we have seen for a long time. While Mr. John Q. was trying to chisel his way through a homogeneous solution of Prestone and water (mine was unfortunately much more water than Prestone), his wife, Mrs. Public, donned her rusty ice skates and decided to give mankind a break. Admiring the performances of Don Metzger and Al Belt, probably the two finest skaters among our numbers, I was astounded by the sight of Mrs. Garriot arriving atop hubby Gene. There's no denying she looked cute way up there, but what about all the extra wear and tear on the precious hunk of man underneath?


Varsity tennis will return to Rose for the first time in three years this spring. Our netmen will begin practice sessions on the campus courts as soon as the climate permits. Four intercollegiate matches are now on the docket, commencing with the Canterbury meet on April 12th. About eight additional contests will be announced later.

Their awareness of danger sharp from the impending Day of Liberation, the greenhats of Freshman II joined with their less suspicious veteran class-mates in making the rounds of Rose's four fraternities. Yes, February 15 was the date of the quarterly rush week-end—there will not be another for nine months, however, since no new freshmen are to be admitted until the summer term.

Rushing—that's what they call those last few days when a freshman can sit down in any of the four fraternity houses and be waited on by the full might of their royal highnesses, the actives; chances are that the next time he walks in it will be backwards on all fours! Nonetheless, freshmen year after year revel in their temporary glory.

The trackmen have been pounding the boards of the fore-to-aft ramp—a none too satisfactory substitute for a field house, you will agree—with

(*Continued on Page* 24)


**RADIO CLUB ACTIVITIES. Leo Piotrowski (left) makes a voice recording while Phil Kranz adjusts controls. At right are Al Strickland, W9LKZ; Charles Bethge, W9UUY; and David Jarrett, W4IOM.**

# Fraternity Notes

### Sigma Nu

Beta Upsilon Chapter of Sigma Nu held initiation in the Wabash Room of the Terre Haute House on January 19, 1947. The chapter hails the following men as brothers: Roy Sylvester Sparks, Merom, Indiana; Robert Kenneth Childress, Olney, Illinois; Richard Wright Hickman, Rosedale, Indiana; Carl Malcolm Carlson, Brooklyn, New York; Earl William Rich, William Smock, Michael George Schaefer, all of Indianapolis; Robert Lee Cotterman, Arlen Rector Elliott, James William Milner, George Bernard Seeburger, and William Timothy Crowley, all of Terre Haute. Following the initiation a banquet was held at the Castle Roma.

The chapter opened the house officially with an open house held Sunday, February 2. Chaperones for the event were Professor and Mrs. E. A. MacLean and Mr. Gordon K. Haist.

Rush was held at the house the weekend of February 15 and 16. The Mothers' Club furnished and served the food for both the open house and the rush. The results of the rush was the pledging of the following men: Floyd Butel, Jr., Overbrook, Kansas; James Corbin, Hillsboro, Illinois; Tom Pilkington, Leo Piotrowski, Ralph Davis, Jr., all of Chicago; Robert Hutchinson, Keith Taylor, Al Strickland, and Maurice Welsh of Indianapolis; and Walter Engle, Bill Killion, and Albert Reed of Terre Haute.

The chapter extends congratulations to Brothers George Staub and Fred Mueller who were "tapped" in the recent organization of the Blue Key.

Recent visitors to the chapter house were Ray Biller, '20, Dick Mullins, '43, Henry Schoemehl, '45, Jack Warrick, '43, and Richard Powell.

### Lambda Chi Alpha

Theta Kappa Zeta of Lambda Chi Alpha is happy to announce that it has obtained a fraternity house, after being without one for nearly four years. Fortunately, the house was not in need of immediate repairs, and the out-of-town members had installed themselves in the house less than two weeks after it was purchased.

Following rush week-end, the following men pledged Lambda Chi: Don Coughanowr, Cyrus Cox, Russell Flock, William Gordon, Paul Hays, Aaron Hogg, Don Inman, Norman Meyer, Leroy Mitchell, Claiborn Motsinger, LeRoy Peterson, Jack Pickett, Troy Richey, Charles Stewart, and Don Stolzy. The chapter extends its heartiest congratulations and a warm welcome to these men.

An open house will be held on Friday, February 21, at 8:00 p.m. Members and alumni are to bring their wives or dates for an evening of dancing, cards, and other entertainment. This will be the first social function to take place in the present house.

### Theta Xi

On Saturday evening, February 8, Kappa Chapter held initiation ceremonies for eight new members. With great pleasure we welcome into Theta Xi John W. Bryant, Robert E. Campbell, Edward C. Bockhold, Fred Campbell, Walter N. Flanagan, Roland T. Kelley, Joseph Markley, and C. Gene McGlone. It was our pleasure to have present at initiation W. F. Rippitoe, Kappa 102, and Ralph B. Waddington, Theta 32.

Activities during the month have included a skating party preceded by an open house. A few falls and unusual gyrations as skaters struggled to regain their "skating legs" added zest to the occasion as a good time was had by all.

The basketball team is still plugging along. Although the record is not too impressive the win-loss total is still on the black side of the ledger.

Jack Cavanaugh last month gave out with the cigars as his engagement to Miss Barbara Garrison of Terre Haute was announced.

### Alpha Tau Omega

On January 19 Indiana Gamma Gamma held formal initiation ceremonies for five men. These initiates are: Joseph Boeckman, Vincennes, Ind.; James Bowman, Terre Haute; Robert Brettell, Terre Haute; Paul Hill, Terre Haute; and William Tennessen, Madison, Wis.

On the evening of February 7 the chapter held a pledge dance in the Mayflower Room of the Terre Haute House. Very good music was provided by Fred Cizek.

At this writing the final plans are being laid for the State dinner and dance on March 8.

### Tau Beta Pi

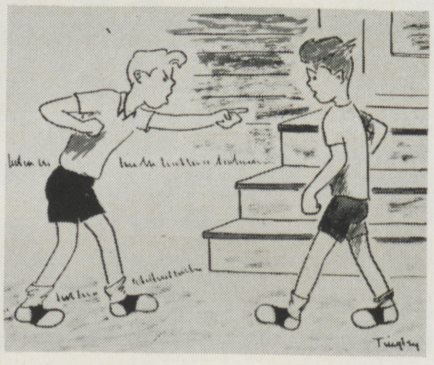
On February 4, 1947, members of the chapter and their ladies held a banquet at the Terre Haute House. Tau Beta Pi members of the faculty were invited to attend. Guest speaker was Coach Phil Brown who spoke on the topic, "My Experience in the Teaching Profession." Toastmaster for the occasion was President Carl Wodika and chairman of the Arrangements Committee was Dick Olson.

---

### A Letter to Santa Claus

At sweet sixteen I first began
To ask you, Santa, for a man.
At seventeen, you will recall,
I wanted someone strong and tall.
The Christmas when I reached
eighteen
I fancied someone hard and lean,
And, then at nineteen, I was sure
I'd fall for someone more mature,
At twenty I still thought I'd find,
Romance in someone with a mind.
I retrogressed at twenty-one,
And found the college boys more
fun.
My viewpoint changed at twenty-
two,
I longed for someone who would be
true.
I broke my heart at twenty-three
And asked for someone kind to me.
Then begged at blazing twenty-four
For someone who wouldn't bore.
Now Santa, that I'm twenty-five,
Just send me someone that's alive!

* * * *



**Your pop does not make better grades than mine.**

*Television today is clearer, sharper, and brighter—thanks to the improved kinescope, or picture tube, perfected at RCA Laboratories.*

## *The Picture Tube that brought "life" to television*

The screen on your home television table model receiver is the face of a large picture tube. And the skater you see on the face of the tube is the *identical twin* of the skater being televised.

Pioneering and research in RCA Laboratories led to the development of this tube which allows none of the original realism to be "lost in transit." It reproduces everything the television camera sees, shows you every detail, keeps the picture amazingly lifelike and real.

An RCA Victor television receiver brings you all the action, drama and excitement that you'd enjoy if you were at the event in person—and on top of that it's all brought to you in the comfort of your own home . . . you don't have to move from your favorite chair.

RCA Laboratories has made possible outstanding advances in every phase of television. And for television at its finest, be sure to select the receiver bearing the most famous name in television today—RCA Victor.

*Radio Corporation of America, RCA Building, Radio City, New York 20. Listen to the RCA Victor Show, Sundays, 2:00 P. M., Eastern Standard Time, NBC Network.*

**Continue your education with pay—at RCA**

**Graduate Physicists:** 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 that offer unusual promise:

Development of acoustics and high-fidelity sound reproduction as applied to radio and television.

Development of optical systems for television receivers.

Investigation and development of high-vacuum techniques.

Development of microwave tubes, construction and operation.

Basic development of AM and FM broadcast transmitters, R-F induction heating, mobile communications, relay systems and commercial communication systems.

*Write today to National Recruiting Div., RCA Victor, Camden, N. J.*

**Also many opportunities for Mechanical, Chemical, and Electrical Engineers.**

**RADIO CORPORATION of AMERICA**

## HYDROGEN WELDING

(*Continued from Page* 7)

of welding aluminum requires a flux, but due to the reducing action of hydrogen, very little flux is required to break down the aluminum oxide present on the surface of all aluminum. In the welding of sheet aluminum where additional filler is required for reinforcement to the joint, flux is always painted on the filler wire and allowed to dry before using. Since flux is employed in this method, full penetration butt and corner joints are the only types permissible in any thickness of plate. Unless complete penetration is obtained, there is a likelihood that some flux will be left between the plates or in the weld. Unless this flux is removed by long and expensive pickling and hot water dipping, the danger of subsequent corrosion is very great. Because of these factors it is suggested that whenever fusion welding of aluminum plates is desirable that the process of argon shielded arc welding be used, because no flux is required with that method.

In any type of fusion welding process there is a choice of using manual or automatic equipment. This choice suitable for automatic welding, the joint must be positioned for horizontal welding. If adjustments of the machine have to be made during the welding of each unit, then there is doubt whether automatic arc welding will be practical. The basic advantages of automatic welding are speed and uniformity. Except in cases where extremely thin material makes hand welding difficult, very large increases in actual speed travel of the electrodes should not be expected.

The important increase in production obtainable through automatic arc welding does not really come through the increase in speed alone. The most obvious contribution to increased production comes from the reduction of operator fatigue. It is not at all unusual to find the overall production rate on a manually welded job is about half what would be expected from that rate measured in the morning. The conclusion made is that fatigue prevents the operator from keeping up his morning rate all day long. With the definite, simple set of motions required of an operator of automatic welding equipment the rhythm of rapid, steady production is more easily established than when the bulk of the work must be done with intense concentration by the operator himself.

## CAMPUS SURVEY

(*Continued from Page* 17)

nall of Baldwin Locomotive Works in the Assembly Room.

Mr. Tatnall discussed the various ways by which the war had improved techniques for testing material. He explained with special thoroughness the principle of operation and countless applications of the electric strain gauge which has been developed by the Baldwin Company.

In the course of the lecture, Mr. Tatnall reminded his audience repeatedly that sound and successful engineering ventures depend principally on the use of common sense and logic.

The A.S.C.E. plans to hold its annual term banquet in March.

## A. I. E. E.

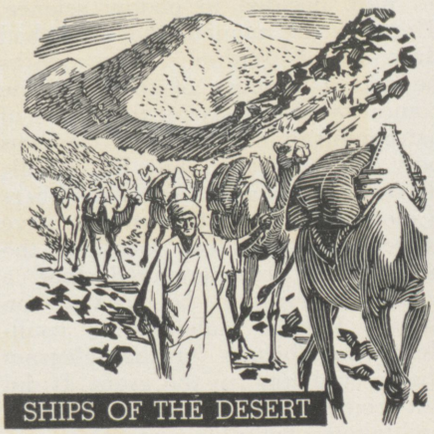
On February 17th was held the first regular meeting of the Rose Chapter of the American Institute of Electrical Engineers since the election of Fred Lundgren as Chairman and Richard Hickman as Secretary of the chapter. The special feature of this meeting was a talk by Donald Tyler, Sr., e.e., concerning facts of interest he learned by his connection with the atomic bomb

(*Continued on Page* 24)

# THE STORY OF CHROMIUM

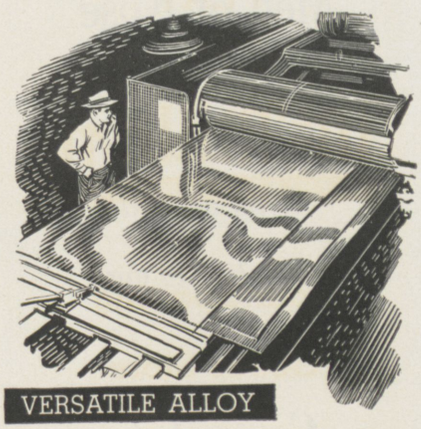
## COLOR FOR ARTISTS

The yellows, blues, and violets of the artist's palette; the red of the ruby, the green of the emerald — all come from chromium, a metal named from the Greek word *chroma*, meaning color. Discovered in 1797, this metal was for years just a laboratory curiosity, but is now top-ranking among alloys.



## SHIPS OF THE DESERT

Caravans of camels laden with chromite ore have often formed the first link on an assembly line thousands of miles long. From the mines of Rhodesia, Turkey, Russia, and India this valuable ore starts its long journey to Electromet furnaces, where dozens of different types of chromium alloys are produced.

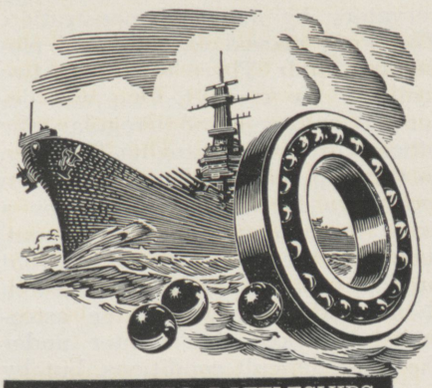


## VERSATILE ALLOY

This silvery-white metal, used with steel and iron in amounts from 1 to 35 per cent, imparts many of its own desirable properties. To stainless steels, chromium gives resistance to heat, rust, and corrosion—to heat-treated steels, strength and resistance to shock—to cast iron, hardness and wear resistance.

## NOT JUST SKIN DEEP

The luster of stainless steel withstands all weather conditions—on streamlined trains as well as on skyscrapers. For hospital, food, and dairy equipment, too, this steel is popular, since it is so easy to clean and sterilize. And for the oil and chemical industries, its resistance to corrosion and heat makes it ideal.



## BEARINGS TO BATTLESHIPS

Axles and armor plate, dies and drills, shafts and springs — these are made from engineering steels that must have the hardness and strength necessary to withstand wear and strain. That's why engineers specify steels with 1 to 3 per cent chromium for applications where dependability is essential.

## It's Been A Long Time

**...since Electromet started to produce ferro-alloys — 40 years ago. In fact, as far back as 1897, a plant in Virginia, which later joined Electromet, was the first to produce ferrochrome commercially in the United States. Electromet is constantly developing new and better alloys, among them the low-carbon ferrochrome essential in the production of stainless steels. You will learn more about chromium and other alloys by writing to our Technical Service Department for the booklet, "Electromet Products and Service."**

**ELECTRO METALLURGICAL COMPANY**

Unit of Union Carbide and Carbon Corporation

30 East 42nd Street UCC New York 17, N. Y.

**ELECTROMET Ferro-Alloys and Metals are sold by Electro Metallurgical Sales Corporation, and Electro Metallurgical Company of Canada, Limited, Welland, Ontario.**

P-19455A

# Electromet

TRADE-MARK

**Ferro-Alloys & Metals**

## GEORGE ELLERY HALE

(*Continued from Page* 11)

In the year 1902 Andrew Carnegie, mellowing and feeling grateful for the way the world had treated him, decided to endow science. This was the moment that Hale had dreamed of. Within a few months he was a member of the Carnegie committee for studying the needs of astronomical endowment. He was only the secretary, but his terrific drive never gave the other members a moment's rest. After an extensive search for an ideal location, the astronomers recommended that a solar observatory be located on Mount Wilson. Hale waited confidently in Chicago for the telegram that would confirm the grant. It did not come. Plans of many months had taken a body blow and Hale was forced to resort to a plan of action he had used many times with his father.

Hale arrived in California just before Christmas and settled his family there for the winter. Within two months he had raised enough money to pay for bringing an assistant and equipment to the west coast. He would show the committee the value of Mount Wilson as a site for an observatory by actual demonstration. The work proved to be a real pioneering affair. There were only two trails to the summit. One was described as steep and irregular, the other with grades ranging from ten to thirty percent and a width of an even two feet was regarded as a great improvement. All equipment, including the men themselves, went up this trail. Virtually marooned in their crude observatory the astronomers worked that winter under the most difficult conditions, but by spring Hale had collected the evidence he wanted, and set out to convince the committee of Mount Wilson's worth. The conference proved to be one of the most discouraging events in Hale's life. Believing that he had failed to secure the needed money Hale returned to the mountain. Soon after he arrived a burro riding messenger brought a telegram that told of the committee's decision to grant the full amount asked. Legend has it that Hale embraced the messenger and gave him five dollars, but truthfully it could be said that he turned, and went up to the stars.

Even while the Yerkes telescope was the most powerful in the world, William Hale had realized that his son would need an even greater instrument to carry on his work. To provide for that day, which had now arrived, the elder Hale had procurred a sixty inch disk of glass. This disk was now to become the basis for the first of Hale's great reflecting telescopes. Hale turned to mirrors at this point because he believed that lenses had reached their limit in physical size with the forty inch giant at Yerkes. He knew also that mirrors would provide a greater light than that obtained from lenses. The grinding and polishing of the sixty inch mirror was to take two years. Yet, before it had time to settle in it's huge mountings, it was destined to be dwarfed.

John D. Hooker had volunteered to finance a one hundred inch mirror for what was to be the world's largest telescope. It was 1917 before the hundred inch rose to meet the stars, but as news the world's largest telescope was completely overshadowed by the world's largest war. Even Hale's attention had been turned. He had seen Germany mobilize her scientific strength while England lost many of her most gifted men in the trenches. It was largely through Hale's efforts that the National Academy of Sciences prevailed upon President Wilson to prevent the repetition of England's mistake in America.

In 1928 Hale began his biggest and last telescope, the glass giant that stands on Mount Polomar. He had long felt that it was possible to move in one gigantic step to a two hundred-inch telescope. Hale's old spirit had returned and gained momentum. The cost had risen from thousands to millions of dollars, but the touch of Midas was still with Hale. The Rockefeller Education Commission made a grant to cover the entire cost of the telescope, six million dollars. All of Hale's organizing genius and executive ability came to the front now. Men from all walks of life and all parts of the country were recruited to help design and build the monster. Work on the mirror began and after a series of heartbreaking experiments with quartz it was finally cast in Pyrex. Mount Wilson had begun to echo with sounds of construction when, like so many of our great men, Hale died with his greatest dream unfinished.

His work was done; more than most men he achieved the things he had fought for in life. Yerkes, Mount Wilson, the National Research Council, Polomar. Each was a memorial; yet each was more—a portion of the spirit of the man, echoes of his lifelong cry for, "Light! More Light!"

# We blew a bubble for a man named Edison...

SIXTY-EIGHT years ago a stranger got off the train at Corning, New York, and asked the station agent to direct him to Corning Glass Works.

He had been sent by Thomas A. Edison to see if Corning could succeed where others had failed, in making a glass bulb to surround the filament of his new electric lamp.

Producing the thin bubble of glass for Mr. Edison's first lamp was an early milestone in Corning research. If he had lived until his hundredth anniversary this year, Edison would see machines developed by Corning turning out hundreds of modern bulbs every minute.

Altogether Corning has contributed in countless ways to science and industry and the comfort of living. Casting the 200 inch telescope disc, which this year will bring our civilization a billion "light years" closer to the secrets of the universe, is a Corning achievment.

So are the colored signals that guide trains through the night in safety. So are the miles and miles of America's neon tubing, and the miles of acid resisting glass piping in food and chemical plants. So are gleaming Pyrex baking dishes and amazing Pyrex Flameware for top-of-stove cooking.

The very thermometer the doctor puts in your mouth is quite likely made of Corning tubing. Today Corning research's main task is helping manufacturers make better products at lower cost. After graduation, this research may help you get ahead faster. Write the name Corning in your memory book now and call on us when you need help. Corning Glass Works, Corning, N.Y.

CORNING
*means*
Research in Glass

### STUDENT LIFE

(*Continued from Page* 17)

almost ferocious vigor for the past six weeks. Viewing this aggregation of athletic brawn and listening to the resounding rhythmical report issuing forth from pairs of suffering feet, I was informed by our good Coach that his squad is anticipating a meet every third day throughout the month of May. The season will officially open with the North Central Relays, March 7th and 8th. Of the twenty-five candidates working out so far, only Bob Hannum, Bill Young, and Ralph Davis have had extensive high school experience. Despite this lack of past performance, the team should place among the best in Rose's Hall of Fame.

With a copy of Doctor Strong's recently published "Chemistry for the Executive" under one arm and the March issue of Batman under the other, Mac Burdett, baby sitter extra-ordinary, stepped fearlessly across the threshold of Apartment 18. Inside, with the diabolical smile of a junior Dracula, three year old Stephen Fields awaited his victim. With the parents safely out of earshot the party got under way. Not only did Stevie refuse to go to sleep, but he was very definite about his disapproval of friend Mac, whose rendition of Brahm's Lullaby failed miserably to restore peace. Careerman Burdett's slogan: when better baby sitters sit, Burdett will be there —sitting!

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### SORRY, NO COKES!

(*Continued from Page* 12)

reation room to remap my strategy.

Following the noon rush, I once again entered the bookstore where I noticed that the only occupant, Clerk Rex Corpuscle, was engrossed in a newspaper. Rushing up to him, I breathlessly repeated my order only to hear him say, "Sorry, Pal, I'm just reading the paper." I started toward the door; suddenly Corpuscle called out, "I *will* sell you a chance in a high school basketball pool—five bucks per team." Since by this time, I had lost all hope, I slumped dejectedly into the soft (Pine) easy chairs provided for the customers' convenience. A few moments later I was aroused by a feminine voice asking Rex for three Cokes, three Milky Ways, and two packs of Beech-Nut Gum. After she flashed her "Inner Order of Bookstore Buyers" card (issued to all permanent personnel of Dear Old Violet), he quickly filled her order.

I spent the rest of the afternoon observing student activity in this haven for tired minds. The principal results from the notes I gathered contained the following information pertinent to all book store historians. The stock phrases in use are as follows: "Can I buy it on the G.I. Bill", "Any more cokes", "Where's all the good candy", and "Who's got the Sport page." Once a customer has mastered these fundamental phrases, he is able to receive all material benefits offered a student at V.P.I.

The conclusion I reached from my extensive research was that of the 67.82% of the students' time spent in book stores, 67.80% is consumed by waiting for identification, certification, ratification and gratification. The remaining 0.02% is consumed by signing V.A. bills and drinking orange (Sorry, no Cokes).

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### CAMPUS SURVEY

(*Continued from Page* 20)

project in Los Alamos, New Mexico, while in the army.

A major part of Mr. Tyler's talk was devoted to problems encountered in construction of the atomic bomb, as well as instruments tested and found impractical for reasons of inaccuracy or lack of dependability.

# Because photography abolishes distance . . .

YOU'D THINK this quaint rural Guatemalan *campanario* with its century-old bells was right before you, wouldn't you? . . . that shows how photography abolishes distance.

Because of photography's unique ability to "bring" Latin America north . . . North America south . . . business and industry have been able to put it to many and varied uses. They use:

**Motion pictures and slide films** . . . to bring manufacturers closer to consumers, dealers, salesmen, employers.

**Photo layout** . . . to close the gap between drafting boards and production lines.

**Instrument recording** . . . to bring electrical or mechanical phenomena into the laboratory for analyzing and recording.

**Document reproduction** . . . to transfer complete and accurate information.

**Photographic illustration** . . . to make things seem real even though they're far away.

**Photomicrography** . . . to jump the barriers between the invisible and the visible.

This may give you an idea of some of the ways photography can be useful because of its ability to abolish distance. You'll find others in our booklet, "Functional Photography." Write for it. It is free.

**Eastman Kodak Company, Rochester 4, N. Y.**

## Functional Photography

**is advancing business and industrial technics**

Kodak

## ALUMNI NEWS

(*Continued from Page* 13)

tinually giving the south American countries a good sales talk and with this as an aid and the fact that Dave had seen the entirity of the United States, he decided to take a position with the Industrial Department of the W. R. Grace Company. When he arrived in Trujillo, Peru, he found himself in a hacienda much the same as the others in Latin-America. For explanation and further elucidation to we illiterates, this phraseology refers to a fertile valley nestled in the center of a broad expanse of dessert country. The land, irrigated by river water and wells, produces many of the varieties of fruits and vegetables grown in this country and, in addition, many tropical fruits. The original mill for sugar cane, the principal crop of this section of country, was built about 1913 and was later purchased by the company for which Dave is working.

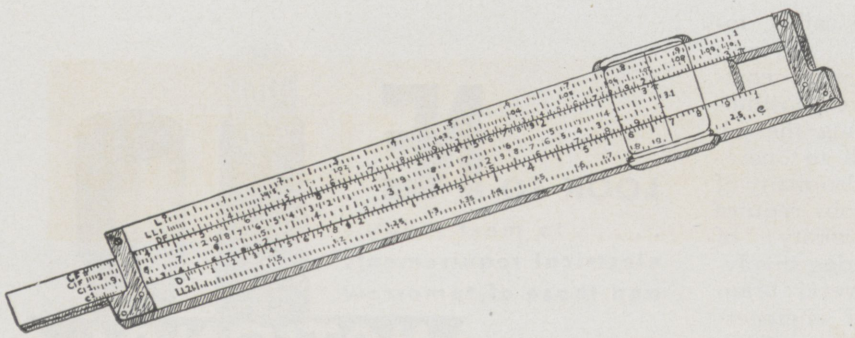
His specific job, one which touches upon practically all phases of engineering, is electrical engineering for "Compania Agricola Caraballya", which is the company name for a sugar estate. This estate is located

approximately 325 miles north of Lima on the coast. With two mills and a refinery on the estate Dave is in charge of all electrical and steam generating equipment. This consists of fourteen boilers having an aggregate capacity of 6,000 horsepower and a steam and diesel engine power plant of 3,000 K.W. Extra boiler capacity is necessary for the mills which are driven by Corliss engines. At the present time Dave is engaged in the installation of two diesel engine generators of 500 K.V. A. with electrical switchboards and auxiliary equipment for each unit. Dave is also expecting to help with the electrification of the drive mechanism for a paper mill which is to be located south of his present place.

In the town where Davis is working there is an American movie house showing American movies three times a week. If you desire further relaxation there is a swimming pool, tennis courts, and some riding horses at your disposal. Fishing and hunting is found in abundance about twenty-five miles from his home.

I personally am not trying to give the reader a salestalk, but Dave did send on some good advice to anyone contemplating a foreign engineerigg position. In his letter to me he says "There is definite opportunity for experience and responsibility here that a young engineer will be called upon to perform tasks with complete responsibility, seeing the job through to operation. Also many of these jobs require a diversity of knowledge involving several branches of engineering and considerable practical experience. For this reason a few years practical engineering experience in the States are a valuable asset."

With a son a year old and his beautiful wife, Dave plans to spend three years in Latin-America, so maybe when we have that Rose homecoming in 1950 Dave Demeree will tell us a few interesting stories in his newly acquired Latin accent.



# Sly Droolings

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

**Tourist Guide: "We are passing the largest brewery in the United States."**

**Mech. Engr.: "Why?"**

* * * *

"F-e-e-t," the teacher exclaimed. "What does that spell, Johnny?"

Johnny did not seem to know.

"What is it the cow has four of and I have only two?"

The commotion which resulted when Johnny gave his answer left the teacher a nervous wreck.

* * * *

**The nurse entered the professor's room and said tenderly "It's a boy, sir!"**

**The professor looked up and said, "Well, what does he want?"**

* * * *

A cow on a curve is much more dangerous than a curve on a calf.

* * * *

"Where d'ja get the black eye?"

"In the war."

"What war?"

"The boudoir."

* * * *

**Wisteria, age 9, was a precocious brat. In fact she was too precocious to live. Wisteria kept a diary.**

**Avidly in search of information, she approached her mother with the perennial question of the very young set as follows:**

**"Where did I come from, mama?"**

**"Er—the stork brought you, dear."**

**This was not explicit enough for Wisteria. She pressed the matter further.**

**"Where did you come from, then mama?"**

**"The stork brought me, too," replied the cornered parent. Wisteria sought out her Grandmother.**

**"Mama says the stork brought me, and brought her too, Grandma. How's about giving me the low down? Where'd you come from?"**

**"The stork brought me, too," darling."**

**"After careful consideration, and exhaustive research, I have come to the conclusion that there hasn't been any love life in our family for the past three generations."**

Skidding is the action,
When the friction is a fraction,
Of the vertical reaction,
Which won't result in traction.

* * * *

**A wayward gentleman arrived home safely enough but in negotiating the front steps somehow smashed the bottle in his hip pocket. Several minor cuts were the result.**

**Eventually he made his way into the bathroom, removed his clothes, and applied adhesive tape to his wounds. Then he got into bed without arousing the household.**

**"So you were drunk again last night," was the first thing he heard from his wife when he came down to breakfast.**

**This he denied and appeared hurt at such an accusation.**

**"If you weren't drunk," his wife said in an icy voice, "perhaps you can explain why you stuck all the adhesive tape on the bath room mirror."**

* * * *

A certain geology student claims that petrified wood was caused by the wind—which makes the trees rock.

* * * *

**Judge: "What is the charge against Mr. Heger?"**

**Cop: "Stealing nine bottles of beer."**

**Judge: "Discharged. I can't make a case out of nine bottles."**

* * * *

A cat is a quadruped; the legs, as usual, being at the four corners.

* * * *

**The poet who rhymes "college"**
**With "knlowledge"**
**Is making a very serious blunder;**
**But not one-half so grave, by thunder,**
**As he who rhymes "learning"**
**With "earning."**

* * * *

"How did you happen to over sleep this morning?"

"There were eight of us in the house and the alarm clock was only set for seven."

**We were amused by this heading for a table of statistics in the World Almanac. It read: "Persons gainfully occupied, by sex." It just goes to show how important punctuation can be at times.**

* * * *

A young woman who had recently taken charge of a kindergarten entered a trolley car, and as she took a seat, smiled pleasantly at a gentleman sitting opposite her. He raised his hat, but it was evident that he did not know her.

Realizing her error, she said in tones audible throughout the car: "Oh, please excuse me! I mistook you for the father of two of my children."

She got out at the next corner.

* * * *

**A young man whose father had been hanged was filling out an insurance form. After the usual hereditary questions there was one asking the cause of the death of his parents. He thought and finally put down this answer:**

**"Mother died of pneumonia. Father was taking part in a public function, when the platform gave way."**

* * * *

A young man dashed into a telegraph office, scribbled a message, handed it to the clerk, and dashed madly out and down the street. The clerk read the message, "May had twins today, more tomorrow."

* * * *

**"Good morning, madam. I'm the census-taker and desire a little information."**

**"Well, young man, what will it be?"**

**"How many in your family?"**

**"Five," she snapped, "me, the old man, the kid, the cow, and the cat."**

**"Any politics in your family?"**

**"Mixed. I'm a Republican, the old man's a Democrat, the kid's wet, the cow's dry, and the cat's a Mormon."**

* * * *

**Junior: "Name a great time saver."**

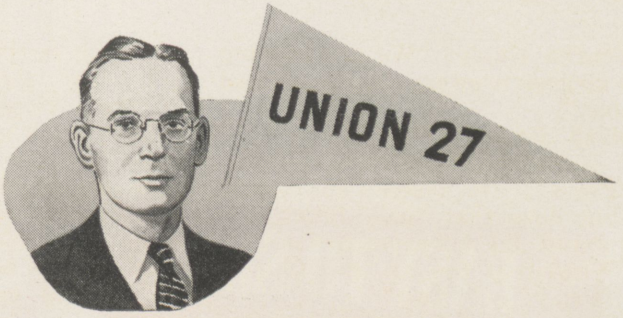
**Sophomore: "Love at first sight."**

# *Campus to* GENERAL ELECTRIC

## TAX AUTHORITY

*The Story of*

## DONALD MILLHAM




THE average man who stews over the filing of his annual tax return is apt to shake his head quizzically over Donald L. Millham.

While he was in charge of General Electric tax accounting, Don used to file more than 500 returns a year—and like it. In some years the sums he paid out in taxes exceeded the Company's net income by more than four times.

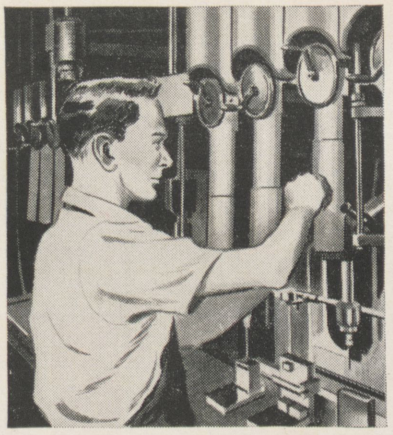
Although he has a new job today—the difficult and important one of Comptroller for the company—Don maintains an active interest in corporate taxation and is still considered one of the company's tax authorities.

A career in corporate taxation problems is, Don admits, short on glamor, long on hard and diligent work. In his early years with G.E. he had learned a great deal about business methods in the company's Business Training Courses, and had worked as an accountant and traveling auditor. But until 1935 he had little more to do with taxation than the filing of his own returns.

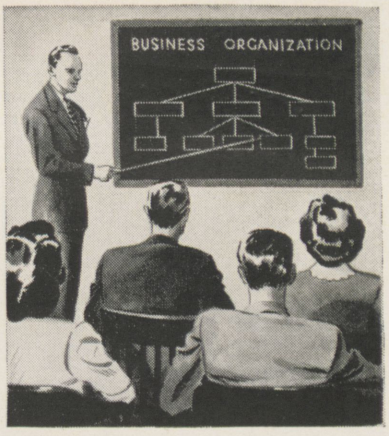
Then an opportunity opened in tax accounting. He took the offer and learned the background, the technical language, the legal complexities of his job as he did it.

By meeting the challenges of an exacting and constantly expanding field of endeavor, Donald Millham has made for himself a career with General Electric that is useful and important, and which has held his interest.

**Next to schools and the U.S. Government, General Electric employs more college engineering graduates than any other organization.**

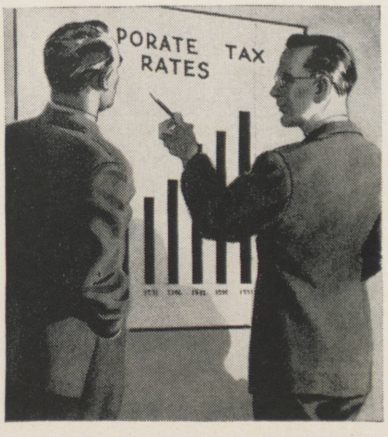


To help pay his way through Union College, Don worked for General Electric during summer vacations, operating a drill press.




After graduating with honors, he enrolled in the G-E Business Training Course, gained insight into modern business operation.

For five years Don worked as a travelling auditor, made a good record. In 1935, without any prior experience in taxation, he took over General Electric tax accounting.




Learning the job as he worked at it, he became the company's tax authority, filing 500 returns a year. Today he has the difficult and important job of Comptroller.

**GENERAL ELECTRIC**