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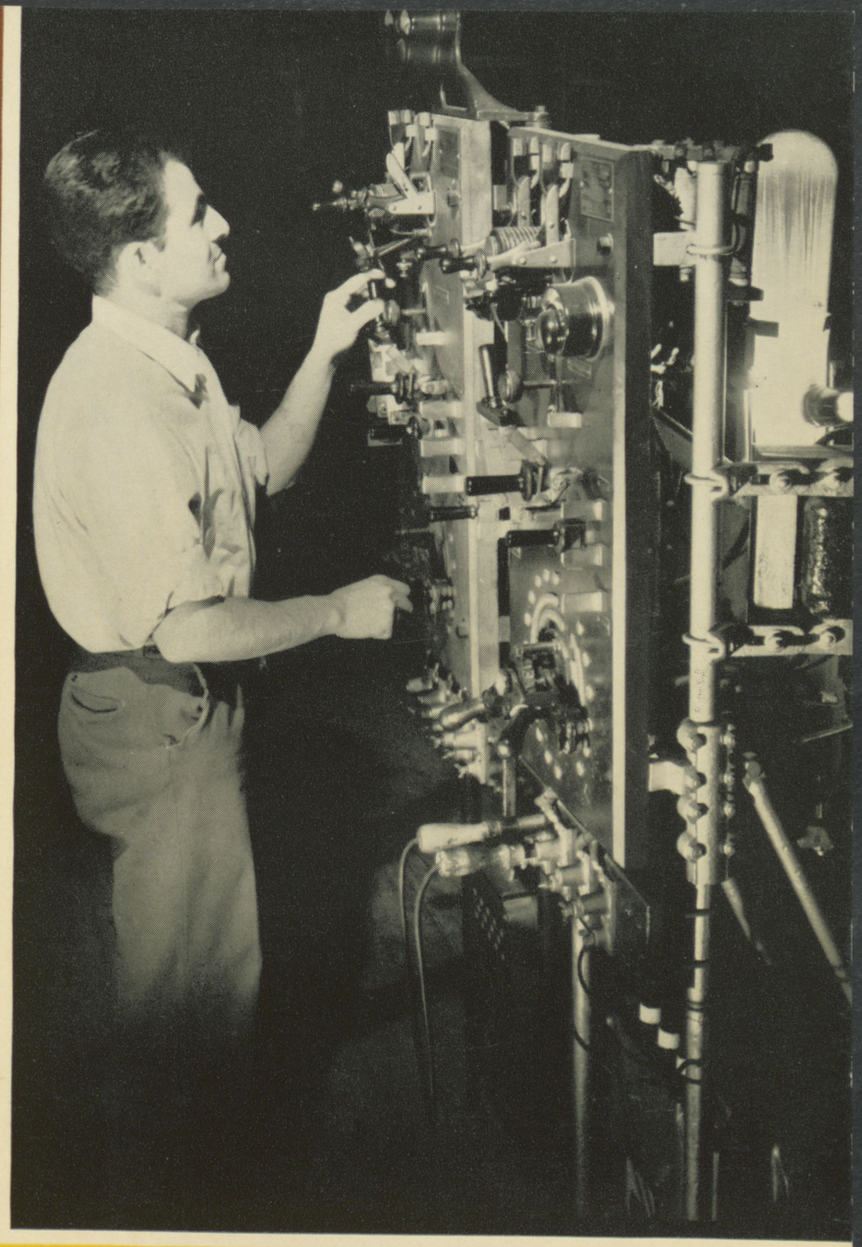

ROSE TECHNIC

APRIL

MEMBER OF E C M A

1942

Formal approval of Rose Polytechnic Institute by the Navy Department makes it possible for students to enlist as apprentice seamen, Class V-1, U. S. Naval Reserve.

Through the Engineer Unit, R.O.T.C., or the Naval Reserve, a Rose student can now become a candidate for a commission as lieutenant in the U. S. Army or ensign in the U. S. Navy while he is studying the regular engineering course for a degree.

ROSE POLYTECHNIC INSTITUTE

TERRE HAUTE, INDIANA

ROSE TECHNIC

VOLUME LI APRIL, 1942 NUMBER 7

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"Hot Stuff"

ATHLETICS IN COLLEGE

Adolph Hitler in one of his recent speeches told the German people that the American people were weaklings and that the United States would leave the actual fighting of this war to the other allied powers. General MacArthur has proved by his history-making stand in the Philippines that the regular army of the United States is tough. They can fight their own battles. Can we, though, honestly say that the youths of America are comparable to the German youths in strength and stamina? Anyone who has seen a college football game would certainly say that if those boys are an example of the American youth the future fighting force of America is probably superior to that of the Germans.

Games such as those held in "Lost Creek Stadium" serve many purposes other than to strengthen the bodies of our young men. They give the needed pep to a school life which would otherwise be tiresome. The belief in the mind of every student that his particular school is superior to all others is important to the success of every school. That belief is commonly known as school spirit, much of which is embodied in these athletic events. This love for their Alma Mater leaves the students with the urge to let other people know of their school and its athletic achievements. Through these students and through the medium of newspapers the fame of a college is carried throughout the nation. In this way, sports furnish one of a school's most important sources of advertising.

When students reach college age they usually have a definite goal to achieve in their life's work. Many feel that nothing should take time away from their studying to attain this goal. They forget that a healthy body is necessary if their mind is to function properly. The exercise needed to build healthy bodies can be found in participation in these supervised school athletics. One may learn while on a football, basketball, or track squad something that can not be found in any book yet written. He finds that proper association with people is essential. He learns to work as a cog in the gears of mankind. Although an educated man usually can make a substantial living, one who combines education with an understanding of how to deal with different types of individuals will climb high on the ladder of success.

The mingling together of all groups of people to witness a contest between two schools is a perfect example of the American way of life. In what other country can people of any race or creed gather together and forget all but one care? That is to root their team to victory. Certainly a gathering such as this would not be found in Germany or Japan. These groups are America.

by Charles W. Newlin, freshman

PRODUCTION OF 100-OCTANE FUELS BY ALKYLATION

by Hulit L. Madinger, senior, ch.e.

In this article Mr. Madinger presents some of the highlights connected with the manufacture of 100-octane fuels by alkylation. Mr. Madinger will present this same article before the American Chemical Society at its 103rd meeting in Memphis, Tenn., on April 22.

THE ability of the United States to produce 100-octane aviation gasoline in quantity may well be a deciding factor in the present world war. The increase from 87 to 100 in octane number of the fuel enables a plane to carry 1200 pounds less fuel on a 1400 mile flight. This increase in octane number of the fuel gives 20 to 30 per cent more power resulting in quicker take-offs, more rapid climbing, increased cruising range and greater speed. Obviously, the less fuel that is required the greater the armament and bomb load that may be carried. It will be the role of the United States in this war to supply both herself and her allies with such fuel.

Among other staggering appropriations announced in January was an appropriation of over 75,000,000 dollars by the government and industry for the construction of new plants for the production of 100-octane fuels. This was the initial step in increasing our daily production of 100-octane aviation gasoline to 150,000 barrels, the goal set for the end of 1942. The announced appropriation will increase our production facilities by about 40,000 barrels per day.

Today 100-octane fuels are produced by polymerization and related processes such as hydrogenation and dehydrogenation, catalytic alkylation, and thermal alkylation. Of these the two most recent additions to the field are catalytic alkylation and thermal alkylation. These processes were first announced in 1935, and the first plants were put into operation in 1939.

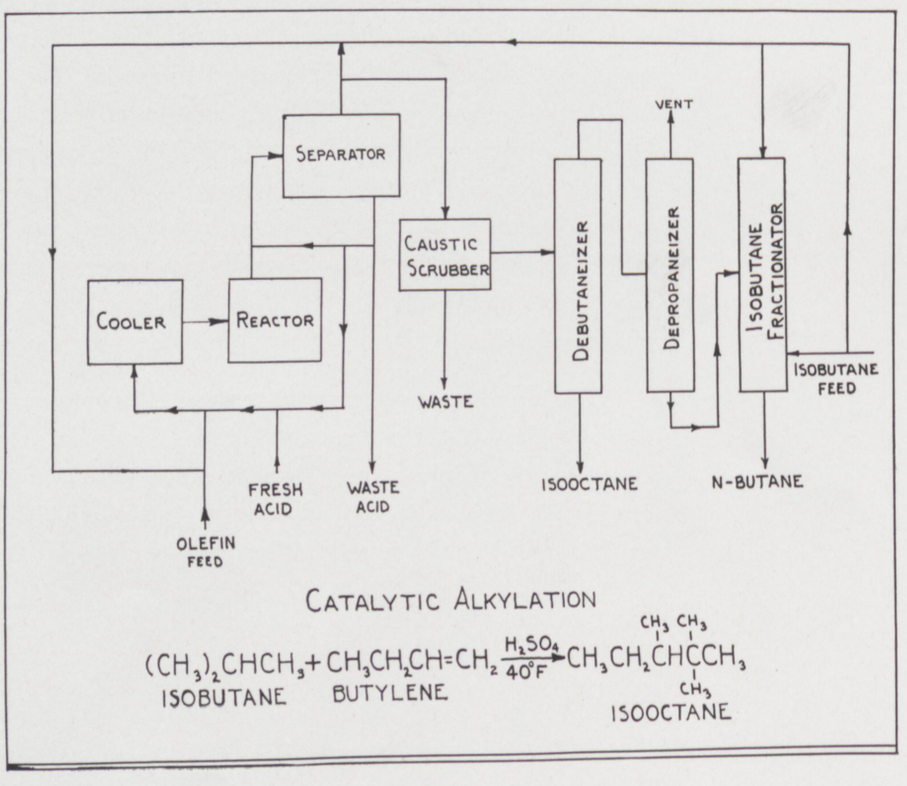
Alkylation is the introduction of an alkyl radical (methyl, ethyl, butyl, or some other member of the series) into some compound to form a new organic compound. A simple example of an alkylation reaction is the Wurtz-Fittig reaction:

$$R\text{-}X + 2Na + X\text{-}R' > R\text{-}R' + 2NaX$$

where R and R′ are alkyl radicals and X is a halogen. Here two alkyl halides react with sodium to form a hydrocarbon and the sodium halide.

The two applications of alkylation used on a large scale in the petroleum industry are the sulfuric acid catalytic process and the thermal alkylation process. In both cases the products are hydrocarbons of high antiknock value and high lead susceptibility. Lead susceptibility is the ability of a fuel to respond to the addition of lead tetraethyl by producing a fuel of higher octane rating. Two other catalytic processes are being investigated at the present time, halide alkylation and hydrofluoric acid catalytic alkylation. These last two processes are only important experimentally. One of the outstanding motives for the research on these processes was to perfect a process which would permit other refiners to compete with the owners of the patents covering the thermal and the sulfuric acid catalytic alkylation processes. This motive has been considerably reduced by the present policy of the government which fosters the pooling and exchanging of patents, processes, facilities, and products to enable all refineries to produce alkylate for the war program.

The alkylation processes may be compared by examining both the operations and the products. A



marked difference is shown by catalytic and thermal alkylation in the way that individual paraffins and olefins respond. The catalytic process using sulfuric acid produces isooctane, or according to the Geneva nomenclature, 2, 2, 3,—trimethelbutane. The thermal process produces neohexane, or 2, 2,—dimethylbutane. These two substances differ noticeably in certain properties. Neohexane shows a slightly greater lead susceptibility than isooctane. The specific gravity of isooctane is 5.96 pounds per gallon and that of neohexane is 5.40 pounds per gallon.

In the sulfuric acid catalytic process the engineering problems are not serious. The operating pressures are relatively low, and standard equipment can be used throughout. At the concentration used, the sulfuric acid does not corrode steel equipment, and so steel, the cheapest structural material, is used. The low temperature of the reaction requires refrigerating equipment.

In contrast to this process the thermal alkylation process offers some more serious problems. An extremely high operation pressure of 4500 psi is used in the alkylation step. This requires special equipment. Because of the danger of leaks or explosions, the high pressure equipment must be operated within thick concrete retaining walls. All operators remain outside the enclosure, and remote controls are used. Relatively high temperatures are used in the cracking step, and so the equipment must be designed to produce as well as withstand such temperatures.

Sulfuric Acid Catalytic Alkylation

Catalytic alkylation with sulfuric acid as the catalyst was the first process to be put into commercial operation. The process was developed by the Anglo-Iranian Oil Co., Ltd., Humble Oil & Refining Co., Shell Development Co., Standard Oil Development Co., and the Texas Co. in cooperation. In this alkylation process isobutane is reacted with butylene at low temperatures in the presence of sulfuric acid to produce isooctane. The reaction can be shown as follows:

$$(CH_3)_2CHCH_3 + CH_3CH_2CH{=}CH_2 \xrightarrow[40^\circ F.]{H_2SO_4} CH_3CH_2C(CH_3)_2CH_2CH_3$$

Isobutane Butylene-1 Isooctane

The olefin and isoparaffin feed enter the system and an emulsion with the sulfuric acid is formed by pumping the mixture through a system of jets and baffles. A high ratio of isoparaffin to olefin is used. This excess of isoparaffin results in complete consumption of the olefin. The reactants must be cooled because the reaction is carried on at subatmospheric temperatures, about 40° F. After cooling, the reactants are admitted to a reactor where the rate of flow is adjusted to allow the proper time of contact, about five minutes. The products are then removed to a separator. The excess isoparaffin and the acid are returned to the system, and the crude alkylate containing alkylate, butane, isobutane, and propane is sent to a caustic scrubber. The alkylate is then sent to a series of distillation columns. Here the alkylate is separated, butane and propane removed, and the isobutane returned to the system.

There are a number of process variables to be considered in the sulfuric acid catalytic alkylation process. These may be listed as follows:

1. Isoparaffin-olefin ratio
2. Olefin concentration of feed
3. Acid strength
4. Acid-hydrocarbon ratio
5. Temperature
6. Contact time
7. Agitation

1. Isoparaffin-olefin ratio

The isoparaffin-olefin ratio is very important as it influences acid life, yield, and the octane rating of the product. Experiments showed that the higher the ratio, the better the results were. In commercial operation with isobutane as the paraffin hydrocarbon, the lowest ratio used is 5.1. When hydrocarbons containing more carbon atoms are used, an even greater ratio is required. The high ratio is maintained by blending the olefin with recycle and fresh isoparaffin. Another means of keeping the ratio of isoparaffin to olefin high is to add the olefin in several stages. This is known as a split feed.

2. Olefin concentration of feed

Excessive dilution of the desired olefin with other olefins and inactive

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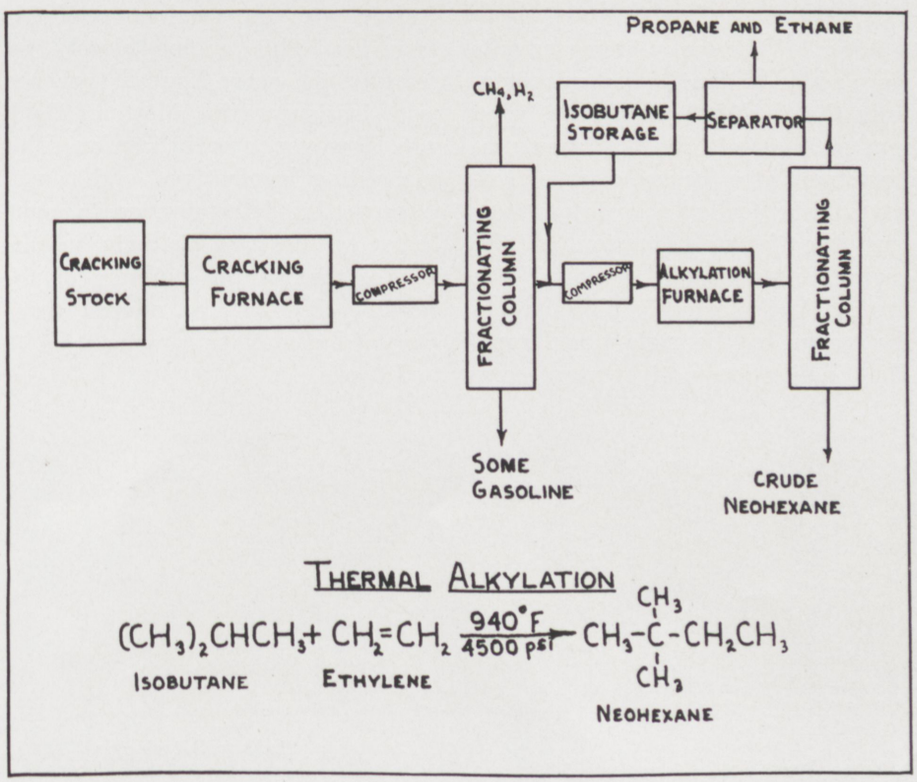


Cut Courtesy of Mechanical Engineering

New York Central 4-8-4 Redesigned for Passenger Service.

LOCO-EVOLUTION

by Alan W. Ker, junior, m.e.

Mechanical engineers are rightfully proud of the powerful steam locomotives which ply the railroads of the nation. The story of the development of these engines is a story of the growth of American industry. In this article, Mr. Ker, junior mechanical, presents this evolution and describes the principles of the operation of today's engines.

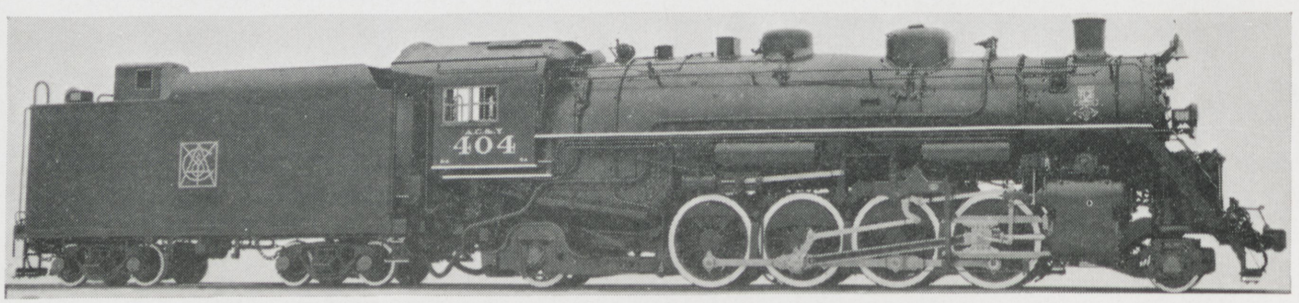
History

THE history of the modern locomotive dates back to 1829 when Stevenson, a celebrated English engineer constructed the "Rocket" for the Liverpool and Manchester railroad. There were many steam locomotives built before this time, for as early as 1769 Nicholas Cugnot, a Frenchman, had constructed a steam propelled tricycle which ran on the streets of Paris; however, the Rocket incorporated the outstanding feature essential to a workable locomotive—the first application of the multitubular boiler and exhaust draft. This improvement permitted a speed of 29 miles per hour, a far cry from the four to five mph of before and further demonstrated the practicability of mechanical traction.

At approximately the time of the Rocket's construction (1827-1830), the development of the railroads in the United States began. English locomotives were first imported but their unsuitability to sharp curves and grades caused the Americans to design and build their own. In 1829, Peter Cooper's "Tom Thumb" ran the famous race against a horse and lost. This engine was little more than a working model built to prove that locomotives could be used on the curved track of the United States and therefore were adapted to practical use. It was not until 1831 that the "Best Friend of Charleston" made a successful run on the South Carolina railroad, the first American-built engine for regular passenger service and also the first engine in America to have a boiler explosion because a negro tied the safety valve.

After 1830 so many improvements were added to the American locomotives that by 1839 they were being sent to England. The first great improvement was the use of an articulated truck (called a bogie) to support the forward portion of the engine. This design removed the turning loads formerly placed upon the tracks by the rigid-wheel type. The English locomotives were coke burners, but because of the abundance of timber in the United States, the American engines burned wood. This difference necessitated the perfection of some type of spark arrestor and also a change in stack design. The other more important improvements on American locomotives were the increase in power, the use of more than one pair of drivers, the use of spring suspension, and finally the employment of equalizer beams with spring suspension. This latter type of springing, introduced in 1837, permitted equal distribution of weight between the drivers when more than one pair were employed.

The humble beginning of the now famous Baldwin Locomotive Works started with the production of Old Ironsides. This engine closely resembled the early English type and was very successful. Matthais Baldwin, however, greatly improved his succeeding locomotives, and it was through this determination to make better engines that Baldwin became one of the leading builders of the country. In 1840 he offered three sizes of locomotives ranging from 10 to 13 tons.



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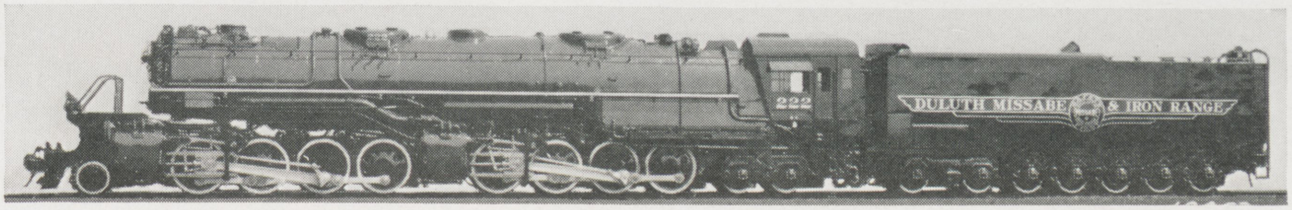
Akron, Canton, and Youngstown 2-8-2.



Cut Courtesy of Mechanical Engineering

2-8-8-4 for Duluth, Missabe and Iron Range.

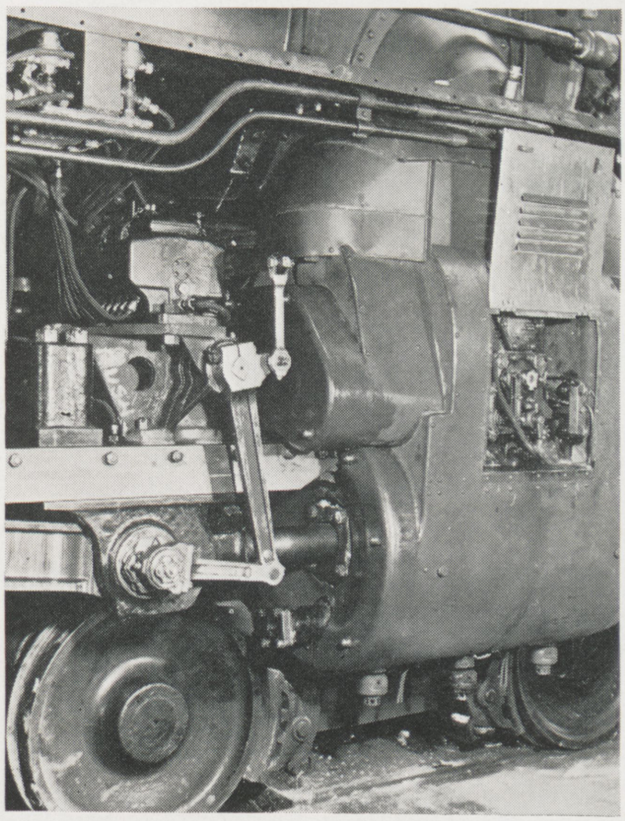
The Long & Norris (later the Norris) Works in 1829 designed a locomotive to burn anthracite coal. It had its cylinders and cranks located on the outside of the two driving wheels just as Stephenson's Rocket, but Norris incorporated the four-wheel truck principle to support the front portion of the engine, and he also used a unique boiler with two sets of tubes for permitting more complete gas combustion. This engine made William Norris the designer and originator of the accepted American locomotive. In 1835 Norris built the George Washington, an engine which employed all his latest experiments upon valve motion. With the George Washington, Norris demonstrated that locomotives could be used on steep grades. He pulled a load on a 7% slope, a feat which brought orders for 170 locomotives from England and Central Europe.

Thomas Roger's Patterson, New Jersey, Works, which later became the American Locomotive Company, first built the American. This engine was the first to have counterbalanced crankpins and rods. This feature greatly relieved their hammer blow action upon rails. His engine was trimmed with gold leaf and bright colors and truly was a masterpiece of its time.

The work of the forementioned pioneers paved the way for the locomotive as we see it today. The story of the later development of these engines is told in the history of transportation.

Modern Locomotive Design

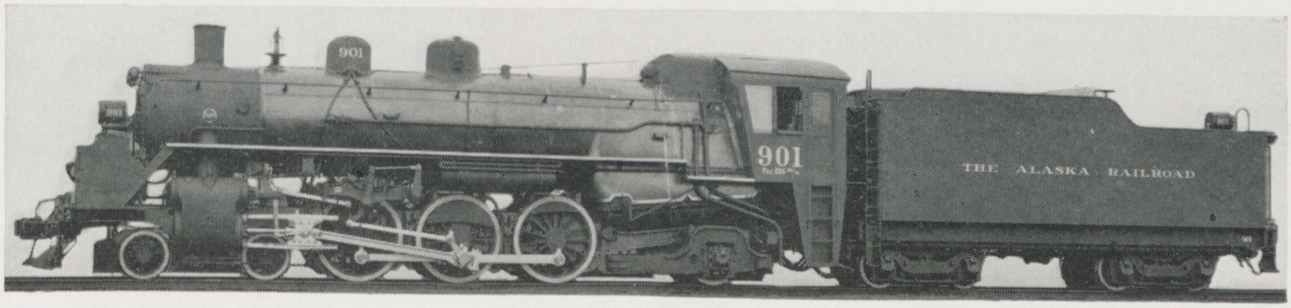
The modern locomotive has had a gradual evolution from Stevenson's Rocket, and, although a much more complicated machine today, it still retains the same basic principles modified by track loading, width and height clearances, gradient and curvature to be negotiated, speed and length of run, and load to be hauled. Auxiliary appliances have also been added, including truck auxiliary engines, stack blowers, air brake pumps, mechanical stokers, fuel oil heaters and atomizers, feed water pumps, injectors, grate shakers, coal pushers, power reverse gears, fire door openers, ashpan slide pushers, ashpan blowers, water scoops, drifting valves, electric generators, steam heat equipment, rail sanders, lubricators, and snow flanges. These devices operated from boiler heat have all improved the actual operation of the locomotive.



Cut Courtesy of Mechanical Engineering

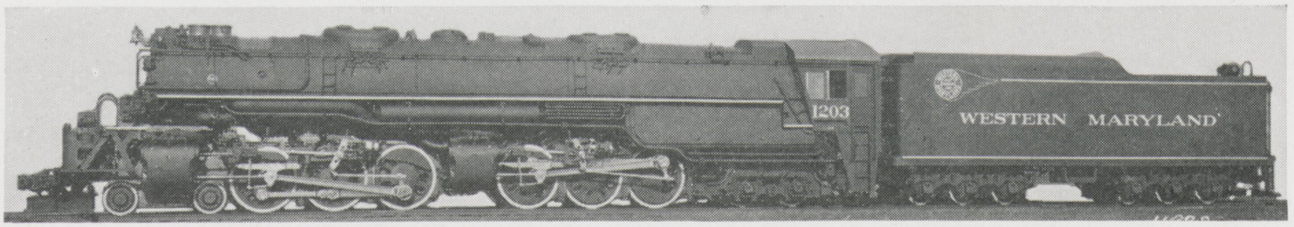
Pennsylvania K-4 with Poppet Valves

Locomotives are rated by tractive force and developed horsepower. Some of the large American locomotives have tractive forces as high as 147,500 pounds and develop more than 5,000 horsepower, but these



Cut Courtesy of Mechanical Engineering

4-6-2 for The Alaska Railroad.



Cut Courtesy of Mechanical Engineering

4-6-6-4 for Western Maryland.

figures represent only eight to nine percent of the total power given up by the fuel. This low efficiency, which is inherent in steam generation plants, led in recent years to the building of several multiple expansion engines for the purpose of research. Since the locomotive is non-condensing, these engines were only slightly superior to the more common uniflow, single-expansion cylinders.

Poppet valves have been used in Europe for several years and are now in the experimental stage in the United States. During the past year a K-4 class engine on the Pennsylvania Railroad, equipped with the Franklin (oscillating-cam poppet-valve) system, was thoroughly tested. Results showed an increase in drawbar horsepower of 24% at 60 mph, 33% at 70 mph, and 44% at 80 mph, with an improvement in steam economy of 30% at 100 mph. The poppet-valve system for high-speed operation is well suited for high-pressure steam which is the trend in all steam generation. Modern stationary boiler pressures are going as high as 2,500 pounds per square inch, while the newer American locomotives are using pressures of 500 pounds per square inch and two experimental German locomotives have pressures of 855 and 1,700 pounds per square inch.

The improvement of steam locomotion is a gradual process as can be realized by a study of the locomotives now in service on the railroads of the United States. The total number of locomotives in service at the end of 1940 was 40,355 of which 27,461 or 68.5% were installed previous to 1920 and have thus "come of age." The percentage of locomotives having over twenty years service has increased 11.5 percent in the last five years. The large percentage of older engines may be

(*Continued on Page* 21)

AN OPEN LETTER TO THE FRESHMEN

Gentlemen:

You've completed your first and most of your second semester here at Rose and perhaps you are rather proud of that fact. Your ranks have thinned considerably and consequently the going will be tougher. What's more, you've been reviewing a lot from high school and from now on the subjects will be new. Your instructors have had an opportunity to size you up and will begin to demand more and better work. A few weeks ago, "beanies" no longer pointed you out as freshmen, and you became a part of the student body of Rose.

Maybe some of you have missed the green caps, how easy it was to thumb a ride to town, or how people looked at you on the street? When a freshman put on his cap, he branded himself unmistakeably as a student of Rose and became an ambassador of good will to the outside community. Whether he measured up to the standards of the townspeople not only brought respect or disfavor to himself but to Rose also. Over a period of years Rose has established herself as a part of the community, and the conduct of her student body must reflect the esteem in which she is held. Every year the freshmen class must set itself to prove to the community, to its classmates and to itself that it is worthy of the distinction of becoming a part of Rose. After the trial period, the members are permitted to remove all class identification and from that time on be identified as students of Rose only by their slide rules and gentlemanly behavior.

Under the present circumstances the whole student body must take care not to bring disfavor upon the school. Ever since engineering students have been deferred from entering military service, many people have been watchful to see that such exemption will not enable certain individuals to escape military service. Any indication of unnecessary horseplay or foolishness will cause those persons to charge that some students are in Rose for the sole purpose of escaping the draft. Let's not have any such things said about you. You're in Rose to prepare for an exacting profession. Perhaps your ability and physical condition make you more desirable as an officer in the Army, or maybe you are best fitted for home service in industry. Whatever your future job may be, let it be in the service of your country.

You freshmen have worn your caps faithfully and well. You have established yourselves as responsible members of the community and also as good sportsmen in the eyes of the upperclassmen. But let's not stop there. There are years of study ahead during which all of us will have to sacrifice our time and pleasures. After graduation there may be more years of self-denial during which we will be either on the firing line or on the production line. Nevertheless a job has been begun that must be seen through - - let's finish it once and for all.—*W. H. P.*

THE ROSE TECHNIC

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The Personal Associations of Chauncey Rose and Walter Mills

EDITOR'S NOTE:—*An interesting letter to the editor of the Technic from W. A. Layman, first editor of the Technic, contained a manuscript written by Walter Mills, who though he dropped out of the class of '92, has since been accorded associate membership in the Rose Alumni Association. Mr. Mills was at one time widely known as Chicago's most active and best informed industrial real estate broker, but has been forced to retire of late because of ill health. Mr. Mills may be remembered as the man who won the mile walk in the Rose Field Day of May 31, 1890, in the remarkable time of 8 minutes and 15 seconds. As far as is known, Mr. Mills is the only student of Rose Polytechnic who ever knew the founder of the Institute, Chauncey Rose, personally, and it is with the thought of interesting those men who knew Walter Mills while he was at school that the story of his relations with Chauncey Rose is here printed in Mr. Mill's own words.*

"Mr. Rose was a grand old gentleman. Insofar as I have been able to learn, I was the only boy that ever attended Rose Poly who had the privilege of meeting and personally knowing Mr. Rose. I first met Mr. Rose when I was five years old. I have a very vivid recollection of going with my father to call on Mr. Rose at his home which at that time occupied the entire block on the north side of Chestnut Street between 7th and 8th Streets in Terre Haute.

On this call made by my father for the purpose of buying a lot from Mr. Rose on which to erect a home, I remember that we were ushered into the northeast room on the first floor. This room Mr. Rose used as his office. After sitting there conversing for a few minutes, Mr. Rose went over to a black walnut desk, took some legal sized paper out of one of the drawers, wrote on it and handed it to father to read. It was the deed to the lot which my father had purchased from him. Father erected a home on this lot—the second lot from the corner in the block on North 8th St. just north of Mr. Rose's home.

According to my memory it was in 1876 that Mr. Rose erected the original buildings of the Rose Polytechnic Institute at Locust and Thirteenth Streets. While the contractors were erecting the Institute's buildings, Mr. Rose used to go out every few days to personally examine the progress of the work. He would come out of his 8th Street gate, and walk north on the west side of the street past our home. Somehow he seemed not to like to make this mile walk alone, and it was his practice, if he saw me playing about in our yard to tell me to go ask Mother if I could go with him. Mother was always glad to have me accompany Mr. Rose. He would take me by the hand and I vividly recall the many interesting visits we had on these walks.

When we would reach the Institute, I recollect how Mr. Rose would hunt around until he found a wooden form such as masons use in the construction of windows and doors. He would turn this over on the ground and arrange it so that I could play teeter-totter while he was overseeing the construction work.

When he was through he would again take me by the hand and together we would return to his home where he always filled my pockets and cap with fruit from his yard. Then he would stand at his 8th Street gate and watch me until he saw that I entered the 8th Street gate of our own yard.

Thus you see that the gracious founder of the Rose Polytechnic Institute understood and was interested in small boys—as well as those of college age. And the little boy who used to accompany him on his trips of inspection when the college buildings were being erected had as his greatest ambition from the time he was six years old, a deep desire to attend this college "his friend" had erected. —*F. L. K.*

RESEARCH AND DEVELOPMENT

Robert W. Hodgers, junior, e.e.

Portable Water Purifier

A water purification unit, completely automatic and self contained, has been developed for use in army camps and by troops on maneuvers, but it has municipal and industrial applications as well. The "Sterozone" unit as the plant has been named, has a rated capacity of 9000 gallons per hour.

After the raw water has been pumped through a filter to remove suspended material, it is passed to an absorber chamber in which ozone, generated by a high-frequency silent electric discharge, oxidizes the bacterial contamination. Pure, sparkling, fresh, tasteless, and odorless water is produced. Unlike purification by chlorination, there is no danger of overtreatment which may cause troops to prefer untreated, contaminated water.

An automatic, gasoline-engine driven, 10KVA, 220-volt, 3-phase power plant supplies the power. This unit is self-starting and self-regulating. A five horse-power, 220-volt, 3-phase electric motor on which the treated water supply pump and coupling is directly mounted drives all the mechanism. The raw water supply pump is connected to the other end. The compressor, cooling water circulating pump, and the evaporative cooler are also driven from the motor shaft.

A silent blue electric discharge between aluminum plates maintained at 13,000 volts by a 2.0 KVA transformer generates the ozone. Ozonized air which is injected directly into the absorber flows countercurrent to the water in four separate stages. Efficient absorption of the ozone is obtained by diffusion, injection, turbulation, and scrubbing.

Element 61

A form of element 61, believed to be the only element of the 92 in the chemists' periodic table not found in nature and never before produced artificially, made a brief appearance recently as a result of the bombardment of other elements with atomic fragments whirled at them by the University of California's cyclotron. According to *Science Service* the new substance stayed just long enough to show by its radioactivity that it was present and then distintegrated completely.

Element 61 belongs to the group of rare earths, of which there are 15. The atomic number 61 means that the nucleus of the atom has a positive charge 61 times that on a hydrogen atom, and this is neutralized by 61 planetary negative electrons. Each chemical element has various isotopic forms, one of which is believed to have been discovered for element 61.

From its position in the periodic table, scientists know that the atomic weight of the element 61 should be about 148, and can predict fairly accurately its physical and chemical properties, but these predictions can not be verified until a fairly stable form is found.

The Thunderbolt Interceptor

According to Congressional reports, our pursuit planes are not equal to those of other nations and our P-40 has been called obsolete and only suitable for advanced training purposes. Congressmen who voiced this opinion did not know that the P-40 was followed by the P-40, A, B, C, and so on, which may be reckoned among the fastest and most effective fighters of the world. The congressmen in question had never heard of Republic Aviation's Thunderbolt, technically known as Republic XP-47B. This is, perhaps, the first single seated interceptor to be equipped with a 2000 horsepower engine. While specifications remain secret, there is reason to believe that the Thunderbolt is the most effective interceptor produced anywhere; tests of the ship were remarkably successful. The Thunder-

Courtesy of Scientific American

Water from the Los Angeles River pumped by Sterozone.

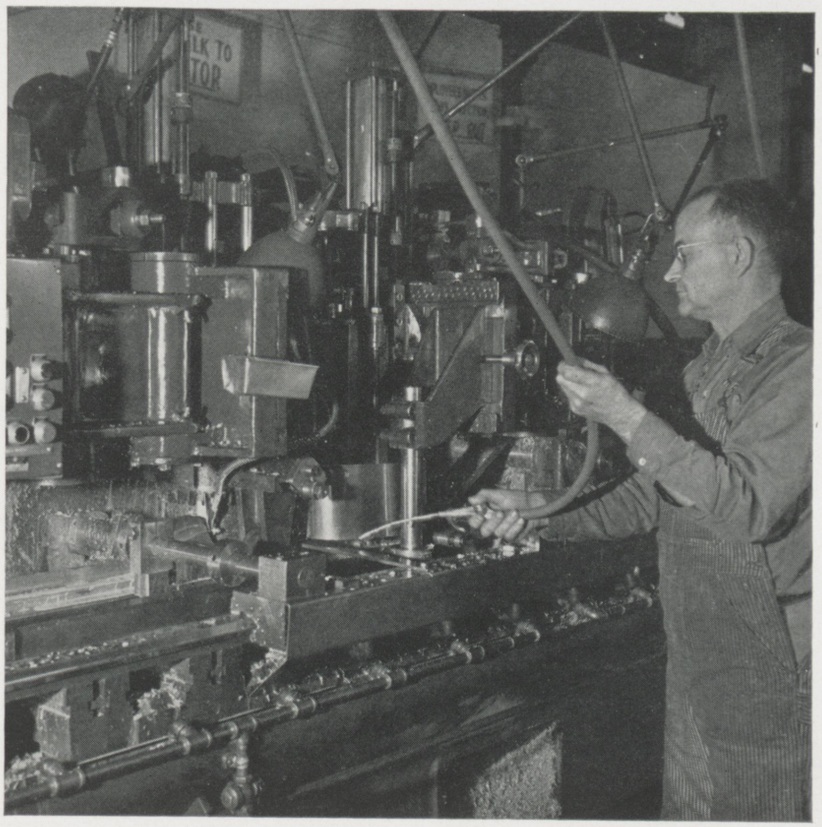
bolt has the strong fire power necessary to attack enemy bombers and fighters. A four bladed propeller of large diameter had to be employed to absorb the enormous amount of power developed. The landing gear retracts into a hole on the under side of the wing and the surface becomes automatically smooth after retraction. The tread of the landing gear is very wide in relation to the span of the wing.

The Thunderbolt which will be built in large numbers is certain to give a good account of itself. Another remarkable thing about the ship is that deliveries were made only eight months after the order to begin work had been received from the Army Air Corps. This is an indication of sound knowledge on the part of the engineers.

New High Speed Milling Machine

An excellent example of the way many hours of production time can be saved by the design of a special machine tool, when the required quantity of one particular part is large enough to warrant such a design, is a new high-speed milling machine recently installed in the Burbank, California, plant of the Lockheed Aircraft Corporation.

The machine is used to mill 10 important parts on each Lockheed P-38 interceptor-pursuit ship—two channels for the center section of the main beam and eight cap strips, which are extensions of the channels into the wings. The channels are each 20 feet long and the cap strips 8 and 10 feet long.

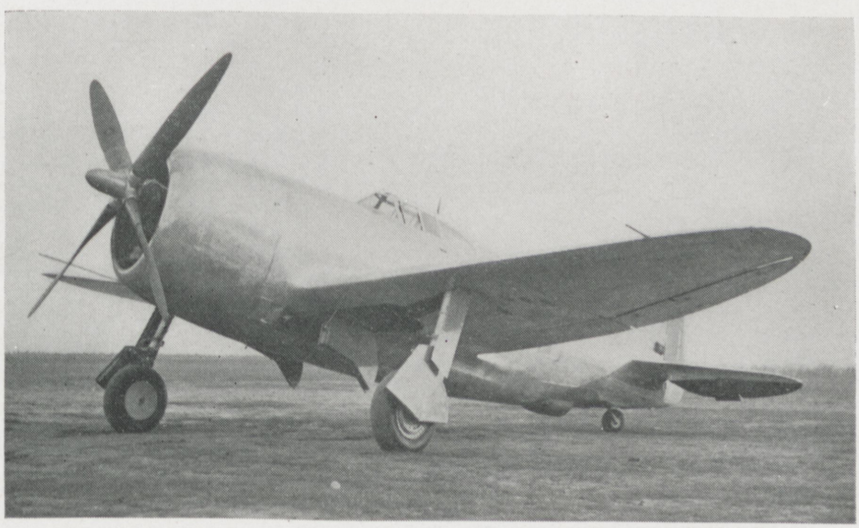


Courtesy of Machine Tools

Close-up of the new special-purpose milling machine.

Previous machining time of the 10 aluminum parts was 90 production hours. Today the same work is done in only 2 hours and 20 minutes, or a saving of 87½ hours per plane.

The machine which is 30 feet long and weighs 13 tons, is manned by one operator and two assistants. The operator rides on a carriage which moves back and forth the full length of the operation. The two assistants meanwhile feed the parts into the machine and keep the chips cleared away. Three cutters are in operation on the machine simultaneously.



Courtesy of Scientific American

P-47 Thunderbolt.

Stainless Steel Bottling Machines

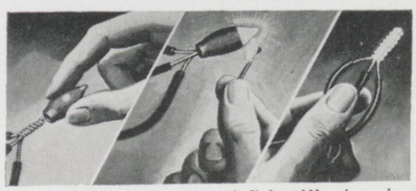
It is necessary to safeguard the wholesome properties of milk not only during the pasteurization period, but also during the bottling and capping operations while it is being handled in preparation for distribution. In order to avoid contamination of the milk in this final stage, many dairies have installed filling machines that are fabricated largely of stainless steel so that the milk touches only this corrosion-resistant material.

Although stainless steel machines for bottling various beverages have been in use for over six years, the units were not capable of performing all the complex operations that the newer units can. For those dairies that distribute milk in fiber containers, for instance, there are machines that open each container, measure into it the allotted amount

of liquid, close and seal the container, and finally date it. Whereas some of the older machines introduced a volume of fluid which was determined by the capacity of the bottle, the latest model made by the American Can Company, New York City, introduces a carefully and automatically measured amount of milk. All of the operations follow one another as one continuous procedure since the containers are conveyed along an S-shaped course, past the various stations at which each filling and capping operation is performed.

Match Soldering

Strong perfectly soldered electrical connections can now be obtained



Courtesy of Scientific American

Slip it on, light match, and soldered joint results.

without the use of the convential touch or soldering iron. Self-contained soldering units, known as "Jiggers", consisting of the correct amount of 50-50 solder and flux, hermetically sealed within a waterproof heat-generating outer shell, can now be used on many types of electrical jobs and is especially adapted for working overhead or in close quarters. The wire splice is pushed into a "Jigger" and a lighted match is applied to the outer shell. The shell ignites and produces the correct temperature to flow the solder into the splice and then the burned shell drops off leaving a clean soldered splice.

20,000,000-*volt Rheotron*

In the 1940 Annual Review of Electrical Developments published by General Electric, a 2,300,000-volt induction accelerator, developed at the University of Illinois, was announced. Since then new, larger, more powerful equipment has been constructed in the G. E. Research Laboratory at Schenectady. The new rheotron, as it has been named, opens a wide field for scientific exploration by producing a 20,000,000-volt electron stream, far more penetrating than the electrons from radium. It also produces x-rays of this power.

Dr. Donald W. Herst, 30-year-old physicist in the G. E. Research Laboratory, on leave from the faculty of the University of Illinois where he developed the first rheotron, built the new one with the aid of G. E. engineers and scientists. In it electrons are accelerated to the highest speed ever produced by a man made machine—almost to the speed of light. Results have been so promising that the Research laboratory has started work on a larger machine designed to whirl electrons to an energy of 100,000,000 electron-volts.

Though much more powerful than the towering machines previously used, the magnet of the 20,000,000-volt equipment is only five feet long, three feet high, and two feet wide. A doughnut-shaped glass tube, between the poles of the large electromagnet, is the heart of the rheotron. Electrons from a hot filament within are whirled around the tube and gradually speeded by electromagnetic forces until they obtain a velocity closely approaching that of light, $3x10^{10}$ centimeters per second. Radiations from the machine have made copper radioactive. Magnetically guided, the electrons travel along a circular path for about 400,000 revolutions, receiving as much as a 70-volt push each time around, and traveling some 200 miles in a small fraction of a second, to gain a velocity within a tenth of one per cent of that of light. The radiation as determined by ionizing power, is equivalent to that of a beam of 1000 grams of radium, which is more than the world's supply of this rare substance.

Automatic Multiple-Spindle Bar Machine

To further speed production on a lathe when the number of identical parts required is increased to tens or hundreds of thousands, a mechanical marvel called an automatic multiple-spindle bar machine is used. It is entirely automatic and works on six parts at one time completing a part every 15 seconds. Once set up and put into operation all the operator has to do is to feed in at one end the rough parts or, more frequently, long bars of solid steel, and take away the finished parts at the other end.

Courtesy of Machine Tools

Making aluminum bomb fuse parts on a multi-spindled automatic lathe.

AROUND THE CAMPUS

by Charles W. Newlin, freshman

Honor Points Announced

It has been the custom at Rose to present honor keys to those students who earn twenty or more honor points in one year or fifty or more points in four years. Those men who have earned the required twenty honor points and who are eligible to receive honor keys for the year 1941-42 are Winston Cundiff, Fred Berghoefer, Charles S. Meurer, Hulit Madinger, Richard Ellsworth, Alan Ker, Raymond Kopan, Carl N. Miller, Richard Driskell, Martin J. Cavanaugh, Harold E. Bowsher, Earl F. Michaels, Leon L. O'Dell, Harris E. Murchison, William Kniptash, Michael Percopo, Fred Kolb, Jack K. Kennedy, Vinton B. Haas, William Leedy, James R. Brown, Gene F. McConnell, and John G. Mehagen.

War Aid Planned for Rose Students

The accelerated school program, which will dispense with the usual summer vacation, has introduced a vital problem for many of the students at Rose. Those who formerly have met the many costs of school with money they were able to earn during the three months of summer vacation have lately been searching for another source of income. Many students in schools over the country operating on the accelerated program feared that they would be forced to give up their college training if some sort of aid were not given.

The United States Office of Education Wartime Commission has formulated a plan which will furnish government aid for students facing the same problem as that confronting Rose students. The proposed aid will be given to students in schools of engineering, chemistry, physics, production supervision, medicine, dentistry, and pharmacy. The details of the plan have not yet been announced since the plan is now before the Bureau of Budget for consideration. It has been announced, however, that subsidies to the students would be in the form of direct loans. Dr. Fred J. Kelly, director of the United States Office of Education Wartime Commission stated that the colleges would be reimbursed along lines not yet determined.

Interfraternity Dance

"Why not bring the fraternities together and have one big dance instead of the several small dances held each Spring?" This has been the question in the minds of many of the members of the four fraternities at Rose. A committee composed of one representative from each of the four fraternities, has completed plans for their first social get-together. Edward Cook, Sigma Nu; Michael Percopo, Theta Xi; Ralph Mitchell, Lambda Chi Alpha; and Hulit Madinger, Alpha Tau Omega were the men who made up this committee.

The event is to be an interfraternity dance which will be held at the Mayflower Room of the Terre Haute House April 24. Verle Bogue and his orchestra, who features a trio of girl vocalists, has been scheduled to play for this dance. The dance is to be informal.

Closer unity between the four fraternities has long been one of the main objectives of Rose. This dance is the first attempt that has been made to unite the fraternities and fraternity leaders hope that other interfraternity events will follow and that in the future closer cooperation can be obtained between the organized students at Rose.

Junior Prom Proves Success

Whenever the students at Rose exchange their corduroys, plaid shirts, and overalls for another garb it is practically certain that they are preparing for a very important occasion. This was the situation April 18. They removed their not too frequently used tuxedos from the moth balls, shined their shoes, and displaying their best personalities, traveled to the homes of their favorite girls. The occasion was the annual Junior Prom.

The Rose Poly Junior Prom has always been among the most important social functions of the spring season in Terre Haute. This year, the Prom, headed by Richard Driskell, general chairman, maintained all the high standards set by the Proms of the past. The fighting engineers proved to their dates that they make as good a group of dancers as mathematicians. The music of Art Kassel, who had just come from a long engagement at the Walnut Room of the Bismark Hotel in Chicago, was the feature of the occasion. His nationally famous "Castles in the Air" style of music proved to be a great hit with Terre Haute dancers.

Campus Rivalries Renewed On March 17

St. Patrick's Day at Rose was observed in traditional fashion when the annual freshman-sophomore skirmish was renewed on the famed and forbidden cinder path at high noon of the 17th.

The final clash was preceded by several minor battles throughout the building during the morning, which were reluctantly but necessarily subdued by members of the faculty. It began when a few inspired freshmen brought most of the student body to the scene by their battle cries. A pair of corduroys donned by a junior was the nucleus of a clash between the junior and senior classes, which was exactly what both freshmen and sophomores wanted in order that they might battle undisturbed. Then followed a skirmish that involved every hold known in

Saint Patrick had his day.

the science of wrestling.

Their lust for battle satisfied, 200 haggard, bruised, and quite unclothed students trudged back into the building later for much-needed relaxation. Mute evidence of the great fray were the strips of clothing lying on the cold, windy campus. The only hard feelings present lay in the limbs and muscles of the participants, for this battle is tradition and fun.

Glee Club

Mr. Emil Taflinger has resumed directorship of the Rose Tech Glee Club. Mr. Taflinger, who is the director of the nationally known Master Singers and the regular arranger-composer for the Glee Club, has returned to Terre Haute after a highly successful concert tour.

Under the direction of Mr. Taflinger the club will present a series of concerts during the next month. The schedule is as follows:

April 2—West Terre Haute High School.

April 8—Woman's Department Club.

April 9—Maple Ave. Methodist Church.

April 12—The First Baptist Church.

April 15—Cory High School Commencement.

April 23—Final concert.

The final concert of the season will be held at the Student Union Building. Since this is the highlight of the club's activity, all members are practicing earnestly in order that it may be the best ever presented. A patriotic composition which has been written by Mr. Taflinger will be featured in future concerts. The Glee Club will give a party for all its members sometime in the near future.

All those students who are interested in music and wish to join this club are urged to do so at the first opportunity.

Committees for Annual Inspection Dance Announced

On April 22nd, the Rose R.O.T.C. Battalion will have its annual inspection. The inspecting officer will be Colonel R. L. Smith, Corps of Engineers, who was graduated from Rose in 1909.

It has been the custom of Tau Nu Tau, the honorary military engineering fraternity, to hold an Officers' Inspection Dance in honor of the inspecting officer. William Wienhardt, newly elected president of the fraternity, has announced the following committees in preparation for the dance:

Orchestra Committee — Darrell Criss, Warren Rombough.

Place Committee — Alan Ker, Robert Pease, J. Thurlow Warrick.

Strip-tease.

Lasher wins War on Weather!

For years, telephone cable has been hung by stiff wire rings from its supporting strand. But repeated expansion and contraction caused by temperature changes sometimes proved too much for even the best cable sheath. Fatigue cracks developed near the poles—this meant leaks—possible service interruptions—expensive repairs.

Recently, men of the Bell System developed a machine that lashes the cable and strand together in such a way that the concentration of strains near the poles is minimized. The Cable Lasher has also proved a great aid in the speedy installation of some of the new cables needed for airfields, camps, bases and war factories.

There are many opportunities in the Bell System for men with the urge—and the ability—to do a job better than it has ever been done before.

BELL SYSTEM
AMERICAN TELEPHONE & TELEGRAPH CO.
AND ASSOCIATED COMPANIES

A-LUMINOUS ALUMNI

edited by W. Alan Winslow, sophomore, ch.e.

Alumni Win Awards

Carl B. Wilson, of General Electric's New York City office, has received from that company the Charles A. Coffin Foundation award for outstanding achievement during 1941. Mr. Wilson was graduated in 1922 with a B.S. degree in electrical engineering.

He was one of 37 engineers, commercial men, factory workers, and administrative employees who each received a framed certificate and a cash honorarium.

The Coffin award is the highest honor which the General Electric Company bestows on its outstanding employees. The total number of those who received the awards in the 19 years since the foundation was instituted is now 592.

Mr. Wilson was given this award for exceptional ability and persistence in solving problems arising from the installation of mercury-arc rectifiers, and suggested changes in design which have resulted in improved performance.

Thirty-five years ago, Addison W. Lee, Jr., who had been graduated from Rose in 1906, was employed by the Louisville Gas & Electric Company as an engineer and assigned to inspecting construction.

Carl B. Wilson, '22.

To-day Mr. Lee is vice-president of the company in charge of operations. In recognition of his services, T. B. Wilson, president of the company, pinned a gold service button on Mr. Lee's lapel.

In addition to his business, Mr. Lee has found time to take part in numerous civic activities. His interest in developing and promoting aviation is widely recognized. For several years he has been chairman of the Louisville and Jefferson County Air Board.

Necrology

The funeral of Howard A. Mullett, Class of 1904, was held last week in Milwaukee. While at Rose, Mr. Mullett won both Heminway Medals, the first in his freshman and the second in his senior year. Sixty-one years old, he was the president and general manager of the Bradley Washfountain Company of Milwaukee.

Mr. Mullett went to Milwaukee in 1906 and was employed by the Electric Co., with which he was associated for 19 years. He once was superintendent of rolling stock and assistant general manager.

In 1925, Mr. Mullett went to Chicago to be assistant to the president of the Yellow Cab Company, later becoming vice-president. He later left Chicago to become assistant to the president of the Minneapolis Street Car Company.

He returned to Milwaukee in 1928 to become secretary of the Washfountain Company. Shortly afterward he took over the major interest in the company and became its president.

Mr. Mullett, a native of Kansas City, Missouri, after leaving Terre Haute, completed the student course at the Westinghouse Manufacturing Company at Pittsburgh, Pennsylvania. He was married in 1909 to Lydia Grossenbach, of Milwaukee.

He belonged to the Athletic Club, Blue Mound Country Club, Rotary Club of Milwaukee, and Alpha Tau Omega fraternity.

Howard F. Dyson, Class of '94, died on January 12, 1942. Mr. Dyson was formerly editor and publisher of the Rushville Times Company, Rushville, Illinois.

J. E. Daily of the Class of 1905, passed away on March 15, 1942, in a hospital at Chicago. Mr. Daily was formerly district manager for the Youngstown Sheet and Tube Company. Until seven years ago, he had been employed with different steel companies in the east.

Mr. Arthur F. Gordon died January 29, 1942, of a heart attack at Takoma Park, Md. Mr. Gordon was formerly senior highway bridge engineer for the Public Roads Administration of Washington, D. C. Mr. Gordon was very active in the civic work of his community.

Weddings

Mr. and Mrs. James Medsker announced the marriage of their daughter, Dorothy, to Mr. Albert Todd Klatte. The wedding took place in Indianapolis, February 24, 1942. Mr. Klatte was graduated in 1941. He is now employed by the State Health Department and is situated in Bloomington, Indiana.

Mrs. Charles Victor Raiser announced the marriage of her daughter, Marjorie, to Mr. Bert LeTellier Pearce, on March 21, 1942. Mr. Pearce was graduated from Rose in 1935. He is now sales engineer for the Link Belt Company in Indianapolis.

Army Notes

Captain James J. Mason, graduate of 1934, has received his captaincy and is with the 307th Engineers at Camp Claiborne, Louisiana. Prior to

Reykjavik off the port bow!

TONIGHT, somewhere at sea, a man stands on the bridge of a freighter with the life line of a nation in his hands.

He is straining his eyes for sight of one of those islands which are our country's first line of defense. To these islands must be transported huge quantities of munitions and food. And the only answer is ships, ships, and more ships.

How is America meeting this tremendous responsibility? You'll get a fair idea at such great factories as the Westinghouse plant where the machinery to drive many of those supply ships is being built, or at the huge Westinghouse-operated Maritime Commission plant which is now being erected alongside it.

The "know how" that works 24 hours a day

There, in these factories is a dramatic example of how Westinghouse "know how" is doing a job for National Defense.

What is this "know how"? It is the ability to get things done in the best possible way—learned in building products for the general welfare and now used in building materials for the common defense.

The same skill and ingenuity that are building those turbines for the merchant fleet, not long ago built more efficient electric refrigerators and washing machines. Again, the research skill that developed intricate new radio equipment has found ways of utilizing that equipment in important defense work.

At 17 Westinghouse Divisions, and in the plants of more than 300 sub-contractors, our energies are almost exclusively turned to the creation of $400,000,000 worth of defense materials. It's our way of speeding the day when our "know how" will be serving America again—in the home, the farm, and the factory.

A salute to the "Class of '41"

In the all-out Westinghouse war effort, no group in our entire organization is more deeply engaged today than the 600 young engineers who last year left your campus paths to join this company. In research, design, production—they have already made important contributions.

This year many more engineers will come to us from your college and others to mesh their eager talent with our "know-how" and apply it to their country's defense. Certainly nowhere does there exist a greater opportunity for them to translate their intelligence, skill and enterprise into vital service. For Westinghouse is, always has been, and we believe always will be, "an engineer's company."

Westinghouse

"An Engineer's Company," Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.

entering the army, Captain Mason was employed with Sunbeam Electric Company in Evansville, Indiana.

Daniel Overholser, graduate of 1936, has been transferred to Camp J. T. Robinson in Arkansas. Formerly he was Personnel Director of Vigo County N. Y. A.

Harry J. Loving, who was graduated in 1931 with honors, has been transferred to Camp J. T. Robinson in Arkansas. Previously he had been employed with Kroger Food Foundation as a cereal chemist.

James A. Hughes, of the class of 1937, has also been transferred to Camp J. T. Robinson in Arkansas. Hughes was formerly with the Ohio Oil Company.

William E. Kasameyer, class of 1936, is now stationed in Australia. Kasameyer was formerly with General Electric.

Lt. H. H. Richardson, class of 1939, has just received his First Lieutenant's rank. He is situated with Company C, 32nd Battalion at Fort Leonard Wood.

Lt. John R. Roberts, class of '41, has been transferred to Alaska with Company C of the 42nd Engineers. Lt. Roberts has been in the army since his graduation last June.

Lt. Joseph Dreher, also class of 1941, has been transferred to Fort Flushing in New York.

Lt. Harold Reintjes, Class of 1935, has been transferred to Camp Forrest, Tennessee on a water conservatoin job. Lt. Reintjes had been employed with Corn Products Refining Company, Argo, Illinois. He was graduated from Rose with high honors.

The Grads Advance

'19 Rudolph Wiedemann has recently moved from Hollywood, California, to Washington, D. C. He is now manager of R. F. E. Wiedemann Agency, The Equitable Life Assurance Society. Previously Mr. Wiedemann had been district manager for the Equitable Life Assurance Society in Hollywood.

'32 Lt. A. L. Ahlers has succeeded Lt. Col. J. L. O'Connor as assistant area engineer for the Hoosier Ordnance Plant. Lt. Ahlers has been placed in charge of utilities and maintenance at the bag loading plant. Former container division superintendent at the Mengel Company, Louisville, he was called back into ordnance service three weeks ago. From August, 1940, to August, 1941, he was attached to the Indiana Ordnance Works and supervised construction of the power plants. Lt. Ahlers was graduated from Rose with honors.

Mr. Charles N. McGillivray, formerly a draftsman with Commonwealth Edison Company, has recently accepted a position in the development department of the Whiting Corporation, Harvey, Illinois.

'36 Mr. Charles E. MacDonald, is now Assistant Project Engineer with Kinner Motors Incorporated at Glendale, California. Mr. MacDonald was graduated from Rose with honors and received his M. S. degree at Chrysler Institute in 1938.

'37 Mr. Charles F. Rich, with Joseph E. Seagram and Sons Incorporated of Louisville, Kentucky, has been made production supervisor. Previous to his employment with this concern, Mr. Rich was with Veliscal Corporation as reducing unit operator.

'39 Mr. Gene E. Petty has taken a position with the Rock Island Refining Corporation of Indianapolis, Indiana. Formerly, Mr. Petty was plant chemist with the Arkansas Fuel Oil Company.

'40 Frederick Thodal is taking a twelve weeks course in aerodynamics at the University of Kentucky. Mr. Thodal has been employed with the Pratt and Whitney Aircraft Company in Hartford, Connecticut.

A. S. C. E.

Thursday, April 16, the Rose student chapter of the American Society of Civil Engineers participated in the joint meeting of the Indiana section with the student chapters of Rose and Purdue which was held in the Memorial Union Building at Purdue. The delegation from Rose arrived at Lafayette in time to visit some of the engineering buildings on the campus. The principle speaker was E. B. Black, president of the American Society of Civil Engineers and an outstanding sanitary engineer. The outstanding seniors from Rose and Purdue were presented with junior memberships in the society at the meeting. This junior membership entitles the recipient to the privileges of the society and may lead to full membership later.

A. I. E. E.

A meeting of the American Institute of Electrical Engineers was held Wednesday, March 25. At this meeting Robert E. Miller was elected chairman of the Rose chapter of A. I. E. E. and Darrell Criss was chosen as the secretary for the coming year.

Professor Knipmeyer and several members of the Rose chapter will journey to Northwestern University on May 2 to attend a district meeting of A. I. E. E. At this meeting they will report on the activities of the Rose chapter.

Rifle Club

The highlights of the past season for the rifle club have been furnished by the high individual scoring honors won by the various members

of the team. Exceptional among these have been the scores shot by William Leedy, who proved himself to be an outstanding marksman when he recently broke the standing record at Rose by firing a 387. He also established a new record for the Indiana University range with a score of 389.

On Tuesday, March 24, the team fired a shoulder-to-shoulder match with a strong Michigan Tech team which was making a tour of the middle west. This match was for R.O.T.C. men only. Those participating were Ker, captain of the R.O.T.C. team, Buckalter, Driskell, Criss, Pool, Kopan, and Brown.

On March 27, the team attended the National Intercollegiate Rifle Match at the University of Chicago, where they fired a score of 1269 to finish seventh. The University of Iowa scored 1372 points to take the honors. Several men also participated in the intercollegiate individual match. Those men making the trip were Leedy, captain, March, Ker, Buckalter, and Driskell. The team was accompanied by Coach Sergeant Burgess.

Season averages for the team are as follows: Leedy—380, March—363, Ker—362, Buckalter—357, Driskell —352, Kopan—347, Pool—352.

Due to the fact that there were no freshmen on the team this year the team will gladly welcome any new material next season. Colonel Noyes and Captain Bennett will personally assist the team next year in schooling and training new men in an effort to produce the best team possible.

The club plans to have several intercollegiate matches this summer on the outdoor range since school will be in session.

100-OCTANE FUELS

(*Continued from Page 5*)

gases results in the necessity of using unnecessarily large equipment and results in increased acid consumption. With four carbon atom fractions from cracking stills, the concentration of olefin is of the order of 8 to 14 per cent.

3. Acid strength

The necessary acid strength in the reactor is 88 to 90 per cent H_2SO_4. At temperatures below 70° F., make-up acid of 96 to 100 per cent H_2SO_4 is added as required to maintain the proper acid concentration. At higher temperatures the acid concentration must be lowered. Waste acid diluted by an accumulation of hydrocarbons and water which entered with the feed is removed to keep the quantity of acid constant.

4. Acid-hydrocarbon ratio

The volume ratio of acid to hydrocarbon can be varied from 1:1 to 2:1. The ratio most generally used, however, is 1:1.

5. Temperature

The optimum operating temperature for four carbon atom hydrocarbons lies between 32° F. and 50° F. as the temperature increases oxidation of the hydrocarbons by the acid results. This effect increases the acid consumption, decreases the yield, and lowers the octane rating of the product.

6. Contact time

Sufficient time must be allowed for the complete absorption of the olefin. A time of five minutes has been found most satisfactory with butylene feed stocks. Commercial equipment has been designed, however, allowing as much as forty minutes reaction time.

7. Agitation

An emulsion must be formed of the hydrocarbons and the acid. Commercial installations achieve this by pumping the mixture through a system of jets and baffles.

Since this is a low temperature, low pressure process, no serious engineering problems are involved. Steel equipment is used throughout as the sulfuric acid is of a high concentration and at a low temperature. The equipment used is of standard type.

Thermal Alkylation

Another high-octane fuel is produced by the reaction between isobutane and ethylene at high temperatures and high pressures. By this reaction neohexane is produced.

$$(CH_3)_2CHCH_3 + CH_2{=}CH_2 \xrightarrow[4500\ psi]{940^\circ F.} CH_3C(CH_3)_2CH_2CH_3$$

Isobutane Ethylene Neohexane

The process of thermal alkylation was developed by the Phillips Petroleum Co.

Ethylene is produced by passing ethane, propane, butane, or a mixture of these gases through a cracking furnace. Cracking conditions are maintained at 1400 to 1500° F. and 20 to 50 psi absolute pressure. The cracked gases are then compressed and fractionated to remove the hydrogen and methane. Isobutane is added to the cracked gases and the mixture is compressed. The mixture is then fed into the alkylation furnace. Here the temperature is maintained at 940° F. and the pressure at 4500 psi, conditions for alkylation. The crude alkylate is fractionated to remove propane, ethane and isobutane. The isobutane is recycled in the system.

The three important process variables are as follows:

1. Olefin-hydrocarbon ratio
2. Temperature
3. Pressure

1. Olefin-hydrocarbon ratio

Olefins are readily polymerized under the conditions for alkylation of 940° F. and 4500 psi pressure. Polymerization is retarded, however, and alkylation made the predominate

reaction by maintaining the concentration of olefin low and paraffin high.

2. Temperature

The cracking step requires a temperature of from 1400° F. to 1500° F. In alkylation the temperature should be from 920 to 960° F.

3. Pressure

In cracking, the pressure should be low. Best results are obtained at 20 to 30 psi absolute pressure, although pressures as high as 300 psi may be used. In alkylation, the pressure must be high to prevent cracking. A pressure of 3000 to 5000 psi is used to reverse the cracking tendency.

The thermal alkylation process employs unusually high pressures, and so high pressure equipment and high pressure operating technic is required.

LOCO-EVOLUTION

(*Continued from Page 8*)

attributed to the conservative policy of the railroads during the 1930's and also the large construction program conducted during the last war. One pleasing fact disclosed by the study of American motive power is the constant increase of locomotive power utilization. This is reflected by the constant increase in the ratio of gross ton-miles per train hour, the 39% decrease in coal consumption per gross ton-mile, and a 32% decrease in the repair cost per million tractive force-pound-miles. Several new performance records for 1941 were made which also help show this increased utilization: freight train speed, 16.7 mph; gross ton-miles per train hour, 33,856; and freight fuel per thousand gross-ton-miles, 111.

Modern locomotives are classified as to type by the number of wheels on the tender, the number of drivers, and the number of wheels following the drivers, such as: 2-4-4 or 2-8-0. The following tables shows the relative cost of making the various types of locomotives.

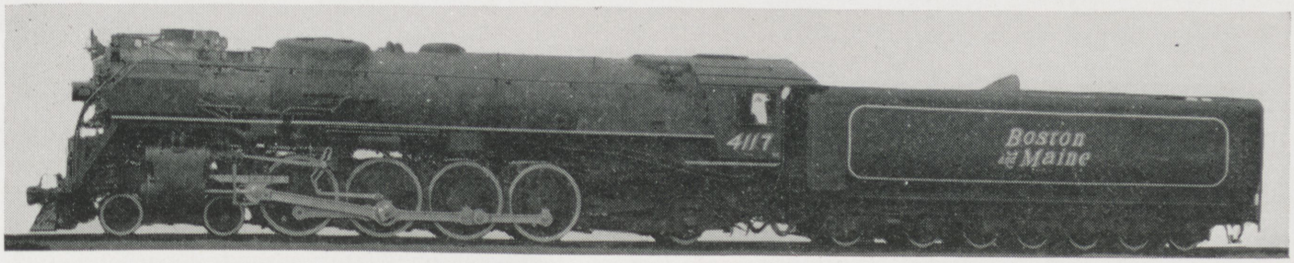
Representative Equipment Costs

Simple 2-8-8-4	$ .31/lb
Simple 4-6-6-4	.31/lb
4-8-4	.37/lb
2-10-4	.304/lb
0-8-0	.30/lb
Diesel-electric, 2000 hp passenger	.57/lb, $88/hp
Diesel-electric, 660 hp switcher	.31/lb, $95/hp

Locomotives besides being listed by the number of wheels and drivers are further described by their types of cylinders, boilers, weights, tractive force, horsepower, and tender capacity. They are also frequently referred to by class numbers which are standard for each railroad. The outstanding characteristics of locomotives now in service for the various railroads of the world are shown in the following table.

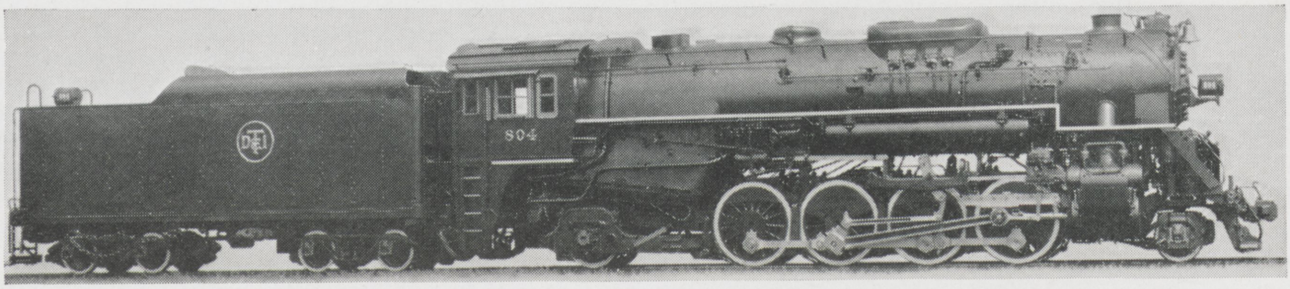
DOMESTIC STEAM LOCOMOTIVES

			Cylinders			Boiler					Weights (1,000's lbs.)				Tender Capacity	
Type	Railway	Builder	No.	Diam. & stroke, inches	Diam. of drivers, in.	Working pressure p.s.i.	Evaporative heating surface, sq. ft.	Superheating surface, sq. ft.	Grate surface, sq. ft.	On drivers	Total engine	Tender	Rated tractive force, lb.	Fuel, tons	gals. Water,
K4S 4-6-2	Penn.	Ry., Lima	2	27 x28	80	205	3686	1277	70	208.8	330.8	176	44400		
4-8-2	N. Y. C.	A. L. Co.	2	25½x30	69	255	4657	2080	75.3	262	388.5	302.2	60100	43.5	15500
4-6-2	Erie	B. L. W.	2	27 x28	79	210	3718	1315	70.8	205	331	314	46100	24	16500
2-8-4	W. & L. E.	A. L. Co.	2	25 x34	69	245	4718	1924	90.3	265	415	289	64100	22	22000
2-8-2	A. C. & Y.	Lima	2	26 x30	64	200	3507	972	66.7	227.5	319.7	176.7	53800	16	12400
4-6-2	Alaska	B. L. W.	2	22 x28	72	200	2660	846	625	156	250	160	36500	14	10000
2-8-8-4	D. M. & N.	B. L. W.	4	28 x32	63	240	6782	2770	125	560	695	437	140000	26	25000
4-6-6-4	W. M.	B. L. W.	4	22 x32	69	250	5770	1735	119	402	601	338	95500	20	22000
2-8-2	D. T. & I.	Lima	2	23 x30	63	260	4009	1815	67	248.5	369.5	194.2	55600	18	143000
4-8-4	B. & M.	B. L. W.	2	28 x31	73	240	4511	1887	79	26	415	320	67000	21	230000



Cut Courtesy of Mechanical Engineering

4-8-2 for Boston and Maine.



Cut Courtesy of Mechanical Engineering

2-8-4 for Detroit, Toledo, and Ironton.

FOREIGN STEAM LOCOMOTIVES

				Cylinders		Boiler				Weights (1,000's lbs.)					Tender Capacity	
Type	Railway	Builder	No.	Diam. & stroke, inches	Diam. of drivers, in.	Working pressure p.s.i.	Evaporative heating surface, sq. ft.	Superheating surface, sq. ft.	Grate surface, sq. ft.	On drivers	Total engine	Tender	Rated tractive force, lb.	Fuel, tons	Water, gals.
2- 6-2	L. & N. E.	Ry.	3	15 x26	68	1444	336	250	28.5	108	157	96	27200	6.7	4200
4- 6-2	Sou (GB)	Ry.	3	18 x24	74	2451	822	280	48.5	141	207	112	37500	5.6	6670
4- 6-2	Ger. State Ry.	Borsig	2	22½x26	79	2174	753	227	44	116	224				
2- 8-0	Victoria Govt.	Ry.	2	20 x26	54	1447	281	175	26	121	140	96.2	28700	5.5	5100
4- 8-2	Bengal-Nagpur	Beyer													
2- 8-4 Garratt		Peacock	4	20½x26	56	3453	661	210	70		516		70000	11	
4-10-2	Sorocabana (Brazil)	A. L. Co.	3	17½x22 x24	48	3346	851	235	65.3	187	250	110	44600	11	4500
4- 6-2	N.W. (Indian)	Vulcan	2	18½x26	67	1762	442	210	38	104	189	138	25500	11	5300
4- 8-2	M.Z.&A. (Spain)	T. & M.	2	22 x28	69	2215	1249	295	54	159	256	168	49100	11	10000
4- 4-2	G.I.P. (India)	N.B.&Ry.	2	20½x26	78	1599	382	180	32	84	161	102	21433	2.2	1600
4- 8-4	Victoria Govt.	Ry.	3	21½x28	66	3980	800	220	72	214	329	255	55000		

The present trend of high-pressure, non-condensing engines of two and four cylinders should lead to locomotives that will operate safely and efficiently at speeds of 110 mph. The efficiency will be raised to 13 or 15 percent with pressures of 500 pounds per sq. in. in the boiler. Streamlining will follow more as a matter of appearance than as a reduction of air resistance. The self-contained, high-pressure-temperature steam locomotives in combination with improvements of steam distribution and valve gear will without a doubt remain in use where heavy trains and traffic must be hauled economically over long distances in all sorts of weather.

Army Ice Boxes Modernized

Armies still travel on their stomachs even in these days of mechanized warfare, and electric refrigeration is helping the cooks to keep them traveling. Indicating the importance of refrigeration to the health of our Army, Westinghouse engineers and contractors are directing the conversion of 3,449 large ice boxes to automatic electric refrigerators in 39 camps and forts from New York to California.

Ultraviolet Lamps and Pilots

Ultraviolet lamps developed by Westinghouse engineers have taken to the air to help make flying safe, lighting airplane instrument dials while keeping the pilot's cabin in near-darkness. Invisible radiation from these four-watt bulbs causes fluorescent coating on the dials to glow in the dark.

Do You Know That?

Hoosier farmers have a spring harvest this year—a new kind of crop. It is just as essential to the war effort as their grains will be later.

This crop is scrap metal. It is urgently asked by the War Production Board that hundreds of tons of this metal, now rusting in barnyard and fence corners, be picked up and gotten somehow to the market.

April has been declared by the WPB in Indiana as Victory Cleanup Month, in cities as well as on farms. During spring vacation week, for instance, 40,000 school children in Indianapolis will search for scrap. County school pupils have been conducting such drives for some time.

As an example of what can be done—ten townships of Jackson County already have found 350 tons of scrap metal on farms.

FRATERNITY FRAGMENTS

Lambda Chi Alpha

This last month has been a very eventful one for the Theta Kappa Zeta of Lambda Chi Alpha. On March 21 the Chapter held an open house at which Mr. and Mrs. V. R. Ratcliffe and Mr. and Mrs. C. F. Bresett acted as chaperons. The Chapter was also very happy to have Dr. and Mrs. Knight for guests. The girls were given a white rose as they entered the front door. The white rose is the Fraternity flower. A very good time was had by those who were able to attend. Because of the success of this last open house, the social committee is planning another for the very near future.

The recently elected officers for the coming year are: James March, President; Harry Wilson, vice-president; Ralph Mitchell, treasurer; William Soudriette, ritualist; and Charles Bresett, social chairman.

The Chapter held its work week on the week end of March 28. Needless to say the pledges enjoyed themselves very much as they made some great improvements in the appearance of the Chapter grounds.

A dinner in honor of Captain Bennett's recent promotion was held on April 6 with every member of the Chapter in attendance.

Sigma Nu

The Sigma Nu state dance was held March 7 in the Columbia Club in Indianapolis. Music was furnished by Dick Pierce and his band. Beta Upsilon of Rose and Beta Eta of Indiana had the largest percentage of attendance among the five Indiana chapters of Sigma Nu. The Phi Delta Theta fraternity and the Sigma Nu fraternity also held their state dances that week-end in Indianapolis. The members circulated freely among all the dances disclosing a truly fraternal spirit. This friendly attitude added to the enjoyment of every one present and successfully closed a typical "Greek" week-end in Indiana.

The chapter adopted a mascot in the form of a massive German shepherd dog. He was promptly named "Mike." This title was derived from "micro-farads" which is an electrical unit of measurement of capacitance. Mike's appetite soon proved that he was aptly named. He developed a wanderlust and visited the Theta Xi house and the girl's dorm at State. However, he always turns up at the house at feeding time.

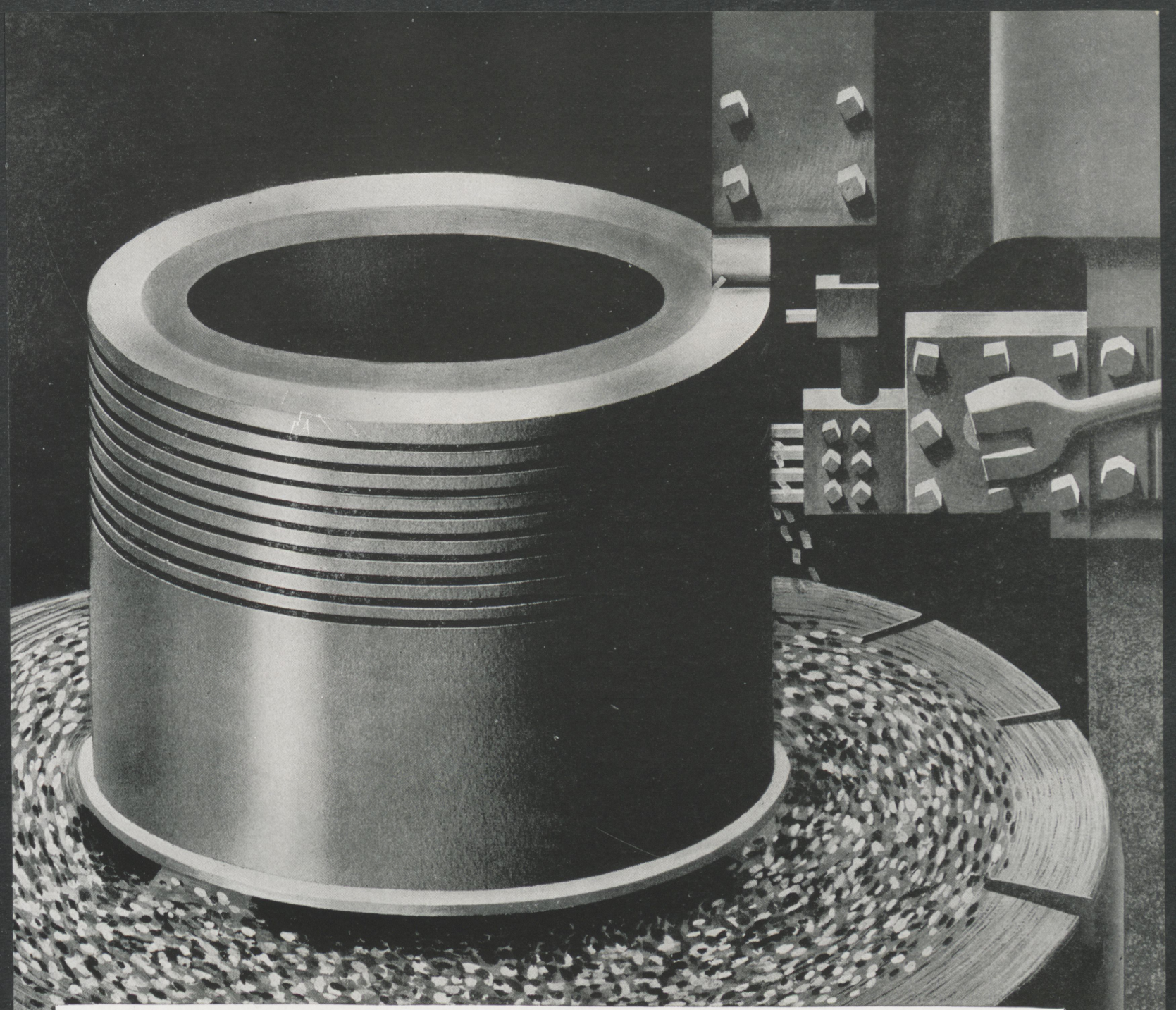
Beta Upsilon is co-operating with the three other fraternities at Rose in sponsoring an inter-fraternity dance. This dance has been abandoned for several years, but its revival by the Inter-fraternity council met with the approval of every fraternity at Rose. It is hoped that this dance in the future will take the place of individual pledge dances.

Theta Xi

The Kappa Chapter of Theta Xi is happy to announce the pledging of John Harris, Paris, Ky., and Dick Pence, Terre Haute, Ind.

The Chapter was honored with the presence of Lt. Colonel Marshall J. Noyes, Professor of Military Science and Tactics, and Professor Herman A. Moench of the Electrical Department at their dinner meeting March 16. Lt. Colonel Noyes gave a very interesting talk concerning the Panama Canal. He gave some of the history back of the building of the canal and told of some of his interesting experiences while in the Canal Zone. He also told of some of the many improvements that the government has been making in the last few years.

In order to promote friendship



HOW TO SEE RED... AND LIKE IT!

Friction . . . arch enemy of *speed* in the machining of iron and steel . . . meets its match in cutting tools made of Haynes Stellite non-ferrous alloys. For these alloys . . . of cobalt, chromium, and tungsten . . . have the amazing property of "red hardness." Unlike cutting tools made of ordinary metals, they *keep their edge* . . . and keep on cutting . . . even when friction heats them *red hot.*

Making possible tougher, longer-lasting cutting tools is only one of the vital roles played by Haynes Stellite materials. Because they stand up under heat, abrasion, and corrosion, they are used to hard-face many different kinds of metal parts.

Oil well drilling bits . . . steam shovel bucket lips . . . heavy gears . . . shafts . . . airplane and truck exhaust valve seats . . . crusher blades . . . mixers . . . plowshares . . . and other pieces of equipment that must withstand steady punishment have their lives lengthened . . . and their efficiency stepped up . . . with welded-on hard-facings of Haynes Stellite alloys.

Use of Haynes Stellite alloys speeds up production . . . lowers production costs . . . saves on tool and part replacements . . . reduces time lost while replacements are being made. In the fabrication of new parts, base metals can be selected for such valuable properties as strength and ductility — without particular regard for wear-resistance — because they can then be armored against abrasion, heat, and corrosion by hard-facing with Haynes Stellite alloys.

Further savings can be made by the use of these alloys because worn parts can be *renewed,* instead of being sent to the scrap pile . . . thus eliminating replacement with materials hard to obtain.

Faster production . . . conservation of metals . . . lower costs . . . these are the contributions made to industry by Haynes Stellite alloys.

• • •

The development of Haynes Stellite Company alloys and hard-facing practice has been furthered by the metallurgical knowledge of Electro Metallurgical Company, by the research facilities of Union Carbide and Carbon Research Laboratories, Inc., and by the service organization of The Linde Air Products Company — which companies also are Units of Union Carbide and Carbon Corporation.

HAYNES STELLITE COMPANY

Unit of Union Carbide and Carbon Corporation

UCC

KOKOMO, INDIANA NEW YORK, N. Y.

among the fraternities a bowling team has been organized. The TX's have a potential first team and a fair second and feel that they can top anything that the other fraternities have to offer.

Plans have been made to have an interfraternity dance in the Mayflower Room April 24. This is something very unusual for the fraternities on the Rose Campus so everyone is looking forward to a wonderful time.

Many improvements have been made around the house this year. The most noticeable one is the new stand of grass that has just come up. The boys are planning to have a nice comfortable place to live during the hot summer months.

Alpha Tau Omega

At the weekly meeting, March 23, Gamma Gamma chapter elected the following officers for the coming year:

Richard A. Holthaus—Worthy Master.

Alan W. Ker—Worthy Chaplain.

Richard O. Driskell—Worthy Keeper of the Exchequer.

John E. Metz—Worthy Keeper of the Annals.

John T. Newlin—Worthy Scribe.

Joseph J. O'Connell—Worthy Usher.

Joseph P. Pipp—Worthy Sentinel.

Raymond I. Kopan—Palm Reporter.

Another successful open house was held Saturday night, March 28. Mr. and Mrs. Johnston and Mr. and Mrs. Kolb, parents of two of the members, were chaperons for this social function.

Saturday night, April 4, the Alpha Taus inaugurated a new type of party held in honor of the parents. The actives and pledges and their mothers and dads, having enjoyed a very interesting evening, agreed that these get-togethers should occur more frequently.

A week end devoted to an informal intiation, commonly known as "Hell Week," was "enjoyed" by all the pledges April 9-10-11. The activities were climaxed by a road trip which the pledges found very entertaining. Sunday, April 12, the chapter attended the Washington Ave. Presbyterian Church, after which formal initiation was held.

To Restore Charred Documents

From England, where indiscriminate incendiary bombings have haused havoc to buildings with consequent injury of valuable records, comes word of a new glycerine-using method for deciphering charred documents. A process calling for chloral hydrate and glycerine is described in an article by W. D. Taylor and H. J. Walls, which they believe, considering the simplicity and general applicability of the process, is a distinct advance over any previous method employed.

Briefly, the method consists in treating the charred document with chloral hydrate which appears to have a clarifying action on the burned figures or letters. This is applied in the form of a 25 percent solution of chloral hydrate in alcohol. This is repeated several times, the document being dried at 60° C. between each application, until a mass of chloral hydrate crystals forms on the surface. At this stage, a similar solution, to which 10 percent of glycerine has been added, is applied and the document dried as before. It may then be photographed; the most suitable type of plate being a contrasty non-color sensitive one.

The method has proven equally satisfactory for typewritten and printed material. With certain modifications it has also been found to restore writing. Moreover, the reading matter is restored equally on both sides of the paper.

The inventors claim certain distinct advantages for this chloral hydrate method: (1) it appears applicable to any type of document; (2) it is fairly quick; (3) in their hands the method has never failed to produce readable results; (4) no special equipment, other than a copying camera, is required.

Iron Production

All daily and monthly world's records for blast furnace production were broken by Great Lakes Steel Corporation's Zug Island furnace, with a straight ore burden production for a month of 43,478 tons and the final day production of 1608 tons. The previous widely acclaimed world record of 41,782 tons for one month was set in Pittsburgh.

The new figures are approximately 40 per cent ahead of the average for a large furnace before Pearl Harbor. This record was established with a consumption of less than 1,700 pounds of coke per ton of iron.

PREVENTING "TOOTH DECAY" THE MODERN WAY

HERE this hottest flame known to man is giving gear teeth a protective "face." The wearing surface of each tooth is readily flame hardened to an easily controllable depth and to any desired degree of hardness, yet its core retains its original toughness and shock-resistance. Gear teeth, wearing surfaces, shafts, sprockets, and a multitude of shapes of any size and form are economically and speedily hardened this modern Airco way.

Because of its many and varied applications, the oxyacetylene flame has been drafted into service to speed defense by cleaning metal surfaces for quicker and long-lasting paint jobs, by shaping steel faster than ever before, by gouging out metal with astonishing speed and accuracy, and by welding it into a homogeneous, permanent unit.

So that you may become better acquainted with the many industrial applications of the Airco oxyacetylene flame, we have prepared a pictorial review of "Airco in the News".

Write to the Airco Public Relations Department, Room 1656, 60 East 42nd Street, New York, New York for a copy today.

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BITS OF WIT

edited by Harold E. Campbell, freshman

He: "I've never seen such dreamy eyes."

She: "You have never stayed so late before."

"What a childhood! I went to an immoral school."

"An immoral school?"

"Yes. We didn't have any principal."

A scientist has stated that man runs faster than woman. But its astonishing the number of men who don't take advantage of this natural gift.

POEM

Tobacco is a dirty weed,
I like it.
It satisfies no normal need,
I like it.
It makes you thin, it makes you lean,
It takes the hair right off your bean.
It's the worst darn stuff I've ever seen,
I like it.

No sooner had I stepped across the threshold into the room than I felt myself hurled into the air like a projectile. Everything began to swim before my eyes. The walls seemed to converge on me like a veritable Poe's Pit. The floor receded from me with a sweeping speed that made all the objects on it dance like living imps, diminishing all the while! The ceiling seemed to be dropping upon me with increasing rapidity, and a horrible, sickening nausea overcame me as I saw it crush me like a Juggernaut! One brief instant—and I was plunged into the water with a resounding splash!

Who in the hell left the soap on the bathroom floor?

Well dressed man, cigar in hand, falling through the air from an airplane: "Gad, that wasn't the washroom after all."

St. Peter: "Where are you from?"

Applicant: "Rose Polytechnic Institute."

St. Peter: "Come on in, but I don't think you'll like it."

"What you need is an electric bath," advised the doctor.

"Nothing doing, doc," replied the patient. "I had an uncle drown that way up at Sing Sing."

He: "Wasn't that girl I was out with last night a knockout?"

Second He: "Yea,—what round?"

She: "I did the silliest thing today. I dropped the baby's blanket out the window."

He: "That was careless. The baby's likely to catch pneumonia."

She: "Oh, no, he won't. He was in the blanket."

The great diagnostician was so busy a man that he could waste no time in preliminaries.

"There's a young woman to see you, sir," announced the nurse.

"Did you undress her?"

"No, sir."

"Well, do so. You know I can't waste time while she undresses in here."

The nurse retired, only to return a minute later with the announcement:

"She says she doesn't want to undress."

"That's a lot of nonsense. You tell her if she wants to consult me, she'll have to undress."

Again the nurse disappeared. A few minutes later an attractive young woman, entirely undressed, entered the doctor's sanctum. "Well, young lady, what seems to be the trouble?" asked the doctor.

"Oh there's no trouble," she replied. "I just wanted to get your subscription to the Saturday Evening Post."

We know its the stork and not the eagle that brings the babies because the stork has the biggest bill.

Auntie: "Well, Junior, how does it feel to be nine years old?"

Junior: "I'm too old to cry and too young to swear."

Liza: "Waffo' yo' sharpenin' that razor, Rastus?"

Rastus: "Woman, they's a pair of gemmun's shoes undah yo' bed. If they ain't no niggah in dem shoes, Ah'm gonna shave."

In the last World War, a German came across a negro soldier in the trenches sharpening his razor. The German was armed with a rifle and bayonet while the negro had only the razor as a weapon. The negro suddenly rose and swung at the German's head with his razor.

"Ha, Ha," laughed the German, "You missed."

"Missed Huh," replied the negro. "Shake yo' head."

Customer: "Remember the can of sardines you sold me yesterday?"

Grocer: "Yes, Madam."

Customer: "Did you say they were 'imported' or 'deported' from Norway?"

A dumb girl is a dope. A dope is a drug. Doctors give dope to relieve pain. Therefore, a dumb girl is just what the doctor ordered.

A corset is like an ash cart because it goes around gathering up waists.

When you knock at the door and find the husband at home, then brother sell something.

A bathing suit is like a barbed wire fence because it protects the property without obstructing the view.

G-E Campus News

NAVY CLASSROOM

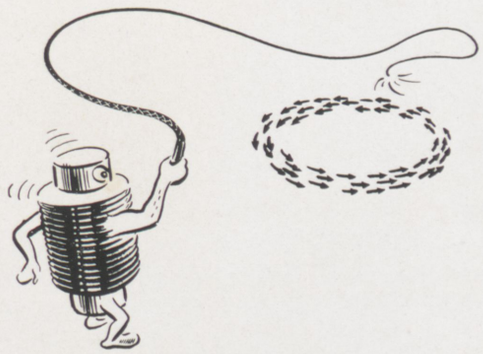
A U.S. submarine is essentially an electric-propelled vehicle, and an amazing amount of electric equipment is packed away in its steel hull. Responsibility for operation, maintenance, and repair of all this electric equipment is in the hands of two classes of petty officers—chief electrician's mates and electrician's mates first class.

For years General Electric has collaborated with the Navy in providing instruction for such men. They are shown how all kinds of equipment aboard their ships is built and assembled. Thus petty officers are better qualified both to care for electric propulsion and other apparatus in normal service and to repair it in case of emergency. This training has lately been accelerated. G-E plants are seldom without groups of these visiting Navy men, and in the past two years more than 50 petty officers have taken the "course."

100 TIMES TOO BRIGHT

IN the early days of electric lights, economical city fathers used to turn out the street lamps on nights when there was a full moon. For the best blackout techniques today, even moonlight is 100 times too bright. But although air-raid wardens can't do anything about the moon, for overcast nights General Electric's illuminating laboratory has developed a special street light which produces illumination about equal to starlight.

The fixture contains a 10-watt lamp, so concealed that the only light visible comes through a circular narrow piece of plastic around the side. A projecting black canopy screens the light from the eyes of aviators. The light output, equivalent to that from a single candle flame, seems at first sight to be practically zero. But after a little time eyes become adjusted, as they do in a movie theatre, and objects can be dimly seen 30 to 40 feet away. Specifications for the new lamp are based on the experience of the British in their blackouts.



ELECTRON WHIRLIGIG

WHETHER you call it a "rheotron" or "betatron" or by its longer name of "induction electron accelerator," a new science tool recently built by Dr. Donald W. Kerst in the G-E Research Laboratory is one of the world's most potent merry-go-rounds. On it, electrons ride to a speed closely approximating that of light — equivalent to that produced by 20 million volts. Copper bombarded by these dizzy, super-speed electrons becomes temporarily radioactive, and other interesting possibilities are being investigated.

Dr. Kerst, young professor at the University of Illinois, got the idea for the device, built a small model, and came to General Electric to build a bigger one. Like the much-publicized cyclotron, except that it accelerates electrons instead of positive ions, the device chases the charged particles round and round in a magnetic field, adding to their speed at every revolution. Scientists are reticent about predicting what the rheotron's chief use will be, but it is promising enough so that a bigger one is being built in the G-E laboratory for speeds of 100 million volts.

GENERAL ELECTRIC

953-37-211

JOAN BENNETT in her American Women's Voluntary Services uniform

★

Starring in Edw. Small's United Artists Production "Twin Beds"

His Cigarette and Mine

It's CHESTERFIELD

Yours too for a full share of *Mildness Better Taste* and *Cooler Smoking*...that's what you and all other cigarette smokers are looking for... and you get it in Chesterfield's Right Combination of the world's best cigarette tobaccos.

Make your next pack Chesterfields... regardless of price there is no better cigarette made today.

EVERYWHERE YOU GO

They Satisfy