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Rose Technic Staff

*Rose-Hulman Institute of Technology*

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# ROSE TECHNIC

*JANUARY, 1941*

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# ROSE POLYTECHNIC INSTITUTE

TERRE HAUTE, INDIANA

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# ROSE TECHNIC

VOLUME L

JANUARY 1941

NUMBER 4

CHARLES A. HOWLETT, *Editor*

RAYMOND C. HOGAN, *Associate Editor*

JOHN G. MEHAGAN, *Business Manager*

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### ENGINEERING COLLEGE MAGAZINES ASSOCIATED

*Professor H. C. Richardson, Chairman*

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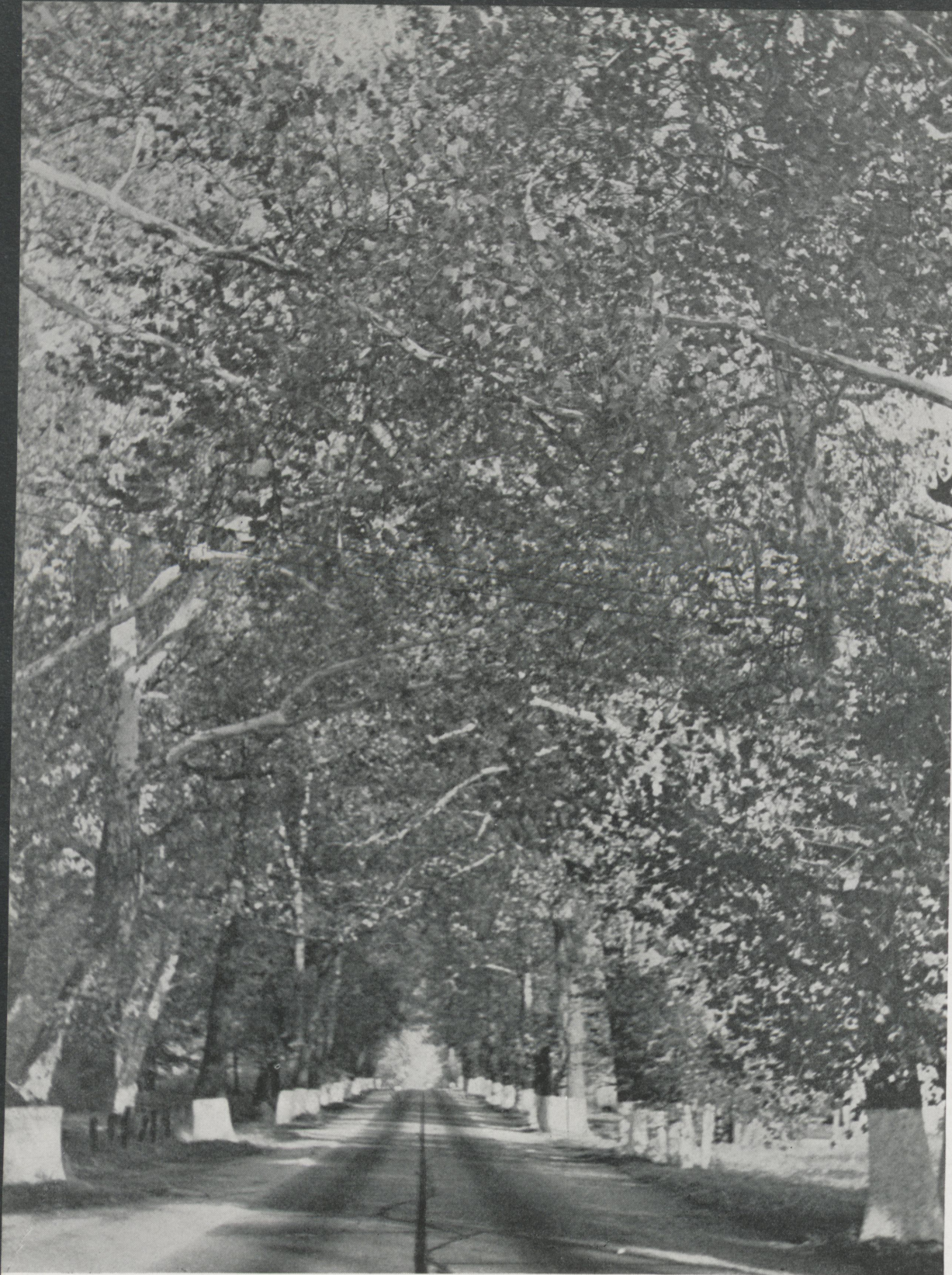
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*Photo by White*

## SHADY LANE

Mr. Howard L. White, of the Civil Engineering Department, again catches with his ever active camera a soothing study of trees and shadows. Unfortunate indeed is the fact that such scenic spots only too often must yield to the modern transportation routes. Shady Lane, located about twenty miles east of Terre Haute on U. S. 40, is soon to fall before the four-lane highway now under construction between Indianapolis and Terre Haute.



# TRANSPORTATION

IN depicting the evolution of transportation we portray man's development. Nothing has had any greater importance in the economic and social development of the human race. Every improvement in the means of transportation has brought about a marked advance in the intelligence and comfort of civilized people, but it has also presented many problems. In former times the development of transportation was exceedingly slow, each step requiring vast cycles of time. From ancient times up to the present the cycles of time required for each step have become shorter and shorter, until during the present century we have seen the very rapid development of both the automobile and aeroplane.

Transportation has been, and always will be, an ever-present problem of civilization both in its own development and in the things it affects. Speed, reliability, cost, and capacity of transportation facilities are its influencing factors. The origins of ancient forms of transportation are lost in the darkness of the prehistoric age, and we can only conjecture their occurrence. However, the ancients were, like ourselves, commercially inclined, and while their appliances were rude and their means of intercommunication and trade limited, their business methods and forms of transportation contained the germs of those now in use. For many centuries man probably had no other means of transportation than his own back. Gradually he sought methods that would relieve him of his burdens, and so has developed his present means of transportation. Probably the greatest step forward in the development of land transportation was the development of the wheel and axle. This resulted in the need for roads, but as its development was slow, the trails were gradually widened into usable roads, and no great problems were encountered. For ages man's fastest speed was the speed of the fastest team of horses. Then came the development of the gasoline engine, and with Duryea's automobile in 1892 the automobile became a great factor in transportation. In fifty years speeds jumped from an average of five miles an hour to sixty miles an hour, and all indications point to still higher speeds. With the increased speeds came many necessary rapid improvements in highways. As the speeds increased superhighways became obsolete within ten years. As the high accident rate indicates, either our highways are technically behind the automobile in advancement, or we are not giving the human factor in highway safety enough consideration. Also the gasoline engine made possible the practical use of the air. We can see the rapid development of heavier-than-air craft since the Wright brothers first successful flight in 1903 at Kitty Hawk. Perhaps the airplane will in the future terminate the growth of the automobile the way the automobile has affected the railroad's growth, the railroad the canal's growth, and the canal the horse-drawn freight wagon. New developments in transportation affect not only transportation itself, but also many seemingly non-related trends. Transportation has always been a determining factor in shaping the form or pattern of American cities. In the earliest stage the residential district had to be within easy walking distance of the business district which defined the city limits. Today with the motor car there is scarcely any city boundary. A study of the census shows that cities grew rapidly up to 1930, but the 1940 census discloses very little additional growth. There is a very decided trend toward decentralization. With this rural trend, the street system becomes of great importance in transporting people to and from their homes and businesses especially during the noon hour. With the larger volume of traffic each year and the greater distance from home to office this trend has caused a major problem.

With the increased rapidity of the development of transportation, many new problems are brought up which must be solved quickly by man, and because of their technical nature they fall largely on the shoulders of the engineering profession. With this rapid development it is exceedingly hard to predict just how far and how long an improvement in some engineering work will remain an improvement and fulfill its purpose. The tall buildings in New York City are an excellent example of a miscalculation. Instead of spreading up, the city spread out. Perhaps in the future there will be a demand for landing fields rather than highways, and our present trend toward superhighways will become a miscalculation. It is the task of the engineer to see the coming changes and build accordingly.

by James R. Brown, c.e., '42



# MANUFACTURED YARNS

by Leon L. O'Dell, ch.e., '42

NEW fields are being opened for the manufacture of various objects made of fabric material through the discovery of several new textile fibers. Among these are Nylon, Cellulose Acetate Rayons, Vinyon, Fiberglas, and Soybean Protein Fibers. The soybean product is still in the experimental stage while the others are being manufactured commercially under various trade names.

## Nylon

Nylon is rapidly becoming the best known of the group through its use in full-fashioned hosiery, although cellulose acetate rayons have been on the market for several years under the trade names of five companies. Nylon can be produced in fibers, bristles, sheets, and other forms.

The name nylon does not refer to any one product, but rather to a group of synthetic fiber-forming polymeric amides having a protein-like chemical structure. Although there is an infinite number of possible nylons having various physical properties, the yarn now being offered has the high melting point of 253° C. (487° F.) The other physical and chemical properties of the nylon now being produced are of great significance.

It is physiologically inert and has found a use as surgical sutures. Enzymes, mold, mildew, and moths have very slight effect on it. While it isn't so resistant to mineral acids, it has high resistance to attack by alkalis of rather high concentrations even at elevated temperatures. Common dry cleaning solvents have no effect on its fibers while they are readily dissolved by phenols and formic acid.

In a comparison made with other yarns having uses similar to those of nylon it was shown that nylon has the highest tenacity and elastic re-

Manufactured yarns, or to be more specific, synthetic fabrics have become increasingly important in the past few years. The research chemist has developed from such common substances as coal, water, air, the soybean, and glass excellent substitutes for previously imported fabrics.

Mr. O'Dell has attempted in this article to give a general summary of the methods of production, some of the present uses, and some of the characteristics of five of these fabrics.

coveries of those tested. The comparison also showed a lower water absorption at 60 percent relative humidity for the nylon yarn.

Since the main use of nylon at the present is in the manufacture of hosiery, something should be said as to the process used in their manufacture. Through the use of condensation reactions, the large molecules common to nylon are produced from low-molecular-weight polyamide units. After sufficient polymerization has occurred the nylon obtained is a tough, hornlike polymer. This polymer while molten is extruded into a ribbon which is ground to granular form. It is a stable crystalline solid which has a sharp melting point and may be stored indefinitely. After melting it is placed in a spinnerette and resolidified into filaments of crystalline and not amorphous structure. Through the application of a small force, the length of the filaments can be increased four fold with an accompanying orientation within the filaments. This orientation causes the change in physical properties observed. This drawn yarn is now ready for use in stockings and is strong, elastic, and tough.

The knitting is done on two machines, one to knit the leg and the other to knit the foot to the leg. After leaving the knitting machine, the stocking is flat, unformed, and ready to be stitched down the back to the toe.

At this point the manufacture differs from that of regular silk stockings. In the latter the stockings are dyed and then shaped while with nylon the stockings must be given a permanent set by placing on a boarding form under 5 pounds gage pressure for 5 minutes before dyeing. This permanent set given nylon under steam pressure is analogous to the pressing of wool material through a damp cloth. Although the set obtained in wool is easily removed by dampness, that in nylon is removed only by more drastic conditions, namely higher heat and humidity.

## Cellulose Acetate Rayon

Undoubtedly the oldest of the materials to be discussed is cellulose acetate rayon. This industry began nearly twenty years ago and during the past ten years has expanded rapidly until at present 30 per cent of all domestic rayon is of the acetate variety. It is used for women's, men's, and children's clothing, household draperies and upholstery, and automobile upholstery. It is especially adapted to these uses since it produces a dull-luster fabric when blended and can be made to resemble light woollens or worsteds, the latter being highly crease-resistant and having stability against shrinking and stretching.

The acetate filaments and fibers are produced by forcing a filtered and blended solution of cellulose acetate flakes in acetone downward through small holes into a drying chamber in which warm air evaporates the acetone leaving the cellulose acetate in a continuous filament. These filaments pass through holes in the bottom of the drying chamber and are wound on a bobbin or spool. This yarn is chemically a finished product but before using in weaving or knitting, it must be twisted, lubri-



cated to prevent breakage in knitting, and wound on proper type of shipping package.

The physical properties of the yarn can be closely controlled during this stage by regulating the size of filament obtained through regulation of extrusion speed and by selection of proper draft, temperature, and humidity of the drying chamber.

Cellulose acetate yarns as produced are so nearly colorless that no bleaching is necessary. Since these fabrics have a low moisture absorption and low affinity to common dyes, new dyes and new methods of application of older dyes had to be devised. The dyes found to be most successful belonged to two chemical groups: the azo group, usually used for yellows, oranges, and reds, and the amioanthraquinones which are used for greens, blues, and violets. These dyes are not as permanent as the vat dyes used on cottons and viscose rayons but are more resistant to fading than the commercial dyes usually used on these fabrics.

A new method of application has been devised by which acid dyes can be used on cellulose acetate rayons. These dyes have slight affinity to acetate rayons when applied in ordinary manner from a water bath but when applied from an alcohol and water bath can be used very successfully. The alcohol swells the rayon fibers and permits a rapid penetra-

tion of the dyes in the cold. The fibers are dried and then washed with soap to remove the surface dye. This drying permits the fibers to shrink to their original size. The colors obtained from this method are bright, boil-fast, and fast to light.

### *Vinyon*

Vinyon is made by the copolymerization of vinyl acetate and vinyl chloride. In the reaction involved the acetate seems to plasticize the vinyl chloride internally. Vinyon has not as yet been produced in large quantities except for use in fishnets. It was found that these nets not only caught more fish than ordinary tar-impregnated nets, but that they were still in excellent condition when the other nets showed either partial or complete disintegration.

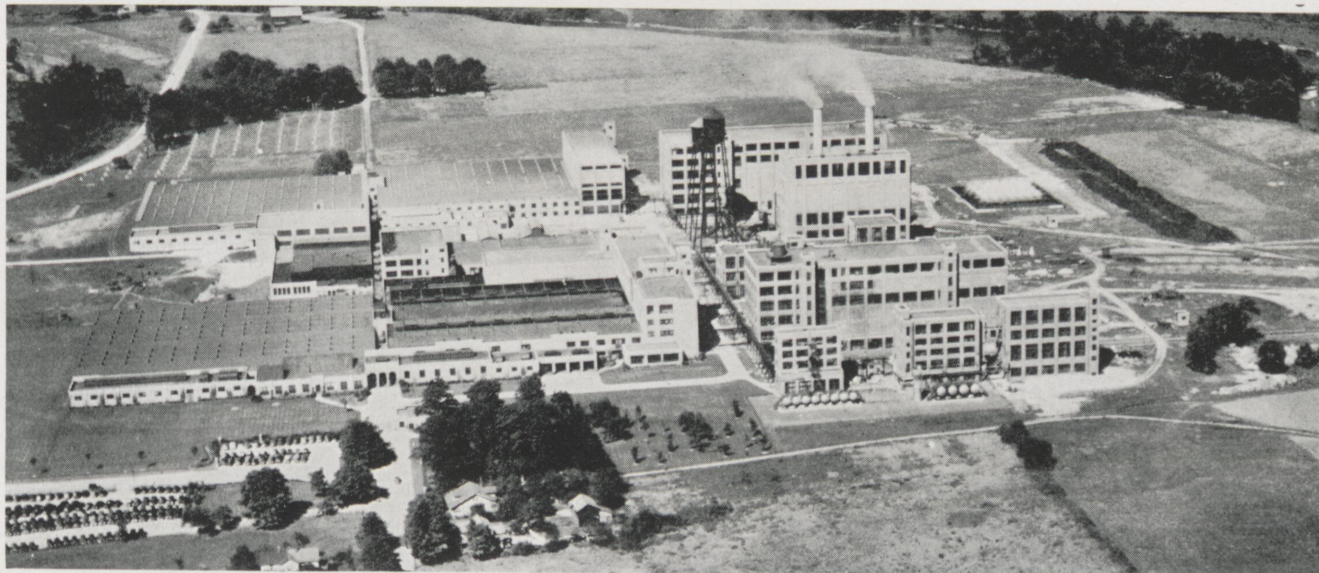
Fibers made from vinyon are unaffected by 70 per cent nitric acid, aqua regia, hydrochloric and hydrofluoric acids at maximum concentrations, 30 per cent sodium hydroxide, 28 per cent ammonium hydroxide, and even copper ammonia solution which dissolves cellulose very effectively. It is soluble in ketones, ethers, and aromatic hydrocarbons (benzene), but is insoluble in alcohols, glycols, or aliphatic hydrocarbons (gasoline, mineral oils).

It not only has remarkable chemical properties but also has some important physical properties. When

exposed to a flame, it first melts and then chars but does not burn. Bacteria, mold, mildew, or any other fungi will not grow on its surface.

Vinyon is produced by the same methods used for cellulose acetate rayons but the yarn must be stretched several hundred per cent after forming in order to obtain maximum strength. This stretching is sometimes modified in order to obtain a weaker but much softer product. After stretching the filaments must be heated to about 90° to 100° C. while under tension in order to fix the fiber. Following this treatment the yarn is stable against shrinkage unless the temperature is raised above 65° C. (149° F.)

As with the acetate rayons it cannot be dyed by ordinary methods, but by using certain assistants such as o-hydroxydiphenyl in small amounts the dyes already described for use with acetate rayons can be used. The ordinary yarn is bright, but as with the cellulose acetate it may be dulled or may be dyed by placing the proper pigments in the spinning solution. The method of dyeing produces a fast color, but due to seasonal changes in preference to colors desired by the public black is the only yarn commonly dyed in this manner. This method produces better dyeing than the method described earlier but necessitates larger stocks in order to provide all colors than



Vinyon, an acetate rayon, is produced in this plant of the "American Viscose Corporation at Meadville, Pennsylvania.

*Cut Courtesy Industrial Engineering Chemistry*



when the fabrics are dyed after weaving.

## Fiberglas

Probably the most inactive of the fibers is fiberglas. While the greatly increased surface area of the fibers gives way to greater activity than with sheet glass, the fibers are still very inactive to most reagents.

Fiberglas is produced in two forms—a wool form and a textile fiber form. The wool form is made in fine fibers for use as thermal insulation and in a coarser variety for air filtration in air-conditioning units. The textile fibers are also made in two types—continuous filaments and staple lengths—both of which are made into yarn and woven into fabrics.

Carefully manufactured virgin glass is used as the first step in the production of fiberglas. This glass is made according to a precision formula with the protective control from automatic recording scales. Each batch must be compounded by melting at a closely guarded temperature carefully selected raw materials.

In the manufacture of continuous filaments the glass is melted, and a large number of filaments (usually over 100) are drawn simultaneously at the rate of about a mile-a-minute and wound on a bobbin. The filaments are lubricated with a mixture of vegetable oil and starch to prevent scratching and subsequent breakage. The lubricant is later removed either by washing with soap and hot water or by heating in an oven at 600°-700° F.

The staple fibers, those having a length of 8 to 15 inches, are made by electrically melting the glass balls and allowing the molten glass to run from orifices in the bottom of the furnace. These streams of glass are torn and drawn into smooth

even fibers by high pressure jets of steam and air. The staple fibers are collected as a web on a traveling belt from which they are removed without twisting.

These fibers are lubricated with mineral oil to improve processing characteristics and to reduce friction between fibers. This type of lubricant can be removed by washing in hot water and soap or by using carbon tetrachloride or ether.

The fibers are treated in the same manner as worsted yarns by being drawn into slivers and yarns of various counts. Continuous filaments are twisted into yarns or threads.

The most important feature of fiberglas is that it maintains nearly all of the properties of other forms of glass. It can be used as thermal or electrical insulation at temperatures varying from 0° to 1000° F. Some fibers produced have a tensile strength of 2,000,000 pounds per square inch while fibers the size of continuous filaments have a tensile strength of 400,000 to 500,000 pounds

per square inch. This type of fiber is completely fireproof but when heated to a high point will melt. Cigarettes may burn themselves out on fiberglas materials without any effect except to leave a stain that can be removed by washing.

Since it is fireproof, the material woven from fiberglas is especially adapted for decorative application. It has been used to produce overdrapes, glass curtains, shower curtains, bedspreads, tablecloths, lamp shades, and awnings. It has found application in homes, offices, hotels, restaurants, clubs, Pullman cars, ocean liners, and airliners.

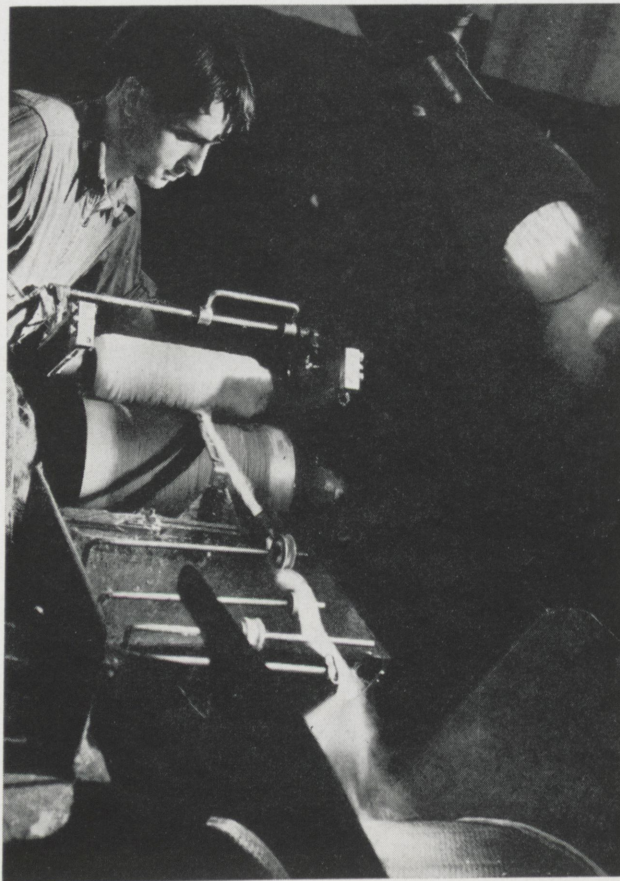
Industrially fiberglas is used widely as electrical insulation in the form of tapes, yarns, and fabrics. It has high dielectric strength, electrical insulation resistance, and low moisture absorption. An important use is as retainer mats for batteries. These mats greatly increase the life of batteries by keeping all active material in place on the battery plates.

Fiberglas fabrics are being used as anode bags in electroplating processes and as filters where either the chemical action is too great for ordinary filters or where the temperature is too high. Not only is it used widely as filters in air conditioning units but also as thermal insulation wherever heat is conserved, controlled, or excluded.

This fabric could become an item in the national defense program if it were used in airplanes where its great strength and light weight are desirable or if it were used in sandbags which could be stored without any deterioration.

## Soybean Protein Fibers

The soybean protein fibers are a synthetic product that as yet is still in the experimental stage. A large automobile manufacturer has done



*Cut Courtesy Industrial Engineering Chemistry*  
Staple fibers are formed by high pressure steam or air jets and drawn into long, smooth fibers.



much research with soybeans to find its uses in industry. One of the possible uses is as a blending yarn for use in wool, cotton, and rayon fabrics to improve their qualities and appearance.

The soybeans used must be of uniform protein content to provide uniformity in the product. This has been obtained by using pure strains of soybeans in carefully fertilized fields and storing the beans in special metal containers.

The oil is extracted from the soybeans by the continuous solvent extraction process in which the beans are washed with hexane to remove the oil. The oil-free meal is dried to remove the solvent by passing through a steam-jacketed pipe. The protein is then removed from the

oil-free meal by washing with a weakly alkaline solution (0.1 per cent sodium sulfite solution) for a half hour. This solution must be clarified by filtering or centrifuging. The protein in solution is precipitated by adding acid. The curd is removed, washed, and dried. The process is carried on in stainless steel or glass apparatus to prevent decolorization through iron contamination.

Spinning is accomplished by dissolving the protein to produce a viscous high solid content solution. Protein solutions containing over 12 per cent of solid tend to gel, but by careful control this may be increased to 20 per cent for spinning.

The actual spinning is done by forcing the solution through spinner-

ette into an acid precipitating bath from which the filaments are collected on a bobbin. This bath usually contains sulfuric acid, formaldehyde, and a salt such as sodium chloride or aluminum sulfate to aid dehydration of the filaments.

The filaments must be stretched between "Godet wheels" at this time to produce good elasticity and high yield points. "Godet wheels" consist of two glass wheels rotating at different speeds to exert a stretching force on the filaments.

The resulting filaments can be changed into a loose, fluffy, woollike material by immersing them in a formaldehyde bath to set the fibers, cutting into staple lengths, and drying these staple lengths with controlled humidity and temperature.

## SQUEAKS FROM THE SCRIBES

Yes, we have a basketball team this year; a good one, too. They are good boys; have lots of pep, but they have been taking a beating both literally and figuratively. There are several reasons why we are not going to play either Northwestern or Michigan this week end—of course they are slightly out of our class—even though the prep school in down town Terre Haute thinks the big ten is not out of theirs. But the big reason that we are not playing them is because with the close of the football season the student body decided to close school spirit—at least toward athletics.

Of course there is a reason behind that too. We just don't play home games—and even the most diligent engineer is not going to drive a hundred miles to see a game—if he isn't pepped up first by a couple home games. There goes that chain of reasons again. Home games—why does our schedule seem so void of them? Could it be that the gym is over the Chem. engineering department and the visitors do not like the "smell"? No, I hardly think so—nor is it the dressing room facilities, for we do get teams to play in Lost Creek Stadium. The reason that it is difficult to schedule home

games is the gym floor. It resembles the Atlantic. They tell the story of the year that there was a small fire in the gym—one of the seniors got out the hose, splashed water over the floor, and became desperately sea sick. It seems that the sub-floor and the playing floor were laid in the same direction with a very uneven floor resulting when natural shrinkage of the wood took place.

Let's play big ten ball. Let's acquire some school spirit. Let's play home games. LET'S GET A NEW GYM FLOOR . . . !

—J. E. B.

# 50th Anniversary of Technic

## WILL BE FEATURED IN THE MAY ISSUE

Suggestions or Contributions Will be Appreciated from

Students and Alumni



# FUEL INJECTION

edited by Alan W. Ker, m.e., '43

THE internal combustion engine obtains its power from the expansion of burning gases. In the gasoline automobile engine that gas is a mixture of air and gasoline which forms a combustible vapor. There are two methods of mixing at the present time: the carburetion system and the fuel injection system. The carburetion system has been used almost entirely on gasoline engines, for it has been only in recent times that the gasoline fuel injection system has had any commercial or military value. Its use has been centered upon military aviation engines of the German Air Force. The fuel injection system affords more power, faster acceleration, more safety from fire, and less danger of failure from icing than the carburetion system.

The principle of operation of the fuel injection system differs from that of carburetion. The carburetor is a device for the purpose of mixing air and gasoline using the suction caused by inrushing air. The venturi (narrowing of the intake tube) of the carburetor increases *the velocity of the inrushing air as it passes a nozzle* so that a better mixture may be obtained. This venturi at the same time restricts the flow of air into the cylinders of an engine which reduces its volumetric efficiency. The fuel injection-valve is basically a nozzle for spraying raw gasoline into the incoming air so that a mixture is obtained. The gasoline is compressed to between 200 and 3,000 pounds per square inch by individual pump plungers for each cylinder that are driven and timed by the engine. These plungers meter the gasoline as they supply it to the injection-valves by an adjustment on the length of the plunger stroke.

There are two types of fuel injection systems which differ mainly in the location of the injection-valve.

Fuel injection systems for gasoline motors have been under consideration for some time, but certain inherent disadvantages have kept them from production. Mr. Ker discusses the relative merits of the fuel injection system in comparison with the carburetion system, and points out that, with the German Air Force proving the practicability of the system, fuel injection may yet take its place in our engines.

The manifold injection system has the nozzle located in the manifold, pointed against the flow of inrushing air. This type nozzle has only a single jet and requires about 200 pounds per square inch pressure from the fuel pump to spray gasoline into the manifold. The cylinder injection system has its nozzles located in the cylinder heads of the engine. The nozzles for this type have jets which either spray several fine streams or one fan-shaped stream that thoroughly mixes the gasoline with the air. The cylinder injection-valves require a pump pressure of between 1,000 and 3,000 pounds per square inch in order to spray the fuel.

The commercial and military use of the fuel injection system has been very limited; the German Air Force, however, is now using a cylinder fuel injection system on a few of its engines. During the present war the Germans have proved their fuel injection system to be practical. United States manufacturers have placed fuel injection valves and pumps on the market, but as yet there are no large engines equipped with the fuel injection system in extensive use.

The cost of the fuel injection system is higher than that of the carburetion. An engine using the carburetion system requires only one or two carburetors to mix the gasoline and air that is piped through the manifold to every cylinder. A carburetor is a relatively simple device for mixing the fuel and does not contain many parts that require accurate machine work or close control of adjustment. An engine using the

fuel injection system, however, requires a fuel injection-valve for each cylinder, and each injector requires a pump piston to supply gasoline to it at a pressure. An injector fastened either in the cylinder or manifold must withstand the pressure built up by the fuel pump, while an injector mounted in the cylinder must also withstand the temperatures and pressures caused by combustion. These requirements necessitate close machining and careful design in order to prevent seizing of the check valve or leaking around the joints of the injection-valve.

The injection fuel pump also presents difficulties in its manufacture and operation. A plunger type pump using pistons to compress the gasoline requires close machining and lapping to prevent piston blow-by that would otherwise allow gasoline to dilute the oil of the pump bearings. The quantity of gasoline supplied by this type pump is readily controlled by a rotation of the pump pistons which have obliquely cut off heads. As the pistons rise, a rotation determines the time when they cut off the intake port and thereby determines the amount of gasoline compressed. A diaphragm pump has also been used which eliminates manufacturing difficulties, but its gasoline output is very hard to control because of its short compression stroke.

The performance difference between a gasoline engine using the different types of gasoline and air mixing systems is very little. In recent tests made at Langley Memorial Aeronautical Laboratory, the only difference between the power output of a test engine was found to be in proportion to the volumetric efficiency of the engine. Since the cylinder fuel injection system afforded the least resistance to the in-flowing air, it allowed the greatest



volumetric efficiency and greatest power output. The manifold injection system was next in efficiency, and the carburetion system was lowest because of the resistance to in-flowing air offered by the carburetor venturi.

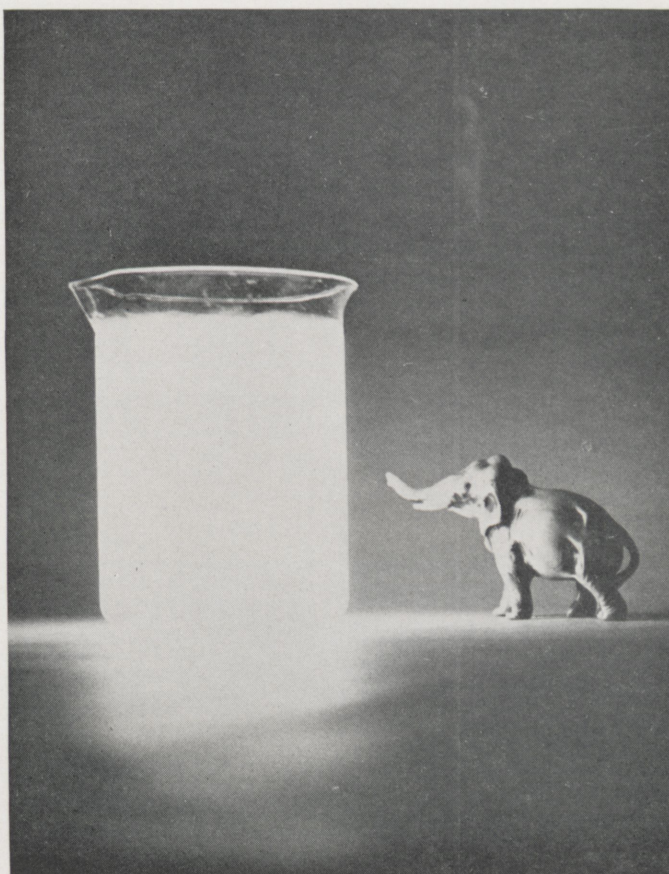
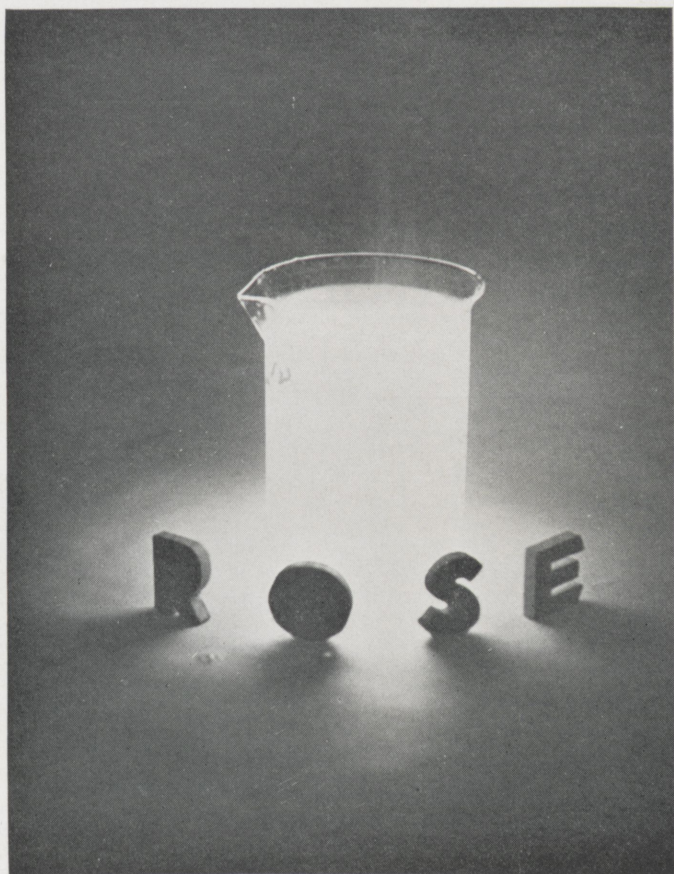
The injection systems afford faster starting and more rapid acceleration than the carburetion systems because they permit a better distribution of the fuel to the cylinders. The fuel injection systems lower the danger

of fire by their adaptability to low volatile, safety fuels; they also eliminate the possibility of carburetor icing which has caused many engine failures in airplanes. The recent tests at Langley Memorial Aeronautical Laboratory, however, showed that a carburetor permitted smoother running at slow speeds with the lean mixtures normally used by an automobile engine.

It is improbable that the fuel injection system in its present state of

development will replace the carburetor on the gasoline automobile engine. The advantages of increased power, rapid acceleration, easy starting, and safety of the fuel injection system do not outweigh the cheaper initial cost and cheaper maintenance of the carburetion method for mixing fuel. After the gasoline fuel injection valve and pump have been placed in production, however, their cost may be low enough to warrant their use on automobiles.

## SOMETHING NEW IN LIGHT - - -



*Photo by Leedy*

## - - - WITH 3-AMINOPHTHALHYDRAZIDE

Striking both in appearance and fact, the two above pictures are taken entirely without external light. The cold, pale, yet rather beautiful, blue light was produced through the oxidation of 3-aminophthalhydrazide with potassium ferricyanide, dilute solutions of each having been poured into the beakers. The camera shutter was kept open throughout the fifteen seconds of the reaction.

3-aminophthalhydrazide is an organic compound manufactured only for the use in producing this chemical luminescence. The pictures were taken by William G. Leedy, ch.e., '42, following some experimentation with the chemical light.

DATA: Camera—Zeis Super Ikomat; Film—Superpan Press; Exposure—f 3.5 (15 seconds); Distance—5 feet.



# MODERN ENGINEERS

edited by John E. Bartmess, m.e., '41

## *Mr. Charles L. McCuen*

Charles L. McCuen, vice president of the General Motors Corporation in charge of engineering, was born at Stockton, California, on May 22, 1892. He obtained his early education in San Francisco and was graduated from the Polytechnic College of Engineering at Oakland, California in 1911. In 1934 this college conferred an honorary degree upon Mr. McCuen.

He began his business career in the automobile business with the Cole California Motor Company as vice president. The lifetime production of this firm, according to Mr. McCuen, "was about fifty motorcars—before it folded up." After this brief experience he became engaged in structural engineering, working on some of the most important building projects in California at the time. He concluded his structural engineering work in California for the Panama-Pacific Exposition in San Francisco in 1915.

Mr. McCuen then returned to the automobile field, this time as a member of the engineering staff of the Packard Motor Car Company in Detroit. He was with the company when they developed the famed Liberty airplane engine for World War I, and he remained with Packard until 1919. At this time he was made vice president of the Isco Refrigerator Company in Detroit. In 1922 he became an experimental engineer for the Rickenbacker Motor Company and in September, 1926 joined the engineering staff of the Olds Motor

In this the fourth edition of MODERN ENGINEERS the contributing editor, having in past issues reviewed men of the fields of Electrical, Civil, and Chemical engineering, presents two men from the field of Mechanical engineering. Both men are engineers in companies which manufacture a large part of the motive power for land transportation in the United States and abroad, and both men hold high positions in their respective companies. These two men are Mr. Ralph P. Johnson, chief engineer of the Baldwin Locomotive Works, and Mr. C. L. McCuen, vice president in charge of engineering of the General Motors Corporation.

The TECHNIC wishes to thank both the Baldwin Locomotive Works and the General Motors Corporation for the information used in this article.

Works at Lansing, Michigan. He designed the F Series six-cylinder and the L Series eight-cylinder Oldsmobile engines. He rose to be chief engineer of Olds and director of engineering, and in May, 1932, was made technical assistant to the general manager of the Olds and Buick

Divisions. In October, 1933, he became the general manager of the Olds Motor Works. In August, 1940, he was made vice president of the General Motor Corporation in charge of engineering, the position he now holds.

Mr. McCuen is a member of the Lansing Country Club, the Detroit Golf Club, and the Detroit Athletic Club. He married Adele Chamberlain in 1916. They have four children, Marshall, Newell, Eleanor, and Charles. The McCuen residence is in Lansing, Michigan.

## *Mr. Ralph P. Johnson*

Ralph P. Johnson, chief engineer of the Baldwin Locomotive Works, was born in St. Paul, Minnesota. He received his early education in the public schools of Oak Park, Illinois and then served an apprenticeship in the shops of the Baldwin Locomotive Works. He managed four years at Cornell University and was graduated in 1921 with the degree of Mechanical Engineer.

In 1915, the Baldwin Locomotive Works and other interests formed the Remington Arms Company of Delaware and erected a large plant at Eddystone, Pennsylvania. This company was formed for the purpose of producing rifles for the British Government for World War I. The plant eventually reached a production average of 7000 rifles per day. After his apprenticeship Mr. Johnson was appointed engineer of tests and metallurgical engineer for the Remington Arms Company. His duties in part necessitated the de-



MR. CHARLES L. McCUEN,  
presented by the Technic as a "Modern Engineer".



velopment of material specifications and heat-treating methods for the rifles.

When the United States entered World War I, the company was, of course, taken over by the United States Government to manufacture rifles for the army. Mr. Johnson, prior to this time, had taken examinations for the volunteer officers reserve corps, and he held a reserve commission as second lieutenant in the Cavalry. At this time, therefore, Mr. Johnson was called to active service and was transferred to the Ordnance Department with the rank of major. From June, 1917, to September, 1918, Mr. Johnson was stationed in Washington D. C. in charge of metallurgy in the small-arms division of the Ordnance Department. Fulfilling this position, he coordinated the practices of the various companies manufacturing rifles, pistols, and machine guns. In the year 1918 he was sent to England and France as a member of a commission to study foreign practices in the manufacture of small arms and to report on the field service of American equipment. He returned to the United States in January 1919 and shortly thereafter was discharged from active service.

Mr. Johnson returned to the Baldwin Locomotive Works as assistant to the consulting vice president. Here he worked on various locomotive problems. In 1927 he was loaned to the South African Railways for a period of several months as an advisor and instructor in locomotive testing procedure. In 1928 Mr. Johnson spent several months in South America acting in the same capacity.

Upon his return from South America Mr. Johnson was appointed to the position of chief service engineer for the Baldwin Works; his duties were handling all customer complaints, shipments, and testing. In 1938 Mr. Johnson was appointed assistant to the general sales manager, and in 1939 he became chief engineer in charge of locomotive design—both steam and diesel-electric.

# THE ROSE TECHNIC



Member Engineering College Magazines Associated

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## Faculty Advisers

JOHN L. BLOXSOME

HENRY C. GRAY

## Fraternally Yours

In the first issue of the Rose Technic, published in June, 1891, there appeared an editorial violently opposing the influence of the Greek letter fraternities. The hope was expressed that the time be far distant when the Greek fraternity should draw the line of demarcation between the "barbarian" and the "gentleman and scholar" at Rose.

Fortunately, however, there were those who were more far-sighted, and the first chapter of a national Greek letter fraternity was established at Rose just two years later, in 1893. Another followed in 1895, and today at Rose we have chapters of four national fraternities.

Today one could hardly deny the fraternity its place in the American college. In the creation of a congenial group with which to live and work, the fraternity has no equal. The fraternities in general encourage extra activities as an aid toward broadening the student's education. Ability for leadership is encouraged and developed. That scholarship often benefits is shown by the fact

that the fraternity men's average for years has been well above the all-student average.

Nationally, the fraternity provides contacts with the other colleges and universities, and enables a broader perspective of college living. It also gives the student contact with men in business, contests of importance.

The main disadvantage of the fraternity system is that of expense. Fortunately, at Rose the cost is at a minimum. Initiation on the average is less than at any other college in the state having national fraternities.

Because of the delayed rush system at Rose, fraternities are not permitted to "talk shop" with any member of the student body until he has attended the Institute for one semester. Thus, you who are freshmen, should be hearing for the first time the merits of the individual fraternities at Rose. You should be weighing their disadvantages, but we who have lived with them for three years would like to point out that they are organizations of picked friends striving to better college living. They are organizations truly worthwhile.

—C. A. H.



# PLAN FOR SELECTION OF THE STAFF OF THE ROSE TECHNIC

*Section 1.* The staff of the Rose Technic shall be composed of students of the Rose Polytechnic Institute.

*Section 2.* This plan shall be presented to the student body of the Rose Polytechnic Institute at a required assembly on the second Thursday following the resumption of school after the Christmas vacation.

*Section 3.* All students who are desirous of seeking a position on the staff of the Rose Technic shall make that fact known in a letter of intention addressed to the Editor and Business Manager of the Rose Technic. This letter of intention shall be in response to a notice posted on the bulletin board of the Rose Polytechnic Institute by the Editor and Business Manager of the Rose Technic on the first Monday following the second Thursday after the resumption of school after the Christmas vacation.

*Section 4.* The purpose of the letter of intention shall be to state the branch of magazine work in which the student is interested and to signify his intention of trying out for a position on the staff of the Rose Technic.

*Section 5.* The Editor of the Rose Technic shall make a list of all students signifying an interest in editorial work. The Business Manager of the Rose Technic shall likewise make a list of all students signifying an interest in business work. The above-mentioned lists shall be made on large sheets of drawing paper and posted on the wall in the office of the Rose Technic. A complete list of all students turning in letters of intention shall be posted on the bulletin board of the Rose Polytechnic Institute by the Editor and Business Manager of the Rose Technic.

*Section 6.* Both Faculty Advisers

During the school year of 1936-37 the entire system of selecting staff members was revised. This system was worked out as the fairest possible method for making these selections, and it has, since adoption, proved quite successful.

A new high in interest in staff positions has been apparent in the past few years, with the result that several new staff positions have been created. The student council last year approved a group of feature article writers, and this year has provided for another staff photographer.

Any student interested in the publication of the magazine is urged to apply for the try-out period. Honor points (See your Student Handbook) are awarded for staff work.

of the Rose Technic shall be empowered to give assignments to the students who have turned in letters of intention. These assignments shall be in connection with the type of magazine work in which the student has stated his interest.

*Section 7.* The assignment and date of assignment for each student shall be entered after his name on the office list by either the Editor or Business Manager of the Rose Technic.

*Section 8.* The number of assignments shall be unlimited but shall be distributed equally among the students on test so that each student has at least one assignment in connection with each department on either the editorial or business side of the staff.

*Section 9.* The Editor and Business Manager of the Rose Technic shall post a notice on the bulletin board of the Rose Polytechnic Institute during the week following March 25 asking for applications for positions on the staff of the Rose Technic.

*Section 10.* Only students who have served on the staff of the Rose Technic during the previous school year and those who have completed the test period of the present year shall be qualified to make application.

*Section 11.* All letters of applica-

tion shall be written to the Editor and Business Manager of the Rose Technic stating: the staff position of first choice, the staff position of second choice, and the staff position of third choice; previous experience; cumulative scholarship rating; and other student activities.

*Section 12.* Actual selections for positions on the staff of the Rose Technic shall be made by the Faculty Advisers, the Editor, and the Business Manager of the Rose Technic. Selections shall be made by the unanimous agreement of the four above-mentioned parties. Recommendations as to English qualifications of applicants shall be obtained from the English department of the Rose Polytechnic Institute.

*Section 13.* Selections of members of the staff of the Rose Technic shall be posted on the bulletin board of the Rose Polytechnic Institute within the week following April 10.

*Section 14.* All letters of intention, all letters of application, and all material submitted by students during the test period shall be filed with the Faculty Advisor of the Rose Technic.

*Section 15.* No position on the staff of the Rose Technic shall be filled during the school year except by a student who has completed the test period of the previous school year. Actual selections shall be made as in Section 12.

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## *From The Files*

What one would expect to find in a well-trained intelligence is not primarily a set of remembered formulas, but a kind of intellectual sensitiveness, an ability to use one's eyes when a situation is presented, to use one's ears when it is described, to use one's mind when its nature or its interests are to be considered, to act sensibly when action is needed.



# RESEARCH AND DEVELOPMENT

edited by Alan W. Ker, m.e., '43

## *"Pygmy" Trucks for the Army*

Several automotive plants in the United States have started to manufacture for the Army a fleet of pygmy trucks known as "command-reconnaissance 4-4's." The American Bantam Car Company has delivered seventy of these combat cars on an initial order for 1500, and The Ford Motor Company expects to begin manufacture of 1500 in January 1941.

The pygmy trucks weigh approximately one ton and are to be used to do the same work performed by the motorcycles and sidecars in the Nazi Panzer divisions. If they are successful, the Army plans to order more so as to have a fleet of thirty thousand. Their light-weight permits two or three to be transported in a bombing plane, making a very mobile unit. They have a top speed of sixty miles per hour and are four-wheel drive to afford good traction over rugged terrain. The four-wheel drive may be disconnected from the front wheels when the extra traction is not needed. The trucks were designed to carry three men and a machine gun, but they can be used in hauling light field pieces or for quick transport of troops.

The Bantam trucks are equipped with forty horsepower, four-cylinder engines made by the Continental

Motors Corp. The Ford trucks utilize an adaptation of the forty-two horsepower, four cylinder, Ford tractor engine. The Ford vehicles have an eighty-one inch wheel-base and stand thirty-eight inches high at the cowl. They are equipped with 5.50 by 16 tires with heavy snow and mud tread. They also have blackout lamps, front and rear, in addition to the regular lighting equipment, a brush guard to protect the front of the car, a windshield that folds flat, and a folding top.

In tests at Camp Holabird, Maryland, these trucks were capable of carrying a quarter of a ton cargo over very rough terrain and were able to climb seventy-six percent grades.

## *Motor Driven Power Control*

One of the most recent improvements added to public trolley cars is a motor-actuated power control. The General Electric Company developed this control to insure smooth stopping and starting no matter how a car operator may manipulate the pedals.

The operation is controlled by a commutator which cuts resistance in and out of the main motor circuit in a large number of steps without arcing. Acceleration is made through 136 control steps and braking through 272 control steps. The me-

chanical parts of the control have been greatly simplified. A simple straight-series type of pilot motor and control is used for driving and controlling the brush arm of the commutator. A current-limit relay is used to control the pilot motor during acceleration, braking, and coasting.

This control will eliminate the excess stresses placed on the motor and axles by jerky starts and stops and will also improve the riding qualities of electrically operated, public conveyances.

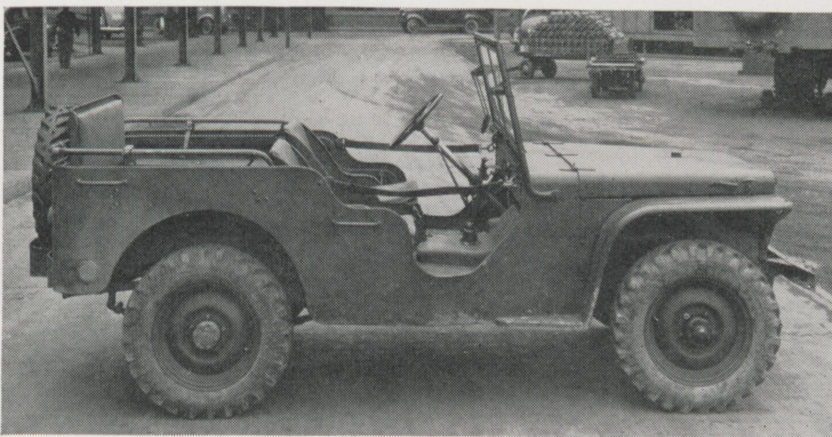
## *Electric Pistol for Spraying Metals*

A recent innovation in the field of metal spraying is the electric pistol. It uses compressed air and direct current electricity for melting and finely dividing the metal.

The principle of the gun is centered about the high temperature produced by an electric arc. The two current-carrying wires are short-circuited in the pistol forming a high temperature arc (4,000° C and over). The metal in contact with the arc immediately melts and forms drops which are divided and sprayed by compressed air at eight to ten atmospheres pressure. The fact that the metal melts by drops and short circuits the arc causes uniform spray spots on the material being sprayed. These spray spots occur in such rapid succession that an even coat is applied.

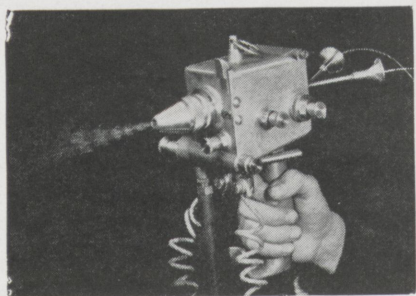
The high temperature of the arc gives the metal a much higher temperature than that of metal sprayed from a compressed gas gun. If glass plate is metalized with aluminum, the metal particles have sufficient heat to melt into the glass and form a surface that is inseparable under ordinary conditions.

One square meter of sheet iron may be sprayed with zinc in two



*Cut Courtesy Automotive Industries*  
The Army has placed orders for 3000 of these "pygmy" trucks. They are designed for warfare similar to that of the Nazi Panzer divisions.





**ELECTRIC PISTOL** to be used for fusing metals minutes operation time with a current of 180 amperes at 50 volts D. C. The electric gun during operation emits powerful ultra-violet rays which require the operator to work with dark goggles; however, it is very useful in spraying tungsten, molybdenum, and chromium metals, which are difficult to fuse.

### *New Japanese Automobiles*

The Toyota Automobile Company of Japan has introduced two new models, this being the first change in design since the outbreak of Sino-Japanese hostilities three years ago. The present European war has caused Germany, France, Italy, and, in some degree, Great Britain to be unable to supply the demand for automobiles in southeastern Asia. This condition has aroused Japanese export ambitions and caused the Toyota Automobile Company to produce a small export model as one of its two new designs.

The Toyota small model has a 98.5 inch wheelbase in only the phaeton body style. It has a seating capacity of five and greatly resembles the popularized English Ford, Fiat, and Citroen. The Toyota car is powered by a four-cylinder, valve-in-head engine of forty-eight horsepower at 2600 revolutions per minute. The car features a three speed, synchromesh transmission and four-wheel hydraulic brakes. It is equipped with a Carter downdraft carburetor, Delco-Remy ignition and generator, and a Bendix starting motor all built by Toyota under license.

The larger Toyota model adheres more closely to recent American design rather than European design. It is being built chiefly for home use

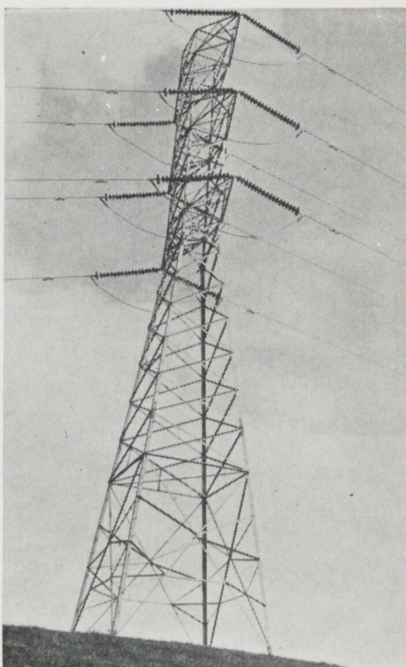
and is not in competition with foreign models. Both new models have been named "Shin Nippon" or "New Japan".

### *High Voltage Transmission Lines*

The construction of the three Boulder Dam-Los Angeles transmission lines marked a new record in high voltage transmission. These lines carry power at 287,500 volts over the desert and mountains of Nevada and California for the longest transmission distance in the world.

There are 1426 steel towers in all with a total weight of 16,300 tons. They were erected by several different methods, the methods depending upon the type of tower and condition of the ground at its location. A conventional floating gin pole was used for special towers and towers located in rough country. In level country the standard ninety and one hundred foot towers were erected by a long-boom crawler crane. With the crawler crane, operator, strawboss, six-man crew of high men, and a six-man crew of ground men, three standard towers were erected in one shift.

Before and during the construction of the lines many electrical



**STEEL TOWER** at the Contra Costa-Mocho Junction of the 220-kv. line of Pacific Gas & Electric Co.

problems had to be solved concerning the design of the conductor. The use of a large-size conductor was necessary to avoid corona losses which would have been introduced with smaller diameters. The development of the 1.4 inch diameter, hollow, copper segmental conductor that was used required a major research program. This large conductor necessitated the designing of special machinery for its manufacture and special tools and technique for splicing. The line is two hundred and fifty-nine miles long and was completed in the record time of ten months.

### *New Soviet Car*

The Russian KIM-10 light car is expected to go into production during 1940. The four passenger, four cylinder automobile is to be offered in both the coach and phaeton body styles. The manufacturers claim a top speed of 61 miles per hour and an average fuel consumption of 34 miles per gallon. The KIM-10 has many of the features which are offered by American automobiles: pressure engine lubrication, four wheel brakes, hydraulic shock absorbers, all-steel body, automatic spark control, and synchronized transmission gears. The new plant for the production of these cars is nearing completion, and it is expected that 15,000 cars will be completed this year.

### *Resins and Plastics in Textile Fabrics*

The use of synthetic resins in textile fabrics for producing oil cloths, tarpaulins, artificial leather, and other similar materials is not a new process. These materials merely use the textile fabric as a backing for the lacquer coating and therefore change the appearance and properties of the cloth.

In the last few years a new process has been developed that gives an entirely new use to resins and plastics in the textile industry. They are not used as coating materials, but they are impregnated into the fibers of the cloth. These resins and plastics im-



prove the properties of luster, strength, or resilience of a fabric without affecting its appearance, porosity, absorbency, elasticity, flexibility, or serviceability. This resin modification impregnates the individual fibers so that they retain all of their original appearance, feel, and even microscopic characteristics. Today there are millions of yards of cotton, rayon, wool, and silk fabrics that have been modified by the addition of one to thirty percent synthetic resins.

The resins that have been most successfully developed for this type of modification are the clear, colorless, light-stable types which can be dispersed or dissolved in water solution. The same resins may be applied from a solvent as a surface coating or applied from a water dispersion to give a lustrous finish or applied from a water solution to give resilience. The important factors are the location, distribution, and concentration of this deposited resin. The permeation of unpolymerized resins into the fibers followed by polymerization produces effects that cannot be matched or duplicated by any other method. It is this permeation that opened a new and larger field for resin application.

Today, the fabric resin-modification has reached such a stage as to give rayon fibers the resilience of wool, cotton fibers the luster of silk, cotton fabrics the stability of worsted, spun rayons the quality of woolsens, and cottons and rayons the coolness of linen. In addition, it increases the tensile strength and wearing qualities of fabric, decreases the elasticity and elongation of yarns, improves their washing characteristics, and increases or decreases their luster according to the application.

The urea-formaldehyde and acrylate resins are the most important and most generally used. Other types, the alkyds, vinyls, and strenes, however, are finding increasing application. The urea-formaldehyde type resins are important because of their ease of application from aqueous solution in high or low degree

of polymerization. The acrylate resins are valuable because of their clarity, freedom from color, and stability to oxidation and aging.

In the next decade it is reasonable to expect that the resin-modified fabrics will be competing and replacing the conventional textile fabrics whose properties are determined by thread count, fiber length, and yarn twist.

### *High Speed Screwdriving*

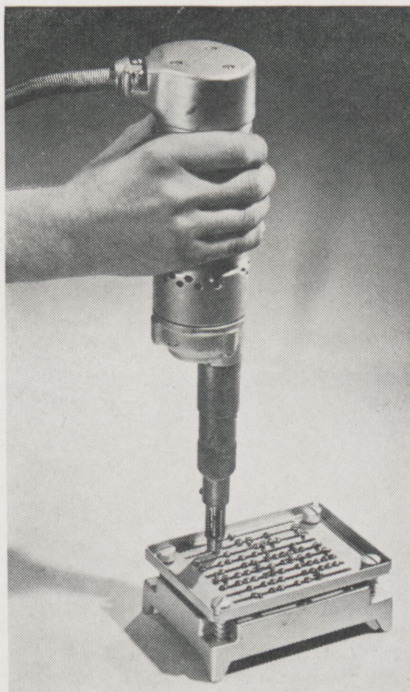
A new method of handling screws on power assembly lines has been introduced by the Independent Pneumatic Tool Company. The equipment is said to increase the speed of production from three to nine times and is especially adapted for assembling clocks, time control mechanisms, refrigerators, radios, heating and air conditioning units, automotive and aircraft accessories, and cameras.

The new equipment consists of an "Adjusto-Tray" and a "Pix-Up" finder for sorting, picking up, and holding the screws for driving with a power screwdriver. The "Adjusto-Tray" is a novel arrangement for holding the screws to be driven. It is a slotted metal tray spring-mount-

ed to its base with a height adjustment for different length screws. The screws to be driven are dumped on the tray, and the tray is shaken. This shaking causes the screws to fall down into the slots and be suspended by their heads. With the screws in this position it is easy for the "Pix-Up" finder to grasp the head of a screw by merely pushing down the tray so as to expose one of the heads. The finder which is attached to a power screwdriver grips the screw firmly in accurate alignment ready for driving.

### *Vacuum Type Radiation Receivers for Pyrometry*

New radiation-receiver vacuum thermocouples, said to be characterized by exceptionally high sensitivity and rapid response, have been designed to fill a specific need created by the development and use of controlled protective-atmosphere furnaces for processing materials at high temperature. Possible applications include temperature measurement and control in brazing, heat-treating furnaces, glass heat-treating, infrared drying and solar radiation. The vacuum-enclosed thermocouple consists of a thin filament of dissimilar metals blackened on one side. Radiant energy acting upon this element produces an emf which is measured by a millivoltmeter or potentiometer which can be calibrated in degrees. This device may be mounted either temporarily or permanently upon a furnace, the only accessory needed being a closed-end tube in the furnace to prevent fogging of the lens and to form a target upon which to sight the thermocouple. Temperatures from 300 to 1500 degrees Centigrade can be read on a millivoltmeter or potentiometer; higher temperatures can be handled by the addition of protective screens or filters between thermocouple and heat source. On maker's production lines, the new instrument is said to have been found particularly useful in controlling temperatures of rapidly-moving objects and materials on conveyors through furnaces.



*Cut Courtesy Iron Age*  
Electric Screwdriver which greatly increases assembly speeds



# AROUND THE CAMPUS

with John T. Newlin, c.e., '43

## Review of '40

As another eventful year has gone into Rose's history it seems appropriate now to pause and hastily review the events occurring *Around the Campus* during 1940.

In January 1940 the Chemicals held a meeting here at school which featured a "smelling bee" between freshman and sophomore Chemicals. The freshmen won! That was also the month the school bought the new pick-up truck. Blue Key held tapping ceremonies for five good men, and some Mechanicals attended a meeting at Purdue.

In February the Camera Club installed its new lockers, and Orien W. Simmons entered the chemical engineering department as a new instructor.

March brought St. Pats Day, and the freshmen finally became members of the student body with only a few dunkings—ask O'Connell or Metz. The annual St. Pat's dance was held at the Terre Haute Country Club with Wayne McIntyre's music. The Glee Club opened its season with a concert at Gerstmeyer, and Mrs. J. Arnold Jones presented Mr. Jones with a seven pound bundle of joy.

April's big event was the Rose Show which brought over eight thousand visitors to Rose to see the "greatest show on earth". The *Technic* ventured the opinion that 14,000 student hours went into the show. The juniors and seniors held a battle royal in the book store which resulted in scores of trousers being turned into material for rag pickers.

May brought about the Junior Prom, which featured the music of Jack McLean, and the Senior Farewell, which was held at Rose the Friday before commencement. A track team appeared with Cundiff and Keeler as its nucleus.

June presented an impressive commencement and the annual finals which herald the arrival of a welcome vacation.

The new school year started off with the freshman-sophomore battles on Lake Deming's venerable shores. Hansche, Hooper, and Bennett were added to the faculty. The football season began.

October brought Homecoming celebrations with a bigger-than-ever bonfire, a 47-0 football victory, and a gay dance. Tau Nu Tau pledged the junior R.O.T.C. students, and Rose's football team rolled up 156 points in its first seven games.

November brought news that Klatte had won high scoring honors in the State, and that Rose was tied for second place in the Indiana conference. The radio club offered code lessons, and tickets to the Military Ball were sold under the influence of high pressure salesmanship.

December closed up 1940 with a football banquet, a successful Military Ball with Anson Weeks' music, and a joyful Christmas holiday.

Well, that's the year 1940—it was

a good year, and 1941 holds promise of even higher successes. Go to it, Rose.

## Aid National Defense

Rose once again has offered her services to the government in the interests of national defense. Night classes are now being held in engineering drafting and in materials inspection and testing in an effort to furnish additional technically trained men to meet the needs of increased production in certain key industries. The classes are being conducted by Rose professors under the United States Engineering Defense Training Program and are offered without tuition charge to high school graduates and those who have had sufficient experience and education to profit from the training. These classes are not directed by military authorities but are under the auspices of the United States Office of Education.

Professor Carl Wischmeyer is handling the establishment of the courses at Rose. Other courses be-



NIGHT CLASSES COMMENCE

Mr. Henry C. Gray with a few of the large number of defense training students which applied for his class in machine design.



sides the two now in session will be added as they are demanded. Such courses as radio, metallurgy, and production engineering probably will be started soon.

Dr. Donald B. Prentice, president of Rose, is regional adviser for the training program. Colleges in this region offering the engineering defense training are the University of Notre Dame, Purdue University, and Rose Polytechnic Institute. Beside the courses offered in the three engineering colleges, classes will be organized in many technical subjects in several other Indiana cities, provided there are enough applicants. Courses probably will be started in Indianapolis soon under the instruction of Rose graduates.

The first meeting of the classes was held Monday night, December 30, and classes were started soon after the first of the year. This engineering training program offered at Rose should not be confused with the vocational training courses which are being taught in technical high and trade schools. Although the courses now offered under the college program are not substitutes for the regular four-year engineering courses and do not earn college credit, they do give valuable training

which will prepare the students for increased responsibilities in rather specialized technical occupations.

Rose is proud to be able to aid in the defense program and promises that the wholehearted cooperation of the student body and faculty will be behind any further projects for aiding in national defense.

### *Attend Meeting*

Dr. Donald B. Prentice and Mr. John M. Phelps, president and field representative respectively of Rose, traveled to Indianapolis Monday, December 9, to attend the fall meeting of the Indiana Association of Church Related and Independent Colleges which was held at the Columbia Club.

Discussion was carried out on the possible extension of the Social Security Act to colleges and also the effects of conscription on college enrollment. Another subject discussed was the preparation of a directory of Indiana Colleges for use by the college advisers in Indiana high schools. This directory, which is being prepared by a subcommittee of the General Committee on Educational Cooperation of which Mr. Phelps is chairman, will include

items of information on colleges, such as enrollment, entrance requirements, courses given, and expenses of each college.

### *Glee Club Opens Season*

The Glee club opened its concert season with a performance at the Student Union Building on the Indiana State campus, Monday evening, December 16. The club, performing under the capable leadership of director Emil Tafflinger, presented a very enjoyable program. The Glee club is looking forward to another successful season this year. Music has been purchased for a complete new program including several popular and amusing negro spirituals and some light classic numbers which soon will echo and re-echo through the halls and laboratories of dear old R. P. I. as well as at regular concerts of the Glee club. Glee club members are noted for their ability to burst forth in song while they are working on engineering problems.

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



The San Francisco-Oakland Bay Bridge, the most expensive bridge in the world, was rebuilt step by step by Robert K.

Morse at the November meeting of the Rose Chapter of the American Society of Civil Engineers. From the foundations, sunk hundreds of feet below the surface of San Francisco Bay, to the tops of the towers supporting the yard thick cables, Mr. Morse ably described the construction of the series of bridges connecting San Francisco to Oakland. His talk was illustrated by lantern slides showing photographs and diagrams of the bridge.

Al Klatte, who spent the summer aboard a battleship in training for the Naval Reserve Corps, provided the chapter with an interesting account of his adventures. His travels took him through the Atlantic and Caribbean to the Panama Canal and return. He spent most of his time



#### **TESTING FOR DEFENSE TRAINING**

Students in materials inspection and testing are under the competent tutelage of Professor Edward A. McLean, and are shown picking up a few pointers before testing specimens of steel.



scrubbing the deck and polishing brass.

## Post Graduate Scholarships

The registrar has in her office notices from several colleges and universities of scholarships available to students desirous of doing post-graduate work. These scholarships furnish aid to college graduates who wish to study for advanced degrees. Johns Hopkins, Bryn Mawr, Massachusetts Institute of Technology, Iowa, California, Iowa State, Illinois Institute of Technology, Ohio State, and Pennsylvania all offer several such scholarships. If any upper classmen are interested in continuing their studies after graduation, they are urged to investigate the notices.

## Rose Quintet Loses Opener to DePauw

The Rose Poly basketeers opened their 1940-41 basketball season against DePauw University at Greencastle, December 14, in a free-scoring contest which saw the Tigers take an early lead and maintain it to win 51 to 42.

Considering the amount of practice the Engineers had, which wasn't very much, and the fact that there are several freshmen on the squad, the Engineers did very well. Another handicap that the Engineers have to cope with in an early season game is the adjusting of six of the regulars to basketball after having played a full season of football.

The Tigers went to work immediately in the first half compiling 24 points against seven counters for Rose. Continuing their scoring spree in the second half, DePauw was leading the Engineers 50 to 29 with but a few moments to play. At this point the Rose attack sparked causing a sensational rally in which the Engineers scored 13 points to DePauw's 1, making the final score 51 to 42.

Don Jones, DePauw's sophomore center, took the individual scoring honors with 7 baskets. Right on his heels followed Charlie Meurer, forward and co-captain of the Rose

team, with 3 baskets and seven foul tosses.

### Box Score:

| Rose (42)          | F.G. | F.T. | P.F. |
|--------------------|------|------|------|
| Dreher, f. ....    | 2    | 1    | 0    |
| Meurer, f. ....    | 3    | 7    | 4    |
| Ellsworth, f. .... | 2    | 0    | 1    |
| Keeler, c. ....    | 0    | 1    | 2    |
| Kniptash, c. ....  | 2    | 0    | 0    |
| Bowsher, g. ....   | 3    | 3    | 4    |
| Harper, g. ....    | 2    | 1    | 3    |
| Walters, g. ....   | 0    | 1    | 0    |
| Hershey, g. ....   | 0    | 0    | 0    |
| Totals .....       | 14   | 14   | 14   |

| DePauw (51)       | F.G. | F.T. | P.F. |
|-------------------|------|------|------|
| Crane, f. ....    | 4    | 1    | 4    |
| Shalley, f. ....  | 4    | 4    | 0    |
| Rhue, f. ....     | 0    | 0    | 1    |
| Dooley, f. ....   | 0    | 0    | 1    |
| Biggs, c. ....    | 4    | 1    | 2    |
| Jones, c. ....    | 7    | 0    | 3    |
| Sheperd, c. ....  | 0    | 0    | 1    |
| Prewitt, g. ....  | 2    | 2    | 2    |
| Roberts, g. ....  | 0    | 0    | 0    |
| Thatcher, g. .... | 0    | 1    | 1    |
| Hercules, g. .... | 0    | 0    | 2    |
| Totals .....      | 21   | 9    | 17   |

## Lose to Earlham 40-39

The Rose Poly basketball team, minus a few regulars who stayed in town for the Military Ball, traveled to Richmond, Indiana on December 7 to engage the Quakers of Earlham College. The Quakers squeezed out a 40 to 39 victory in this Indiana College Conference game. Led by co-captain Meurer and Bill Kniptash, the Engineers got off to a flying start in the first half to gain a considerable lead which they held till the closing moments of the half when Earlham put on a fine rally to tie the score at 26 all.

In the final half, behind the fine shooting and passing of Bill Wright, Quaker guard, Earlham took the lead which they retained till the end of the game. Rose, however, was never out of the game since the greatest lead the Quakers had at any one time was six points. Dick Wright took individual scoring honors getting 8 field goals and 2 foul shots. Kniptash lead the Rose aggregation

with 12 points, 10 of which were the result of field goals.

### Box Score:

| Rose (39)         | F.G. | F.T. | P.F. |
|-------------------|------|------|------|
| Meurer, f. ....   | 5    | 0    | 4    |
| Kniptash, f. .... | 5    | 2    | 1    |
| Keeler, c. ....   | 4    | 1    | 1    |
| Mehagen, g. ....  | 1    | 3    | 1    |
| Walters, g. ....  | 0    | 1    | 1    |
| Hershey, g. ....  | 1    | 0    | 1    |
| Totals .....      | 16   | 7    | 9    |

| Earlham (40)       | F.G. | F.T. | P.F. |
|--------------------|------|------|------|
| Watt, f. ....      | 1    | 0    | 1    |
| DeHoney, f. ....   | 1    | 1    | 0    |
| Ellington, f. .... | 1    | 0    | 1    |
| Ortwein, f. ....   | 3    | 1    | 2    |
| Anderson, c. ....  | 3    | 0    | 1    |
| Wright, f. ....    | 8    | 2    | 1    |
| Rolff, g. ....     | 0    | 0    | 1    |
| Miller, g. ....    | 1    | 0    | 1    |
| Totals .....       | 18   | 4    | 8    |

## Rifle Team Members Qualify

The members of the Rose Rifle Team have been chosen for the week of December 14-20. The highest scores were turned in by Leedy and Howlett, both with 380. Students are urged to fire on the "B" team, and if their scores are high enough they will replace some person on the varsity. The scores fired in the week of December 7-13 are as follows:

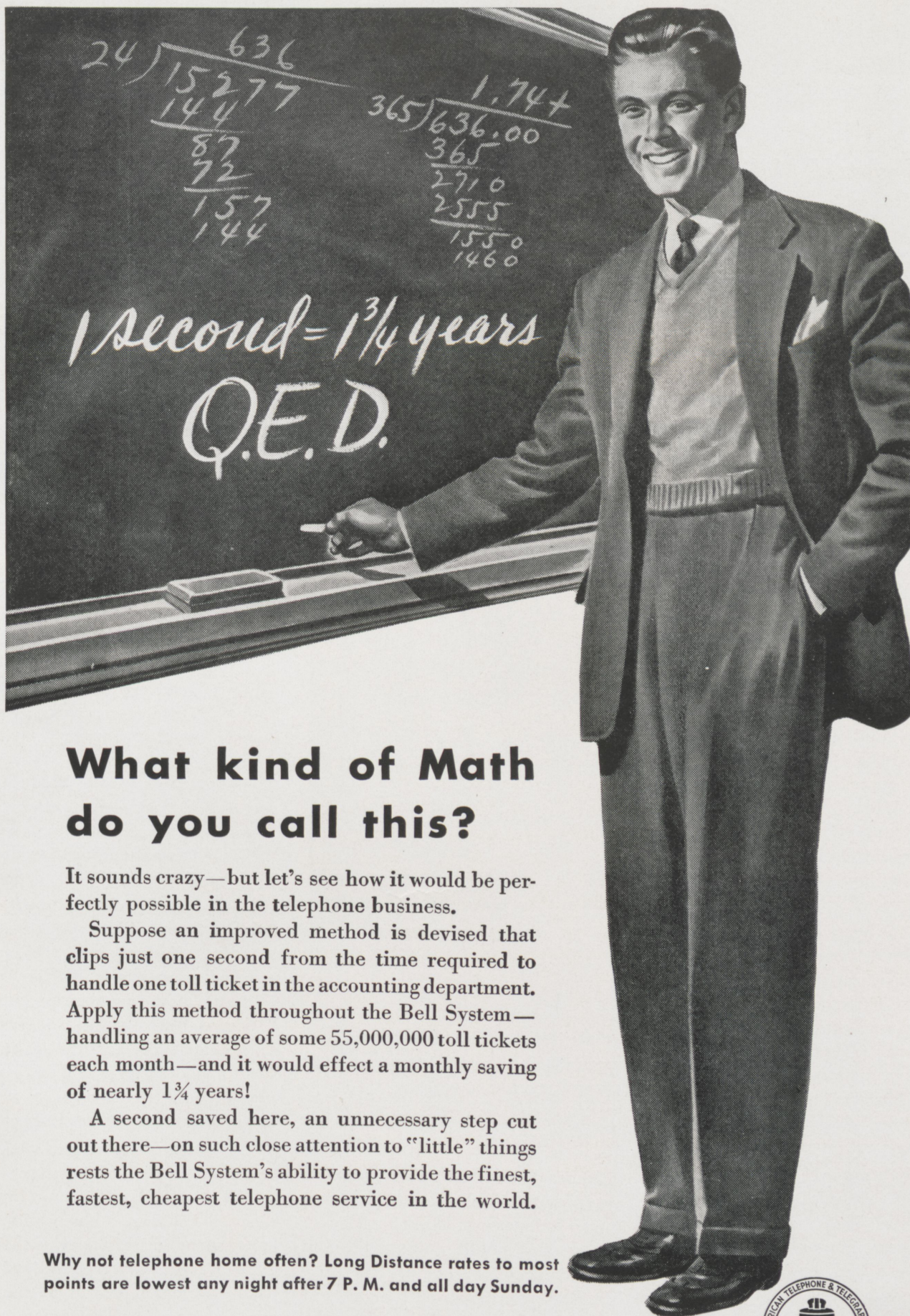
### Varsity Team

|                     |     |
|---------------------|-----|
| Leedy .....         | 380 |
| Sollars .....       | 363 |
| King .....          | 361 |
| Ker .....           | 361 |
| Moore .....         | 351 |
| Buckalter .....     | 350 |
| March .....         | 349 |
| Jones .....         | 342 |
| Demaree .....       | 340 |
| Lane .....          | 337 |
| Snellenberger ..... | 334 |
| Tatleman .....      | 329 |
| Bowers .....        | 328 |
| Kopan .....         | 326 |
| Howlett .....       | 380 |

### "B" Team

|                |     |
|----------------|-----|
| Driskell ..... | 326 |
| Blakey .....   | 300 |





## What kind of Math do you call this?

It sounds crazy—but let's see how it would be perfectly possible in the telephone business.

Suppose an improved method is devised that clips just one second from the time required to handle one toll ticket in the accounting department. Apply this method throughout the Bell System—handling an average of some 55,000,000 toll tickets each month—and it would effect a monthly saving of nearly 1 <sup>3</sup>/<sub>4</sub> years!

A second saved here, an unnecessary step cut out there—on such close attention to "little" things rests the Bell System's ability to provide the finest, fastest, cheapest telephone service in the world.

Why not telephone home often? Long Distance rates to most points are lowest any night after 7 P. M. and all day Sunday.





# GRADE A GRADS

edited by Gene F. McConnell, m.e., '42

## Mr. Francis H. Miller

Francis Hegan Miller was born on a farm near Louisville, Kentucky on April 24, 1874. He attended county schools until high school came along, whence he entered Louisville Male High School, graduating therefrom in June, 1891. He was awarded a B.S. degree in electrical engineering from Rose in 1895. Since that time he has been the recipient of the following degrees from Rose: M.S., '97; E.E., '99; M.E., '14.

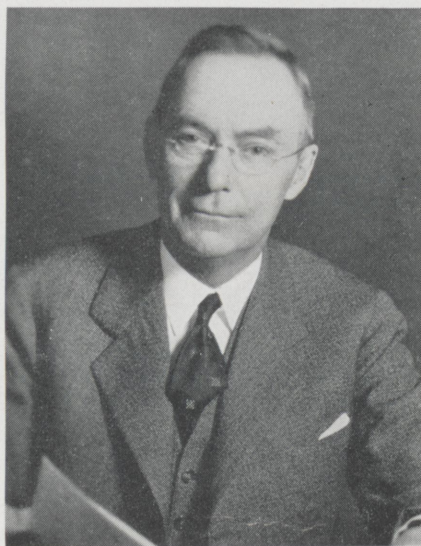
On September 1, 1895, Mr. Miller accepted a position with the Louisville Railway company and has been with this organization since that time. He has advanced from assistant superintendent of shops in 1895 to president and general manager by the following steps: superintendent of linework, 1898; assistant superintendent of power stations, 1899; superintendent of power stations, 1900; superintendent of motive power, 1901; vice-president in charge of engineering, 1920; and thence to his present position. Mr. Miller is also president of the Louisville and Interurban R. R. Co.

Among his accomplishments have been the designing and construction of an underground conduit system for wire cables and the building of two power stations as well as many sub-stations. He has been the author of many articles for the technical press. His most interesting job has been "the development of transportation, urban and suburban."

On February 11, 1902, Mr. Miller married Georgia McCampbell in Louisville. They have five children—one son unmarried and four daughters with one, one, two, and three children each.

He is past president and director for 15 years of the Engineers and Architects Club of Louisville; an

associate member of the A. I. E. E. and the A. S. M. E.; a member of the executive committee of the American Electric Railway Engineering Association Recreations; and a member of the Committee of the Louisville Board of Trade on Social Agencies. Mr. Miller also holds membership in the Electric (past president), Rotary (president, 1921-22), Transportation, Penndennis, Louisville Boat, Louisville Country, Louisville Automobile, and Audubon Country Clubs.



MR. FRANCIS H. MILLER

Photo by Randolph-Maniatis-Garcia, Inc.

Fishing and hunting with "golf as a steady diet" constitute the hobbies of Mr. Miller. His advice to us is to work hard—"giving your employer everything you have."

## Departed

James E. Phillips, ex-'07, veteran engineer for the Los Angeles Aqueduct, died October 26, 1940, after an illness of a month. Joining the Los Angeles Water Department in 1913, Mr. Phillips was placed in charge of maintenance and operation of the aqueduct in 1928 and held this position at the time of his death.

He was a member of the American Society of Civil Engineers and a past president of the American Water Works Association. He also belonged to the Sigma Nu fraternity and the Masonic Lodge.

Mr. Phillips is survived by his widow, Lucy, and three sons, Dr. James E. Phillips Jr., Robert, and William Phillips.

## Les Enfants

Mr. and Mrs. Fred O. Andrews, '29, are the parents of a 7 lb. 5 oz. son, Fred Overe, born November 18, 1940. The father was graduated from Rose with a B. S. degree in electrical engineering and is employed by the Illinois Bell Telephone Co.

## The Grads Advance

'89 John D. Galloway, consulting engineer in San Francisco, was recently honored with an honorary membership in the American Society of Civil Engineers by the Board of Directors of that organization. This honor will be officially bestowed at the Society's annual meeting in New York on January 15.

'10 Nathan A. Bowers, Pacific Coast Editor of the *Engineering News-Record* had an article in the November 14 issue of that magazine entitled, "Tacoma Narrows Bridge Wrecked by Wind." The article contained several photographs and an eyewitness account of the collapse as well as an analysis of the possible causes.

'21 Irvin R. Weir, who is a radio transmitter engineer with the General Electric Company, has again published a significant paper in the new field of frequency modulation. This paper, which appeared in the November issue of *Electronics*, is entitled "Tests of FM for Aircraft Communication."



'25 Orville M. Dunning is chief engineer for the Gray Manufacturing Company in New York. He was formerly manager of the research department of the Thomas A. Edison Co. in Orange, N. J.

'27 In the article "Some Notes on Coupled Circuits," which appeared in the *RCA Review* for October, W. Robert Ferris presents an analysis of the advantages of proper matching in transformer-coupled circuits. Mr. Ferris is research engineer with the RCA Manufacturing Company.

'28 Wayne Kehoe, chief engineer of the City Light and Water Utilities, Ft. Wayne, Indiana, presided at the technical session of the annual meeting of the Indiana Engineering Council held at Fort Wayne on November 15. Mr. Kehoe is chairman of the Ft. Wayne section of the A. I. E. E. and a member of the executive board of the Indiana Engineering Council.

'29 Ralph C. Bailey has been ordered to active duty in the Engineer Corps at Ft. Belvoir, Virginia.

In the *Magazine of Light* for October, 1940, appeared an account of an outstanding solution of the problem of lighting a doctor's laboratory office as worked out by Robert H. Downen. Mr. Downen is lighting sales engineer with the Detroit Edison Company.

E. Sheldon Johonnott has a position with the E. I. du Pont Co. at Charlestown, Indiana, and will live in Louisville.

'34 George F. Stark, who has been in government employ for several years, is now personnel consultant in the office of the Executive Director, Social Security Board, Washington, D. C.

'36 Louis Duenweg, technical interviewer with the Detroit Edison Company, is president of the Edison Players, an employee association of that company.

William G. Lindeman is employed by Russell Moore, consulting engineer of Indianapolis, on the powder plant being constructed at Burns City, Indiana.

'37 Harry J. Halberstadt, previously stationed with the Air Corps Training Detachment at Love Field, Dallas, Texas, is now an instructor at Maxwell Field, Montgomery, Alabama.

Robert I. Sears has a position with the Allison Engineering Co. in Indianapolis.

'38 John E. Lindeman is engineer for the L. & K. Contracting Company at Seymour, Indiana.

'40 Avery C. Kelsall has accepted a position with the Louisville Gas and Electric Company.

### Cuttings

Back in 1915 our predecessors, or at least the senior class, were interested in the framing and proper composition of business letters. The following snatches from the *March Technic* of that year demonstrates the concern manifested in this form of penned prose.

Mr. John T. Montgomery, '98, of Chicago, addressed the Senior Class February 6, on the subject of writing letters of application. Mr. Montgomery had requested that each member of the class write him a letter of application, and these were sent to him for criticism before he came to Terre Haute. Each letter was carefully read and handed back to the writer with a type-written criticism which should prove a great aid to the near-graduates in nailing jobs . . . . The Senior class has never given such profound attention to a speaker since it has been in school.

We really doubt if the class of '15 was as much like our good friend Rip V. Winkle as the last sentence would indicate, but it does sound like a good idea (the letters or the four-day siesta—take your choice).

A wee bit of versification in this

issue might be paraphrased to read like this:

The boy sat in the book store,  
He did not hear the bell,  
And when he reached Calculus class  
Doc Sousley gave him—some extra work.

This was one of those infrequent periods in our history when athletic engagements with Normal were not confined to "sparklers" and tiddley-winks. The Rose aggregation rolled over Normal, 29-19, led by the coaching and conniving of Wischmeyer, '06.

Concerning the game:

. . . . The student body took victory in a well preserved manner as was to be expected.

Slightly pickled?

In closing, here is a 1915 compliment very applicable yet today.

Rose Alumni are undoubtedly as loyal to the old school as the graduates of any institution in the world, and this can be vouched for by any one who has ever attended a Tech Club meeting any place in the country, from New York to San Francisco. . . .

### From the Files

Writing brings bad mental habits to a showdown. Scrawled manuscript reveals lack of muscular control; misspelled words mean that you do not use your eyes sharply; monotonous sentences mean that you do not use your eyes or ears; rambling paragraphs mean that your minds drift instead of steer; crooked, illogical themes mean that your thinking is crooked—and that you cannot see your crookedness and correct it.

Do you take time enough to think, to write? *Take time to think*; lock yourself in. Think fewer thoughts, and think through to the bitter end. Stick to one thought trail when it becomes difficult, instead of fidgeting to something easy. *Take time to write*. Produce fewer pages and better. One page carefully written is worth while. Ten pages carelessly thrown together at the last minute may do you harm. Do few things, and make them your best.

—Easley S. Jones.



# FIFTEEN YEARS

by Harold B. Hood, '24

## 1925

In this year, 1925, it was noted that the levels of Lakes Michigan, Huron, and Erie had dropped several inches, and there was great public excitement when the responsibility for the condition was laid solely at the door of Chicago's new drainage canal. Further investigation demonstrated the fact that the levels of the Lakes do vary materially from year to year.

A United States Arsenal at Lake Denmark, N. Y. was struck by lightning, setting off one of the most violent bombardments that has ever been known in this country. \$93,000,000 worth of government property was destroyed, there were more than 100 casualties, and several nearby villages were almost completely demolished by projectiles.

## 1926

In 1926, Queen Marie of Roumania visited the United States, and in England, a baby girl was born and christened Elizabeth Alexandria Mary. The possibility that twelve years later she should become heir apparent to the British throne seemed so remote as to be substantially non-existent.

Roald Amundsen, Lincoln Ellsworth, 15 other men, and a dog flew over the North Pole in a semi-rigid dirigible. Richard Evelyn Byrd and Floyd Bennett reached the North Pole and returned to Spitzbergen without stopping in a Fokker monoplane.

The Holland vehicular tunnel beneath the Hudson River was completed and opened to traffic, and a total solar eclipse, visible only in the Southern hemisphere, created panic among the natives.

The pilot of a one-ton airplane abandoned his controls 2500 feet above the earth and released a parachute attached to the ship, reaching

The survey of the interesting events of the fifteen years between Mr. Hood's graduation from Rose in 1924 and his speaking for the 1939 commencement exercises is hereby continued in this issue of the *Technic*. This second installment covers the years 1925 to 1931.

the ground safely and without material damage to the ship. In the same year, Farnan Parker, a 14 year old boy, flew solo from Anderson, Indiana, to Philadelphia, and thence to Washington; and a French aviator established a new altitude record of 40,820 feet.

Gertrude Ederle swam the English Channel, the first woman to accomplish the feat, in a time two hours shorter than the previous record, established by a man. Three weeks later, Amelia Corson swam the Channel, thereby becoming the first mother to complete the swim.

Gene Tunney defeated Jack Dempsey at Philadelphia for the boxing championship of the world, Pompey won the Kentucky Derby, and Frank Lockhart, in a Miller Special, was leading at Indianapolis, with an average of 94.63, when the race was called at 400 miles because of rain. The St. Louis Cardinals defeated the New York Yankees 3 to 2 in the World Series; a terrific hurricane cut a wide swath across the State of Florida, spreading death and desolation in its path, and the Sesqui-Centennial Exposition opened at Philadelphia.

## 1927

1927 was the year in which practically everybody seemed to be making plans for non-stop flights from New York to Paris. Chamberlain and Acosta tried an endurance flight in preparation for the long jump and stayed in the air 51 hours to establish a new record. Richard Byrd's "America" was damaged in landing after a test flight, and the mono-

plane "American Legion" was wrecked on a takeoff to test the lifting power, killing both aviators. Coli and Nungesser were lost on a westward flight across the Atlantic. Saint-Roman and Mouneyios were lost in a flight from West Africa to Brazil.

Without any advance publicity, 25 year old, unknown, Charles Lindbergh flew solo from San Diego to St. Louis, thence to Curtiss Field, Long Island in 21 hours 20 minutes flying time to establish a new trans-continental record. Chamberlain and his new partner Bertaud were ready and waiting for good weather, as were Byrd and Acosta. Early one May morning, after two hours sleep, Lindbergh climbed into his monoplane, and 33½ hours later stepped out of it at Le Bourget field.

An interesting thought—"what would Lindbergh have done with his life, and how far would he have gotten, in the absence of the enormous popularity created by this successful flight?"

President Coolidge moved out of the White House into a private mansion on DuPont Circle, while repairs were being made to the White House. It was in this year that he made his famous statement "I do not choose to run for President in 1928". This ultimatum was delivered to the Press in writing, on small slips of paper.

Babe Ruth, near the top of his career, refused a \$52,000.00 salary for the baseball season of 1927, and his Yankee team won the World Series with four straight games against the Pittsburgh Pirates.

British Major Seagrave established a new record of 203.792 for a one mile straight-away run; and at Indianapolis, George Souders, driving a Duesenberg, won the 500 mile



classic with an average speed of 97.54. In that race, Norman Batten displayed remarkable sportsmanship when, standing in his car, fighting flames with one arm, he continued to steer his mount with the other, necessarily changing arms now and again as one or the other became too scorched to use. He regained control of his car and avoided a smashup which probably would have cost the lives of one or more other pilots. At Louisville, Harry Payne Whitney's Whiskery came from far behind to win the Kentucky Derby.

Do you remember "Be Nonchalant—Light a Murad"? In 1927, that slogan was so publicized as to become a byword, the basis of many humorous cartoons. Cigarette manufacturers in that year feared advertising which might indicate that women actually smoked cigarettes. Until this time, the closest approach to such advertising had been a picture showing a beautiful girl sitting to leeward of an Arrow collar type collegian and begging him to "blow some my way". In 1927, Ernestine Schumann-Heink was quoted in advertisements as saying, "I recommend Lucky Strikes because they are kind to my throat". She promptly repudiated the implication, whereupon Alla Nazimova, famous stage actress, was similarly quoted and ratified the advertisement.

Shipwreck Kelly topped the list of flag pole sitters by standing atop a 50 ft. pole on a Newark hotel roof for 12 days and 12 hours; and, equally silly, Mussolini banned adenoids from Italy.

In this year was the second Tunney-Dempsey fight in which occurred the "long count" which had the whole country divided into two factions for months.

Conspicuous firsts of 1927: Dry Ice—solid carbon dioxide—began to be publicized and to reach the attention of the general public. The American Telegraph & Telephone Company inaugurated Trans-Atlantic radio telephony service for the public.

## 1928

In politics, Herbert Hoover defeated Al Smith in 1928 for the Presidency of the United States, Franklin Roosevelt was elected Governor of New York, and Hirohito ascended the Japanese throne.

Aeronautically, the year was important for the facts that Amelia Earhart first became nationally important in the news for her flight from Newfoundland to Wales, where she arrived with a dry fuel tank, Stinson and Haldeman stayed in the air for 53 hours, 36 minutes with 500 gallons of gasoline; Wilkins and Eielson flew from Point Barrow, Alaska, to Spitzbergen, Norway, crossing the pole for the first time in a heavier-than-air ship; a new record of 24 hours, 51 minutes, was established between New York and Los Angeles; and the Graf Zeppelin started commercial flights between Berlin and New York. In that year, Trans-Continental Air Transport and the Pennsylvania Railroad combined to provide a 48 hour train-plane transcontinental service. Its passengers rode in the air during daylight hours and on the rails during the night. New 20-passenger air planes bragged of cruising speeds of 130 miles per hour and top speeds of 150.

Lou Meyer won his first race at Indianapolis, and that night the celebrants at one of the big Country Clubs were rudely interrupted by five masked men who stopped the dance, lined up all guests, and stripped them of all valuables. Reigh Count won the Kentucky Derby, and talking pictures were finally conceded to be successful.

A cruise ship, the Vestris, started for the South Seas, began to leak in a bad storm, listed slightly, and experienced a cargo shift. For a day and a half she continued to float, listing more and more each hour until finally she rolled over and sank with a loss of 111 lives.

New York Yankees won the World Series in four straight games against the Cardinals, a promoter named

Pyle managed a foot race from Los Angeles to New York which, within a very few days after its start, became known to the press and public as the "Bunnion Derby", and Jean Lussier rode over Niagara Falls in a 9 foot, steel frame, rubber ball, to be the third person successfully to negotiate the Falls.

Grace Moore made her debut at the Metropolitan Opera House and received very bad reviews, while a new band leader, known as Rudy Vallee, appeared on the air, mounted swiftly to national popularity, and predicted that his success would be short lived. Eleven years later, Vallee felt that he had to discontinue regular weekly broadcasts for fear that his popularity might wear out.

In a famous private hospital in Cleveland a large store of X-ray films began to smoulder just at noon. The hospital was crowded with patients, doctors, nurses, and clerical assistants. Slowly at first, and then with a deadly rush, heavy, yellowish brown fumes flowed through the building. Those who breathed it deeply died quickly. Others, who breathed more dilute mixtures, only coughed a little at the time. Dozens left the building, thinking themselves uninjured; were transported, hours later, to hospitals where they spent weeks in convalescence or only hours before death. Heart rending instances occurred by the score. One girl, 19, beautiful, musically talented, just completing her nurse's training, was away from the building on her lunch hour; she returned to see "smoke" rolling from the doors and windows, rushed in to recover her compact and lip stick from her locker. She coughed a little. She came back out with her dear possessions, telephoned her family to tell them that she was safe and would be home shortly and was not heard from again until, the next day, her family found her body at the morgue where it had been sent by the people who took her in when she became deathly ill 10 minutes after telephoning.

The first annual national air show



was held at Cleveland in 1929. It was a marvelous display. Racing, stunting, formation flying, and the like were beautiful. The Graf Zeppelin appeared overhead at about midnight, a ghostly, silvery, enormous ship, floating placidly beneath the full moon. That same afternoon, I saw one of the Ford-Stout, all metal monoplanes, then considered a huge and ungainly machine, put through the same kind of stunts that were supposed to be the province of the small, light, fast planes. Loops, barrel rolls, Immelmann turns, and the like were very impressive indeed, when accomplished by a ship which was then the most enormous thing on wings. The newly perfected stunt of dropping a small plane from the belly of a mother dirigible was also demonstrated that day. The little fellow was lowered on a cable and then cut loose while the dirigible was in flight. He dived briefly, and then flew on under his own power, returning a few moments later to hook onto special tackle dangling from the mother ship, and be withdrawn into the hold of the Zeppelin.

## 1929

Robbins and Kelly, amateur flyers, established a refueling endurance record of 172 hours 32 minutes; Frank Hawks set 18 hours 22 minutes as the new speed record be-

tween Los Angeles and New York; and Commander Byrd, at Little America, flew over the south pole, all in 1929.

Three of the country's railroads created a furor by notifying their diner passengers that smoking in the diners was permitted; six lines continued absolute prohibition of smoking in the diners, and the other lines tolerated the practice, but frowned upon it.

Chicago was the city of gang wars in profusion. This was the year of the St. Valentine's Day massacre of 7 men in an old garage. Al Capone was arrested in Philadelphia for carrying a gun, and the country as a whole believed that he had purposely arranged the arrest for sanctuary.

Charles Lindbergh was married to Anne Morrow, and, in the spring, Eddie Cantor announced his permanent retirement from the entertainment field, little knowing what the fall of that year would bring to him.

Ray Keech won the Indianapolis Speedway race with an average of 97.583 miles per hour and Bill Spence was killed in the race, the first death in the race in nine years.

The United States changed the size of its paper currency, and the new, small bills looked as strange in those days as the old, larger bills would look today. Roy Riegels was the first football player to become confused and make an enormously long run in the wrong direction to lose the game for his team.

The less said about the stock mar-

ket crash in the fall of 1929 the better.

## 1930

After seven years of obscurity, following his imprisonment for treason in 1923, Adolf Hitler regained the World news, and the former Kaiser was accused of backing him.

Dial phones were introduced in Washington, Hoover refused to have them installed in the White House, and Congress ordered them removed from the Congressional office building. Senator Carter Glass said "I object to being made an employee of the telephone company without compensation."

Did you know that it was as late as 1930 that the Star Spangled Banner became the National Anthem of this country? By Act of Congress in that year, the song was established as our National Anthem.

1930 saw the investment of over \$325,000,000 in miniature golf equipment. Courses consisted of bordered runways leading from tees to cups and surfaced with various compositions, although cotton seed hulls were most popular. Hazards of all sorts were interposed between the tees and the cups. Perhaps the most interesting of these was a bear chained, on a Los Angeles course, adjacent one runway, and trained to try to catch the balls as they passed him. There was a \$4,000 prize tournament at Lookout Mountain, and a \$10,000 prize tournament at Chicago.

Billy Arnold won the Speedway race at Indianapolis, and emerged from the track to find that his private automobile had been stolen during the race. Earl Sande, upon Gallant Fox, won the Kentucky Derby; and the Philadelphia Athletics defeated the St. Louis Cardinals 3 to 2 in the World Series.

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Rudy Vallee popularized the Stein song of the University of Maine, while Sonja Henie, then 17, won her fourth world's championship in figure skating. The Candid Camera made its first appearance among press photographers.

In San Francisco, a ferry boat collided with—of all things—a whale!

Frank Hawks flew from San Diego to the Bronx in a cabin glider. No, this was not a world's record for powerless flight, because the glider was towed by an engined airplane. They made twenty landings during the flight, without accident to either ship. In the same year, a new east-west continental record flight was made in 14 hours, 50 minutes and 3 seconds, the pilot being forced to make five stops on the trip. Later in the same year, a west-east record of 12 hours, 25 minutes and 3 seconds with only three stops was made. This was in the hey day of endurance flights, and Jackson and O'Brine stayed aloft 647 hours, 28 minutes, 30 seconds.

A poisonous fog settled over Belgium, causing 67 deaths. The theories attempting to explain this catastrophe ran from the suggestion that it was caused by escaping gas from cylinders buried by the Germans during the war, through the suggestion that it was produced by gases

escaping from a comet's tail, to pure witchcraft.

The popularity of Amos and Andy was such that numerous moving picture theaters stopped their programs for 15 minutes every night and piped in the Amos and Andy broadcast through their speaker systems. National Broadcasting Company threatened to sue, but the theaters continued, because they found that nobody would come to the theater until after the Amos and Andy broadcasts were over.

The baby Austin car came to the market, capable of averaging 40 miles to the gallon of gasoline, with a top speed of 50 miles an hour.

(This concludes the second portion of Mr. Hood's "Fifteen Years." The article will be continued in the February issue of the Technic.)

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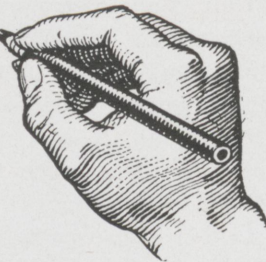
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# Fraternity Notes



## Alpha Tau Omega



Gamma Gamma chapter held its first formal dance of the year Friday evening, December 20. The dance was held in the Mayflower Room, and music was furnished by Wayne McIntyre and his orchestra. Chaperons for the affair were Dr. and Mrs. Clarence Sousley and Professor and Mrs. Carl Wischmeyer. Many members of the faculty, alumni, and several representatives from Purdue and Indiana University were present as guests of the fraternity.

At the last assembly of the year four ATO's received a special honor in being elected into Blue Key national honorary fraternity. These men were John G. Appel, senior; Harold E. Bowsher, John G. Mehanagan, and Earl F. Michaels, juniors. Other ATO's who are Blue Key members include John L. Combs, president; Charles A. Howlett; and Joseph W. Dreher.

The chapter had a very extensive house re-decoration over the Christmas holidays. The entire downstairs was re-papered and all the woodwork re-finished. The kitchen also has a new sink which was a gift from the Mother's Club.

The Alpha Tau's are very grateful to the Alpha and Kappa sororities of Indiana State for two beautiful serenades on Monday and Tuesday evening of the week before Christmas. Monday night, the chapter being in full meeting, the Alpha's were invited in after their serenade for an impromptu open house in honor of the unusual event. Miss

Mary Gilbert and Mr. Palmer very graciously consented to serve as chaperons for the evening.

## Lambda Chi Alpha



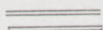
The members of the Theta Kappa Zeta of Lambda Chi Alpha recently presented another open house. The chaperons were Dr. and

Mrs. Smith and Mr. and Mrs. Arley Combs. This meeting was one of the most successful given in recent months, and a very enjoyable time was had by all. Considerable pride was displayed by the various members as they left the house for their annual Christmas vacation for they knew that the preceding year had been a very successful one. There was no worry on the minds of the members as to the condition of the house in their absence for it was left in very capable hands.

All Matters Relating to

*Patents and*

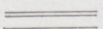
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## Sigma Nu



Although the last day of school was just another day to many of the students at Rose, it was an important event to the members of the Beta Upsilon Chapter of Sigma Nu. The evening began with a trip to Clinton for an excellent spaghetti dinner at Antoninni's, and then the group returned to Terre Haute to finish the evening and open the vacation in the true holiday spirit.

The chapter is looking forward to the next stag affair which is to be given soon after Christmas. Perhaps it would be better to say that all but two members are looking forward to this gathering. These two fellows are responsible for the party, for the occasion is to celebrate the transferring of their fraternity pins to the fairer sex.

The regular monthly dinner meetings of the chapter will be resumed on Sunday, January 12, the first Sunday following the holidays.

## Theta Xi

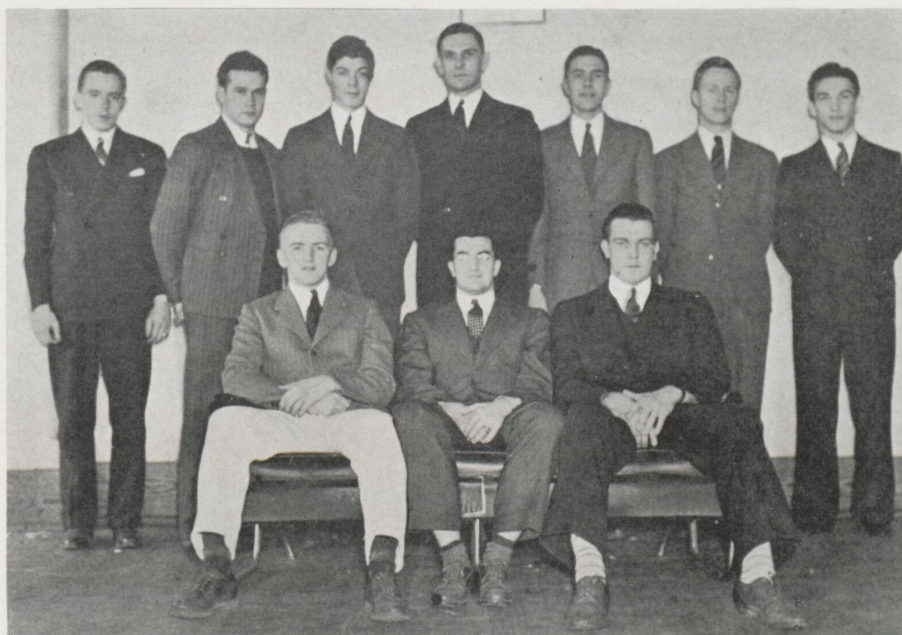


Kappa chapter is happy to announce the election of Edward J. Klecka, a Senior in the Chemical Engineering Department, to the Blue Key honorary fraternity Thursday, December 19, at assembly.

Plans are being made for a stag party to be held during the first or second week-end after vacation. Fritz Wehle is in charge of the committee.

Thursday evening, December 19, in keeping with the festive spirit of the holidays, the fraternity members serenaded the Women's Residence Hall at Indiana State. The following day most of the members left for a joyous two weeks Christmas vacation at home.

The furniture committee, headed by Ray Hogan, recently provided the



### BLUE KEY ELECTS MEMBERS

The election of five new men brings the Blue Key chapter at Rose to a membership of ten. Reading left to right they are, sitting: George C. Harper, John L. Combs, president; and Raymond C. Hogan. Standing: John G. Mehagan, Harold E. Bowsher, Joseph W. Dreher, John G. Appel, J. Edward Klecka, Charles A. Howlett, and Earl F. Michaels.

house with two new rugs.

Since the last *Kappa Kantilever*, which was the first chapter paper, had much success, plans are being made for another edition. The editor-in-chief of this edition will be John Bolton, and he will be aided by Fred Nahm. Everyone is looking forward to the next edition since the first one was highly enjoyed by all.

## Blue Key



The Blue Key fraternity at Rose pledged five new men at an assembly Thursday, December 19. The men tapped were John G. Appel and Edward J. Klecka, seniors; and Harold E. Bowsher, John G. Mehagan, and Earl F. Michaels, juniors.

John Combs, president of Blue Key, presented a short history of the fraternity before the tapping ceremonies. Blue Key, he explained, is a national honorary fraternity which chooses its members on the bases of their leadership in school activities and their scholarship. Men must be

in the upper half of their class scholastically to be eligible for membership in Blue Key, but the prime requisite is extra-curricular activity.

After the men were tapped, Dr. Prentice congratulated them and reminded them that they were entering an excellent organization, for the Rose chapter of Blue Key was cited as being the best all round chapter of Blue Key in the United States for the year 1938-39.

The members of Blue Key chosen last year are John L. Combs, George C. Harper, Charles A. Howlett, Raymond C. Hogan, and Joseph W. Dreher.

## From The Files

An example of the wonderful mathematical mind is told by engineers who once interrupted Steinmetz unexpectedly with this problem: "If you bore a hole two inches in diameter through a rod two inches in diameter, how much material is removed?" Steinmetz hesitated but a moment, picked up his pencil and wrote down the answer—5.333 cubic inches. It was correct, yet Steinmetz had determined the answer without effort, as easily as one would multiply five by five.



# SLY - DROOLINGS

edited by Ralph E. Brown, m.e., '43

The Students Aid of Vassar is publishing a booklet of advice for girls on house-party dates, titled "What Every Young Lady Should No".

—Columbia Jester

A recent White House visitor found a page of a calendar pad on the floor. On it was written, in pencil: "Call Eleanor—Philadelphia? Los Angeles?"

—Leonard Lyon in N. Y. Post

Drunk, phoning to wife: "That you dear? Tell the maid I won't be home tonight."

A minister on a train was quietly reading when a trio of drunks passed through the car. One of the spirited ones stopped to talk to him: "What company are you with, bud?"

"Church and Lord, my good man."  
"What doesh dat company shell?"  
"Fire insurance."

Mother: "What have you been doing Mary? Why, it's three a.m."

Mary: "Walking, Mother."

Mother: "For goodness sake!"

Mary: "Yes, Mother."

War does not determine who is right—only who is left.

We heard that Vic Tatelman spent one whole afternoon trying to buy a gallon of propeller wash for his flying instructor.

Then there was the girl who was so clumsy that she broke six of the Ten Commandments in one evening.

Jack Warrick went out wool gathering New Year's Eve and came home clipped.

First corpse: "What's the matter with you?"

Second corpse: "Oh, I feel rotten."

## PASSING THE BUCK

Will H. Hayes has nothing much On the dirty such-and-such That censors our every joke That isn't just quite okey-doke.

We go to work and slave To jot down and to save, Some really darn good jokes That are told by other folks.

We type our copy just in time To meet the staff's dead line. Then we submit our witticisms To the censors for their criticism.

And then they storm and fuss About what seems to us Almost as innocent and clean As a parson with a shiny bean.

But just the same they cross out; And cut; and change about Until we have just what you read— A lot of jokes, a la hay seed.

So if you want to yell About the jokes we tell, Just remember what we say: "Come in and read the cuts some day."

—Ralph E. Brown

Ike: "When you were arrested in that street brawl what did you tell the police when they asked you who you were?"

Mike: "I gave them my riot name."

Then there is the fellow who went spooning the other night with his sugar and found there was nothing stirring.

Old Maid: "I can't decide between the divan and the arm chair."

Clerk: "Lady, you can't make a mistake on a nice comfortable chair like this."

O. M.: "That settles it. I'll take the divan."

Drunk: "Where'd you get that cut on your head?"

Drunker: "Mushst 'ave bit myself."

Drunk: "Don't be shilly. How could you bite yourself on the head?"

Drunker: "I shtood on a chair."

Reformer: "Young man, you must conquer yourself. Why, I conquered myself by the time I was your age."

Wally Nellis: "Yeah, but I'm harder to lick than you are."

"Jones is running for sheriff," yelled a bystander in the old man's ear.

"Who's he? Never heard tell of him," commented the deaf farmer.

"Oh, yes, you have," shouted the informant. "He's the son of the Bishop."

"Oh, well," quavered the ancient philosophically, "most of these politicians are."

"Folks," said the colored minister, "the subject of my sermon dis evenin' am 'Liars'. How many in de congregation has done read the sixty-ninth chapter of Matthew?"

Nearly every hand in the audience was raised immediately.

"Dat's right," said his reverence. "You is just de folks I want to preach to. Dere ain't no sixty-ninth chapter of Matthew."

"So you say the water you have at the fraternity is unsafe?"

"Yeah."

"Well tell me, what precaution do you take against it?"

"First we filter it."

"Yes."

"Then we boil it."

"Yes."

"Then we add chemicals to it."

"Yes."

"And then we drink beer."



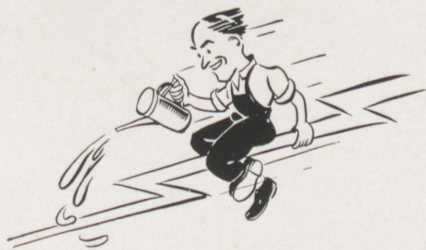
# G-E Campus News



## STOP THIEF!

**B**URGLARS and other criminals can no longer hope that bad radio weather will increase their chances of a getaway by gumming up police radio. Atmospheric disturbances, ignition noises, street car interference—in fact all the reception devils that plague the life of radio police practically disappear with the introduction of frequency modulation, the new method of broadcasting developed by Major E. H. Armstrong. Several two-way FM installations have already been made. One of the first was in Douglas County, Nebraska, which recently installed a number of G-E transmitters and receivers.

Among those responsible for many of the G-E developments which have made two-way FM possible are I. R. Weir (Rose Poly, '21) and H. P. Thomas (Harvard, '25)—transmitter engineers; and W. C. White (Columbia, '12) and K. C. DeWalt (Iowa, '27)—vacuum tube engineers.



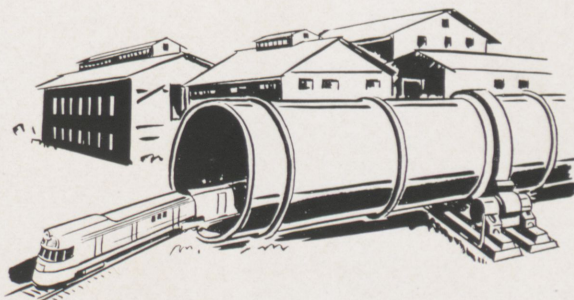
## GREASED LIGHTNING

**T**HIRTY-ONE hundred revolutions a minute is lightning fast all right. But when a bearing revolving at that speed makes more noise than a boiler factory and coasts to a stop in 12 seconds, then it's time to look for a good lubricant.

There's a catch though; the bearing is a part of an x-ray tube and operates in a high vacuum. The tendency of oil and grease to vaporize under these conditions makes it impossible to use ordinary lubricants.

So G. E. X-Ray Corporation engineers Atlee (Oregon State, '29), Filmer (Armour Tech, '31), and Wilson (College of Emporia, '31) set to work and developed a new lubricant—barium. When a thin film of this metal was applied to the bearing, its speed rose to over 3500 rpm, the noise of operation was materially reduced, and the coasting time was increased to eight minutes.

The benefit of these young men's research is not limited to the x-ray field alone, for their findings will apply equally well in all cases where rotating devices operate in a vacuum.



## GARGANTUAN GARAGE

**I**F Burlington Railroad officials would give their permission, you could drive their Twin Zephyrs into the newest kiln of the Permanente cement mill in California and still have enough room left over for a large freight car.


This cement kiln, one of the largest pieces of rotating machinery in industry, measures 450 by 14 feet. It will be used in furnishing 6,000,000 barrels of cement for the construction of Shasta Dam.

The kiln will be driven by a 200-hp G-E motor—the largest ever built for this purpose and representing an innovation in design as well as size.

The big motor was tested by young engineering college graduates taking the General Electric Test Course at Schenectady.

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