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Vol. XLV February, 1936 Number 5

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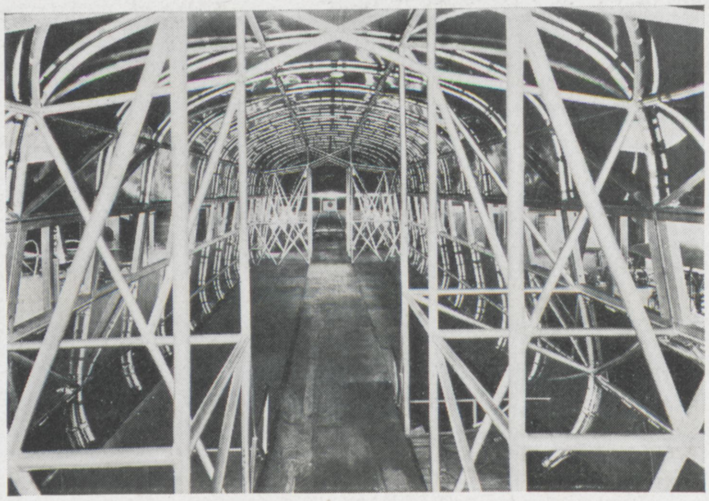
MARKS-'35.

. . . . SECOND SEMESTER BEGINS . . . .



HERE'S HOW—the framework of the light weight, streamlined rail cars for high speed is Lindewelded from chrome-molybdenum steel tubing.

Mastery over all Metals

Welding Makes Jointless Structures Possible in Practically All Commercial Metals and Alloys

By A. B. KINZEL*

One great advantage of using welding is that practically every commercially available metal and alloy can be made by this means into a jointless assembly.

Contributes to Home Comforts

Numerous articles fabricated by welding are found in most homes. Familiar ones cover a wide range of metals—kitchen ware and furniture of aluminum, copper and stainless steel; copper tubing in refrigerators, sheet metal in refrigerator boxes; kitchen cabinets and gas ranges; water pipes of copper, brass, iron and steel; furnaces and hot water tanks of strong heat-resisting irons and steels. Even the tiny alloy wire elements in radio tubes are welded.

Simplifies Automobile Maintenance

Automobile manufacturers use welding for innumerable assemblies where your safety and comfort depend on permanent strength and tightness. The modern automobile repair man also uses welding. With welding he quickly restores broken parts to use again. Steel bumpers, fenders, frames are readily made jointless by welding—as strong as or stronger than the original piece. Cracked cylinder blocks and broken aluminum crank cases are welded. Valves and valve seats are made service free by welding a thin coating of Haynes Stellite to the wearing surfaces to give longer life and added thousands of low cost miles.

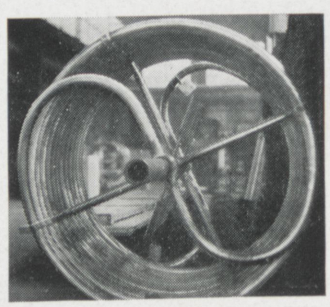
Aids Industrial Users

In industry—for tanks, containers, piping and a wide variety of other machinery and equipment of all sizes, shapes and metals—the use of welding is even more extensive.

Welding Marches Ahead

The wide-spread use of welding for various metals and alloys has been due largely to constant advances in technique and materials. Typical among these is the development of Lindewelding, a procedure for the rapid welding of steel pipe and plate. Speed increases of 50 to 65 per cent and material savings of 25 to 50 per cent over previous methods have been made.

Bronze-welding, welding with a bronze welding rod, is widely used for both repair and production. Smooth joining of metals or alloys of different compositions can be accomplished by bronze-welding. Steel can be bronze-welded to cast iron, bronze and copper can be joined, brass and steel plate can be united.



EVERY METAL—responds to the oxy-acetylene blowpipe. This stainless steel coil for cooling milk has welded joints.

Makes Modern Metal Designs Jointless

Exact procedures for the welding of corrosion-resistant steels and alloys have been developed. Welds so made are sound, strong and ductile. Resistance of the welded joint to corrosion makes it valuable also for use in joining special alloys such as Monel Metal and Everdur. Welded aluminum alloy chairs, tables and other furniture have been made possible through the development of special aluminum welding rods.

At Your Command

Modern welding technique, plus the great variety of metals and alloys on the market today provide many new possibilities for your products. Information and data which will help you use welding to wider advantage may be had from the nearest Sales Office of The Linde Air Products Company, a unit of Union Carbide and Carbon Corporation. These are located at Atlanta—Baltimore, Birmingham, Boston, Buffalo, Butte—Chicago, Cleveland—Dallas, Denver, Detroit—El Paso—Houston—Indianapolis—Kansas City—Los Angeles—Memphis, Milwaukee, Minneapolis—New Orleans, New York—Philadelphia, Phoenix, Pittsburgh, Portland, Ore.—St. Louis, Salt Lake City, San Francisco, Seattle, Spokane and Tulsa.

WELDING ALUMINUM—an architectural plaque, modern in design, is repaired by a modern method.

Everything for oxy-acetylene welding and cutting—including Linde Oxygen, Prest-O-Lite Acetylene, Union Carbide and Oxweld Apparatus and Supplies—is available from Linde through producing plants and warehouse stocks in all industrial centers.

*Chief Metallurgist, Union Carbide and Carbon Research Laboratories, Inc., Unit of Union Carbide and Carbon Corporation.

Surveying This Issue

OUR lead article this month, "The Early History of Rubber," treats with the discovery and history of rubber and treatment of the crude rubber at the plantation. An article to appear in a future issue will cover the manufacture of refined rubber.

AIR Conditioning is finding application to almost every phase of our everyday life. Trains, theatres, factories, and homes are more healthful and more comfortable because of this science. Mr. Kasameyer's article gives more detailed information on this interesting subject.

MR. Averitt completes his series of articles on "Fuels" this month. In this, his third article of this group, he discusses Gaseous Combustibles.

—C. D. O.

THE ROSE TECHNIC

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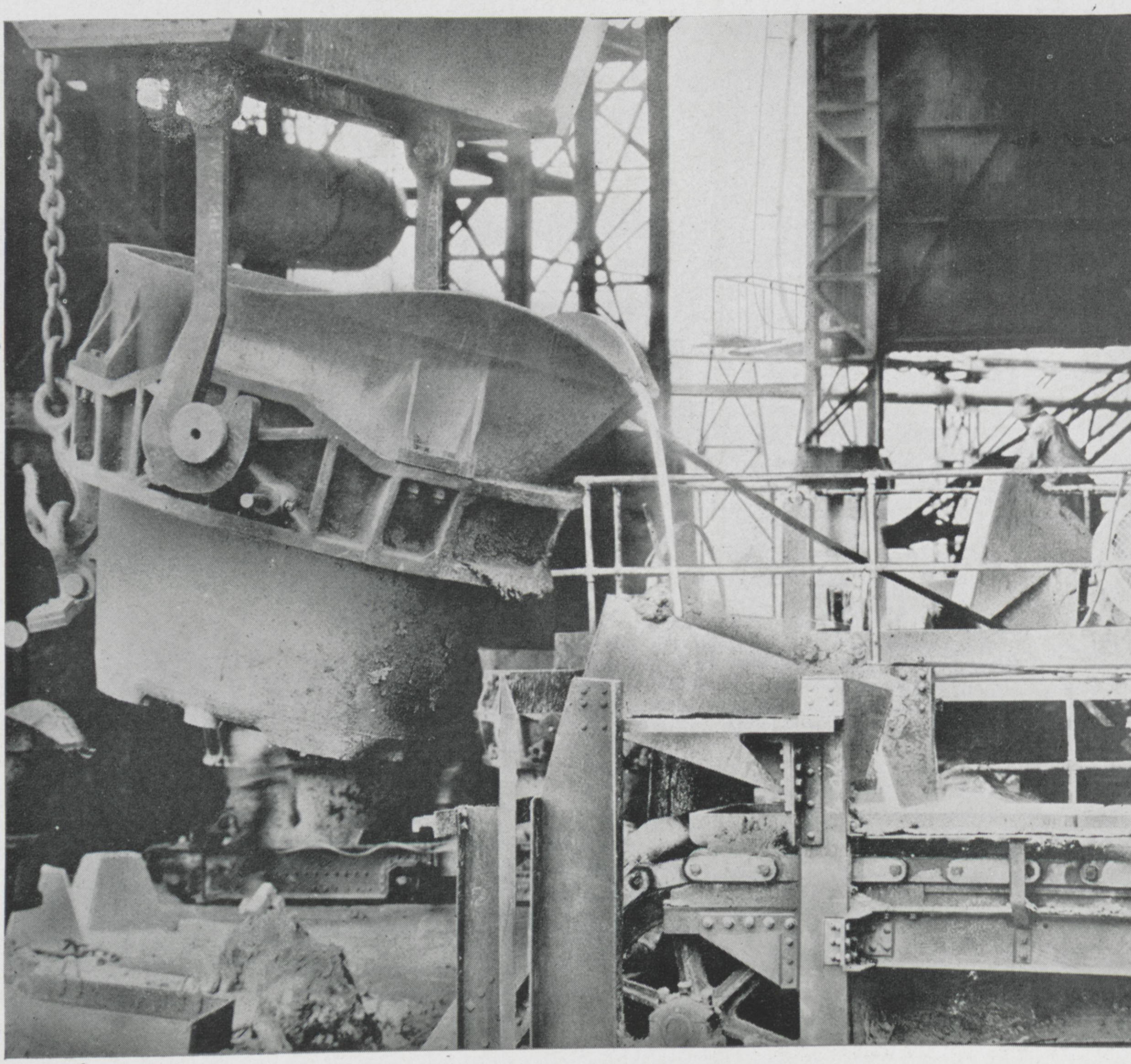


Pouring Molten Copper

THE ROSE TECHNIC

THE TECHNICNAL JOURNAL OF THE ROSE POLYTECHIC INSTITUTE

Volume XLV FEBRUARY, 1936 Number 5

The Early History of Rubber

J. Robert Marks, m., '36

Copyrighted by United States Rubber Company

THE answer to the question "What did Columbus discover in 1492?" is obvious. However, it is not so easy to answer the question "What was his chief discovery on his second voyage?" When he landed on the island of Haiti on that second trip, he was looking for gold; his eyes were blind to the importance of a simple game being played with a ball that was bounced by some half-naked Indian boys on the sand between the palm trees and the sea. Instead of the coveted gold, he took back to Europe, just as curiosities, a number of the strange black balls given him by these Indian boys. He had learned that the strange balls were made from the hardened juice of a tree.

As a result of his failure to take back gold, Columbus was thrown into prison for debt. He could not foresee that four hundred years later men would convert that gummy tree juice into more gold than that of which King Ferdinand and Queen Isabella ever dreamed.

A century later the Portuguese founded the colony of Brazil on the continent of South America. Their settlements were near the coast, and the great Amazon region remained unexplored for another century. A Portuguese missionary, who found the same kind of gummy tree juice that Columbus had discovered in the West Indies, was the first to make the trip up this great river. As he traversed the route, he found many Amazon natives wearing shoes. They had long since discovered that besides being elastic it was waterproof and that by pouring some of this liquid over their feet and letting it dry, they had perhaps the best fitting shoes that were ever made.

In 1731 the Paris Academy of Science sent a group of scientists and explorers to South America. One of these Frenchmen, La Condamine, wrote of a tree called "Hevea": "There flows from this tree a liquor which hardens gradually and blackens in the air." The people of Quito were waterproofing cloth with it, and the Amazon Indians were making boots which, when blackened in smoke, had the appearance of leather. Most interesting of all, the natives coated bottle-shaped molds, and after the gum had hardened they broke the molds, leaving unbreakable bottles that would hold liquids.

A short time later Lisbon began to import some of these crudely fashioned articles, and it is said that in 1755 the King of Portugal sent to Brazil several pairs of boots to be waterproofed. A few years later the Government of Para, Brazil, sent him a full suit of rubber clothes. For all that, this elastic gum was for the most part only a curiosity; few people knew there was such a thing.

About 1770 a ball of this gum found its way into England, and Priestly, the scientist, discovered that it would rub out pencil marks. You have probably guessed what he named it long before this: "rub-ber". Almost every language except English uses in place of the word rubber some form of the word "caoutchouc", which means "weeping tree", and which is the French spelling of the name given to rubber by the natives of Brazil. After Priestly's discovery, a one-inch "rubber" sold for three shillings, or about seventy-five cents; artists were glad to pay even that price because their work was made so much easier and neater.

In 1800 Brazil was the only country manufacturing rubber articles. Her best market soon proved to be North America. Rubber shoes were most in demand by buyers in American ports, although water bottles, powder-flasks, tobacco pounches, etc., found ready sale. Soon Americans began to import raw rubber and to manufacture rubber goods of their own.

Charles Goodyear

In the Old World a Scotchman named Macintosh found that by spreading liquid rubber, dissolved in coal naptha, on cloth, he was able to waterproof it. This explains why many people still refer to raincoats as mackintoshes. Rubber clothing shared favor with rubber shoes, but its popularity was short-lived for it did not wear well and was very sensitive to temperature. The rubber shoes and coats became hard and stiff in winter, and soft and sticky in summer. A man wearing a pair of rubber overalls who sat down too near a warm stove soon found that his overalls, his chair, and he were stuck together; and the first rubber coats became so stiff in cold weather that on being taken off they would stand like tents until the rubber thawed out. When thawed out, the coats were very uncomfortable to the touch. Rubber manufacture was attempted on a large scale in North America, but the money invested was lost because the goods produced could not stand changes in temperature.

One day Charles Goodyear, a Connecticut hardware merchant of an inventive turn of mind, went to a store to buy a life preserver. Finding only imperfect ones, his attention was drawn to the study of rubber, and in a short time he was thinking of it by day and dreaming of it by night. He was satisfied that some way could be found to make rubber firm yet flexible regardless of temperature, and for ten years he experimented with different mixtures and processes, hoping to find the right one. His hardware business went to pieces, so intent was he in his search. Finally, in the winter of 1839, when he was at the point of giving up in despair, he accidently came upon the solution.

While experimenting in his kitchen, which, through lack of funds, he was often forced to use as a laboratory, he engaged in one of those animated conversations so habitual to him in discussing his experiments with his neighbors. A piece of rubber combined with sulphur, which he held in his hand as the text of his discourse, was, by a violent gesture, thrown into the stove near which he was standing.

Upon taking the charred mass from the fire, he saw that through its contact with the heat it had been completely transformed. Without question this transformation would have had no significance to anyone else, but Goodyear immediately saw that something of vital interest had occurred.

When the rubber had cooled enough to be handled, he tested its properties and found that it could be bent and stretched easily, without cracking or breaking, and that it always snapped back to its original shape. Above all in importance, it was no longer sticky, and apparently half of the problem was solved. He had yet to determine whether or not the baked mixture would withstand the cold, so he nailed it to the outside of the door and went to bed. Probably he slept but little and was up early. At any rate he found the rubber unaffected by the cold. It was then he knew that he had made an important discovery. The process was named "vulcanizing" after Vulcan, the Roman god of fire.

Vulcanization is now effected in several different ways, but chiefly by adding certain chemicals to rubber and subjecting the mixture to heat. The great rubber business of the world has been established on this process. Practically everything made entirely or partially of rubber must go through the vulcanizing process, whether it is a pair of Keds, a tire, or a rubber doormat.

Notwithstanding the wonderful discovery Goodyear had made, the path ahead was not simple. He knew that certain chemicals and heat must be used in combination to bring about the "change" he had searched for, but just what quantities of chemicals and just how much heat would produce satisfactory results he did not discover until after years of painstaking toil and experiment. He tried unsuccessfully all sorts of heating devices and manufactured tons of goods, only to reject them before finally the proper methods were worked out.

So many people had been deceived by previous ventures that Goodyear had great trouble in finding anyone with enough faith to invest money in his discovery. As a result, it was five years before he was able to take out the first of the more than sixty patents which he was granted during his lifetime for applying his process to various uses. Goodyear often had to defend his patents in court because many people attempted to take an unfair advantage of his discovery. In the most famous of these suits, he was defended by Daniel Webster and opposed by Rufus Choate. Thus we see interwoven in the story of rubber the names of two of the greatest statesmen this country has produced.

The Hevea Tree

Whenever the bark of a rubber tree is cut, a liquid pours forth to heal the wound. This juice is called latex, and from it come the world's supplies of crude rubber. Many people have the erroneous opinion that latex is obtained by boring a hole into the tree and letting the sap run out, as in the case of maple trees. However, latex is not the sap of the tree but a secretion found only in the inner bark, and when the tree is tapped care is taken that the wound shall not be deep enough to reach the woody part of the tree where the sap flows.

Time was required to discover which variety of rubber tree gave the largest amount of pure rubber. Finally, the Hevea, the very tree the Frenchman La Condamine wrote about, proved to be the best, although by no means the only one of commercial value.

The Hevea tree grows sixty feet tall, and when full grown is eight or ten feet around. It rises as straight as a walnut tree, with high branching limbs and long, smooth, oval leaves. Sprays of pale flowers blossom upon it in August, followed in a few months by pods containing three speckled seeds which look like smooth, slightly flattened nutmegs. When the seeds are ready to drop, the outer coverings of the pods burst with loud reports, the seeds shooting in all directions. This is nature's clever scheme to spread the Hevea family.

Best Rubber Producing Zones

The tree grows wild in the hot, damp forests of the Amazon valley and in other parts of South America which have a similar climate. The ideal climate for the rubber tree is one of high humidity and heavy rainfall, where the temperature is uniform the year round, from eighty-nine to ninety-four degrees at noon, and not lower than seventy degrees at night.

The moist but very hot climate which rubber trees require is found only in the zone around the world between parallels thirty degrees north and thirty degrees south of the equator. Within this zone there have been found more than 350 different kinds of rubber-bearing trees, shrubs, and vines; for this reason the zone is called the Rubber Belt. As most of the rubber used commercially is gathered from trees growing within a zone extending from ten del grees north to ten degrees south of the equator, this latter zone is sometimes calles the Inner Rubber Belt.

Columbus First Sees Rubber

Continuing the belt across the Atlantic Ocean to Africa we come to the Belgian Congo which produces a small quantity of wild rubber. Partly owing to the fact that it is not originally of such good quality as Brazilian rubber, and partly owing to the careless manner of gathering, Congo rubber is not so valuable for manufacturing as is Brazilian rubber.

The circle is completed by following the belt across the Indian Ocean to Ceylon and the East Indies, which contain the great rubber plantations from where most of the rubber comes.

The Amazon country, lying almost under the equator and with a rainy season that floods the jungle half of the year, is the ideal home of rubber trees, which grow wild there in abundance.

For centuries these trees grew untouched with their wealth securely sealed up in their bark. The trees around the mouth of the river supplied whatever was needed for the little manufacturing that was first done. But Goodyear's discovery, which resulted in a universal use of rubber, changed all this. Brazil was surprised to find what great treasure her forests contained, and she began in a serious way to develop a large crude rubber business.

Less than thirty years ago Brazil produced most of the rubber used in the world, but today she furnishes only a small fraction of the world's supply. How Brazil, possessing millions of rubber trees of the finest quality in her vast forests, has been forced by unfavorable conditions to permit the Far East to wrest from her in this short time the crude rubber supremacy of the world is one of the most unusual chapters in modern industrial history.

The Struggle for Crude Rubber Supremacy — Plantation Development

THE story of the success of the East Indies in wresting the crude rubber supremacy from Brazil begins with an Englishman named Wickham, who is called the father of plantation rubber.

Goodyear at work

Wickham, after spending some years in South America, was fully aware of the difficulties of gathering rubber in the jungles. He was of the opinion that if rubber could be cultivated, it might prove a good crop on the coffee plantations in India, which a blight had rendered valueless for coffee.

As a result of this blight in India, Brazil was given a chance to establish herself in coffee growing. This was indeed a strange situation. While Brazil was losing the rubber supremacy to the Far East, the Far East was surrendering the leadership in coffee to Brazil. Brazil now holds the supremacy in coffee growing as firmly as does the Far East in rubber growing.

Wickham saw that there were difficulties that would prevent the gathering of wild rubber from keeping pace with the growing demand. Although millions of rubber trees still stood untouched in the Brazilian forests, only those trees near the river banks could be tapped easily because of the dense vegetation. Life in the jungles was dangerous, and rubber gatherers were hard to find. It was necessary for workers to carry food with them on their expeditions into the rubber country, thereby adding greatly to the expense. Moreover, methods of handling the rubber were very crude, and the rubber as it reached the market was not always clean or of high quality. It is no wonder that rubber obtained in this manner came to be known as "wild rubber."

Wickham wondered why, if rubber trees grew from the seeds which nature scatters in the jungle, they should not grow from seeds put into the ground by hand. Instead of having to brave the jungles, men could plant and cultivate rubber in spots of their own choosing, in rows where they could easily be tended and tapped quickly and safely, so long as they chose places where the climate was right.

While in Brazil Wickham planted a number of rubber seeds to see what would happen. The seeds grew, and he later wrote a book concerning his idea and experiments. A copy of this book came into the hands of Sir Joseph Hooker, the Director of the Botanical Gardens in Kew, near London. So interested did he become that he called Wickham's plan to the attention of the Government of India, and finally Wickham was commissioned to take a cargo of rubber seeds to England, so that his idea might be tried out.

Far up the Amazon river he placed in the hold of a steamer several thousand carefully packed seeds of the Hevea Braziliensis, or rubber tree. The voyage across the Atlantic was filled with anxiety for fear the seeds might die before they reached London. Wickham left the ship at Havre, hurried over to Kew and arranged for a special train to meet the ship at Liverpool, where they were rushed to the Botanical Gardens and planted. In three days they were germinating, and soon were growing lustily amidst their strange surroundings. On August 12, 1876, several thousand seedlings were packed in special cases and shipped to Ceylon, on the other side of the globe.

Plantation Development

The young shoots sent out from London were planted at Heneratgodo, sixteen miles from Colombo, and were ready for tapping four years later. When tapping began, it was evident that Wickham's plan would succeed.

From these trees, so carefully tended in their youth, have sprung the great rubber plantations of the Far East. The plantations spread from Ceylon to Malaya, where rubber growing was eagerly taken up by planters who despaired of ever making a living out of coffee. It later spread to Sumatra, Java, and Borneo.

While the first plantations were growing, the development of the automobile was receiving the zealous attention of inventors in Europe and America. The automobile industry suddenly assumed vast importance early in this century, and began to demand rubber in quantities that Brazil, with its unorganized methods and high labor costs, was unable to supply. It was very fortunate that in this sudden emergency there was found ready in the Far East, as a result of the planting that had been done there, a supply that met the requirements. Rubber manufacturers continued to use plantation rubber because it was as good as Brazilian rubber for most purposes, and was cheaper and more uniform in quality. Brazil has continued producing about the same quantity of rubber year after year, while the plantation output has grown so rapidly that Brazil's relative importance as a rubber producing country has steadily waned.

In 1910 the United States Rubber Company began the development of a plantation of its own. Today the largest single rubber plantation in the world is owned by this Company. This plantation is on the island of Sumatra in the Dutch East Indies, one of the best governed colonies in the East. On the plantation is a great orchard of rubber trees, comparable to the better kept orchards of fruit trees in our own country. For eighty square miles, an area larger than the District of Columbia, the gently rolling landscape is filled with the orderly ranks of trees, which number nearly 5,000,000 and require ten thousand employees for their care.

On this plantation and on the others owned by the United States Rubber Company, the science of growing rubber trees has been brought to a perfection known nowhere else in the world. Groups of botanists, chemists, and tree experts constantly study tree diseases, methods of increasing the yield, and other problems concerning the growing of fine trees which will produce high grade rubber. Here, by experiment and investigation, the secrets of the rubber tree are being brought to light. The years of study and research on the plantations have made possible a better understanding of rubber.

Aside from the plantation mentioned heretofore, the United States Rubber Company owns many other plantations scattered throughout Sumatra and Malaya. The total area owned by the Company is 134,452 acres, and the total planted area is 99,400 acres, of which more than 73,000 acres are at the tapping stage.

In 1930 the company's plantations produced 36,000,000 pounds of rubber. Since that time, the yield has increased rapidly year by year. The number of trees is now about 12,000,000, and planting is going steadily forward. In 1911 the Company broke all records for the largest planting in any single year—14,000 acres.

Plantation Life

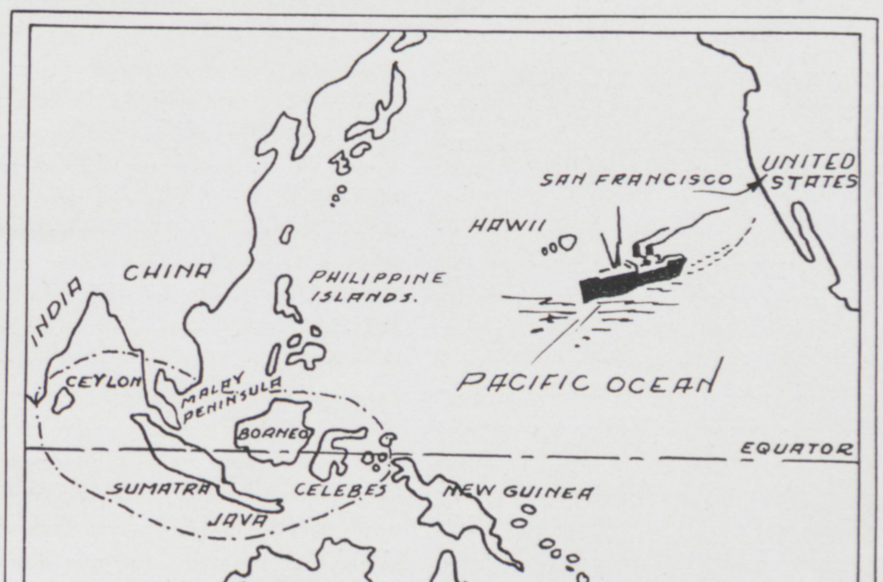
In establishing a rubber plantation, the choice of a site is of first importance, for the rubber tree will not yield satisfactorily unless climate and soil conditions are altogether favorable. Second in importance is the necessity of access to a steady labor supply and a convenient shipping port. As the proper climate is a tropical one there is usually dense vegetation to be cleared away. Immense trees, thick bushes, rank straggling weeds, vines, etc. form an almost impenetrable forest. To convert such a place into a plantation means a genuine battle against jungle conditions. But gradually the trees, shrubs, and undergrowth are torn out, laying bare the rich soil ready for the plow of the planter.

Meantime the rubber seedlings have been sprouted in nurseries. When the ground is ready, they are carefully taken up and transplanted in the fields where they are to remain permanently.

Though the growth of the trees is very rapid, sometimes as much as six feet in the first year, there are five or more years of anxious waiting and guarding against winds and disease before they are ready to be tapped. In the first year of tapping the yield of a tree may only be about one-half pound of rubber a year. This increases slowly, and after several years amounts to as much as four or five pounds a year. The yield on the United States Rubber Company's estates is being increased through "bud grafting," by which buds from high yielding trees are grafted on very young trees.

Life on the rubber plantations of today is far more pleasant and comfortable than the life of the gatherer of wild rubber in the jungle. In Brazil, the solitary workers plunge at dawn into the perilous forest, with its lurking wildcats and jaguars, its coiled and creeping serpents. The dwellings are flimsy huts, food is scarce and expensive, and the most primitive methods prevail.

On the other hand, workers on a well-managed plantation live in comfortable houses in healthy surroundings and are supplied with plenty of good food. The conditions are so much better than generally prevail among natives in the Orient that work on a plantation is considered more desireable than almost any other form of labor. The unmarried men live in barracks, and the men with families have individual houses or rooms, often with garden plots adjoining. Big kitchens prepare the food in the best native style and with due regard to religious sects. Nurseries for children, recreation centers for young and old, and hospitals to care for the sick, all have a place in the plantation organization. Scientific supervision of food, drinking water, and other important health conditions have greatly lessened diseases of the type which most frequently occur among natives of the tropics.



LOCATION OF RUBBER PLANTATIONS.

AIR CONDITIONING

William E. Kasameyer, m., '36

Introduction

AIR conditioning means the positive and accurate control of humidity, temperature, circulation, purity, and the component constituents of the atmosphere under indoor conditions. These characteristics may be varied so as to produce either an atmospheric constituent possessing the maximum personal comfort, health, and safety of the persons in the building, or to produce the ideal atmosphere for maintaining the quality of a material or a product in an industrial plant. The Air Conditioner Manufacturers' Association considers an air conditioning unit as a specific air treating combination consisting of means for ventilation, air circulation, air cleaning, and heat transfer, with control means for maintaining temperature and humidity within prescribed limits.

The humidity of the air is very essential to comfort and to health. The above statement is usually classed as one of the leading principles of air conditioning. There must be a definite humidity, that is, percentage of water vapor present in the atmosphere, for each of the different conditions which may appear in the enclosure. For example, on a dry hot day the humidity must be higher than during cold moist weather.

In order to obtain the maximum comforts from the air it must be kept in constant motion. Still air tends to make the occupants in a room very uncomfortable because it soon loses its freshness. However, too much circulation is harmful to both health and comfort. Engineers have determined that for the best conditions for air ventilation in buildings the following precautions should be observed:

1. Air velocity should not exceed two feet per second to insure maximum comfort for persons at rest.

2. Air currents should not strike the occupants of the building from above, from behind, or from floor level.

Dust in the air is very objectionable, since it carries not only germs which are injurious to good health but also chemicals which are harmful to machinery. Since the number of germs varies directly with the amount of dust in the atmosphere, it is easy to understand why purity is very essential in air conditioning.

People perspire very freely during hot weather. It is dangerous for a person who is perspiring to enter a building in which the temperature is considerably lower than that outside. When he enters the building the pores in his body close immediately; therefore, he cannot perspire freely and the sudden change often produces an intense chill. Air conditioners have reached the conclusion that the inside temperature should not vary more than ten degrees from the outside reading.

Another important factor for good health and comfort is that of sufficient air. The amount of air necessary per person varies with the place and is of particular importance when that place is a classroom, kitchen, theater, hotel, or hospital. In some states statutes exist which regulate the minimum amount of fresh air for each person in enclosures. Since it is difficult to supply enough fresh air in a crowded room without making the velocity too high for satisfactory use, regulations have been developed stating the amount of floor space required per person in various buildings. It is a general custom to allow a room volume of about one hundred and seventy-five cubic feet per person in schools and about ninety cubic feet in churches and auditoriums.

Trends in Air Conditioning

Although most of the leading developments in air conditioning have been made in the last few years, the foundation was laid many years ago. Robert Boyle is given credit for inventing at Oxford in 1666, the first suitable means of determining the humidity of the air. John Dalton, in the third of four important papers contributed to the Manchester Society in 1801, was the first to announce that water vapor exists mixed with air and that evaporation is proportional to the temperature. The first comprehensive humidity tables were published in London in 1847. Joseph McCreery of Toledo, Ohio, initiated the development of the modern types of air cleaners in the later part of the nineteenth century. Early in the twentieth century two Americans, Cramer of North Carolina and Carrier of New York, patented systems which controlled relative humidity.

Manufacturers have known for nearly fifty years that humidity is vitally important in drying and storage. Various methods of adding moisture to the air have been developed in the textile industry to counteract atmospheric variations. An attempt was made to mix humid air from the drying chamber with dry heated air, but it was necessary to make the damper adjustments by hand and, therefore, they were not extremely accurate. About thirty years ago when the thermostat was invented, it was applied to automatically regulate dampers by means of compressed air and in this way to maintain any required relative humidity.

The art of air conditioning has been developed by applying mechanical equipment with the idea of creating and maintaining desirable atmospheric conditions within enclosures.

Present Day Systems and Uses

Air conditioning has suffered severely because of the lack of uniformity of the different units. The term was applied to any system which made the air colder. Some of the units were very serious fire hazards. Buyers often became disgusted with the entire field when bids for an installation were received and ridiculously wide variations in price range were noted. This was true because one concern was putting in a very cheap and dangerous system, another was setting up a very thorough unit, or still another was planning something fairly similar to air conditioning. However, during the past few years educational institutions have increased their instruction in the art of air conditioning. Codes and standards are being drawn up and adopted to regulate the different branches of air conditioning, both as to interpretation and parts.

The condition of the air depends a great deal upon humidity; at times the humidity will be too high and then at other times it will be too low. A humidifying unit adds water vapor to, and circulates air in, a space to be humidified. A dehumidifying unit removes some water vapor. Humidifiers may be classed either as direct or indirect. In the direct system moistened air is supplied to the room, while in the indirect system the moisture is sprayed into the enclosure. Silica gel, a hard crystalline substance, is used to remove excess vapor from the air. Silica gel has a chemical composition of silicon dioxide (SiO_2). One of its chief characteristics is that it will absorb water to the extent of about twenty-five percent of its own weight.

The air must be filtered in order to improve the quality of the equipment, to recover valuable dust, to conserve heat losses, to safeguard health and personal efficiency, and to eliminate dust nuisance. Various types of cleaners, After the air has been purified, humidified or dehumidified, and the temperature adjusted, it is distributed to the various parts of the enclosure by means of fans, ducts, grilles, and dampers. The working of the apparatus is quieted by the installation of silencers. Ventilators are used to remove the stale air so that it may be replaced by a fresh supply.

With the use of such instruments as the thermostats, hydrostats, electric controls, and other types of regulators, the system is automatically kept in perfect condition. Thermometers and other recording instruments tell how the unit is working.

The power for a system is usually obtained by means of a steam turbine or motors. To obtain the correct speed and power at the right places, switches, couplings, control panels, belt and chain drives, and speed reducers are used. Sound isolaters are installed so that the noise of the engine will not irritate the people in the building.

In order to obtain the maximum efficiency, walls and other portions in direct contact with the exterior air should be weather stripped. In a perfectly air conditioned building the windows should be used only as a means of obtaining light.

Since 1932 millions of dollars have been spent in the improvement of the conditions of air. Units are now being installed in hotels, hospitals, factories, and residences. Henry Ford established a large system in his River Rouge plant at Dearborn. The Department of Interior Building was completely air conditioned last year. This is one of the greatest achievements accomplished along this line, because the space conditioned is approximately eight million cubic feet and the expenditures totaled about one million dollars.

Air conditioning at the present time may be compared to a new bud on a rose bush. Both have a good foundation behind them. However, people will, in the future recognize their full beauty and usefulness. Different states in the country are establishing codes to regulate the different systems of air conditioning. These codes will remove the scavengers who have in the past misrepresented true air conditioning and have sold systems which do not come up to the standards. The store, restaurant, or beauty parlor which is now air conditioned enjoys a distinct advantage over those which are not so conditioned. In the future, as more and more of these establishments are equipped with air conditioning, this advantage will become less and less. However, the building that is without a unit will be at a very distinct disadvantage. An example of this situation is to be found in railway-car air conditioning. As soon as one of the companies started to install units it was necessary for the rest to follow suit. Forward-looking managers are beginning to realize that the advantages received by installing air conditioning systems will pay off the high cost of the necessary investments. In the near future the cost will undoubtedly be reduced sufficiently so that people will be able to equip their homes and automobiles with air conditioning units. In fact, the time is not so far away when the slogan, "No home is complete without a telephone", will be equally applied to air conditioning units.

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FUELS

Robert A. Averitt, e., '37

THE third general class of fuels is that of the gaseous fuels. The ease of application and control of gaseous fuels have made them exceedingly important within the last thirty years. Although gas for lighting purposes has been supplanted to a large extent by electricity, it is becoming a more and more important domestic fuel. At the present time gas is used domestically for heating, cooking, and for refrigeration. The principal disadvantage of a gaseous fuel as compared to coal is its initial cost.

Natural Gas

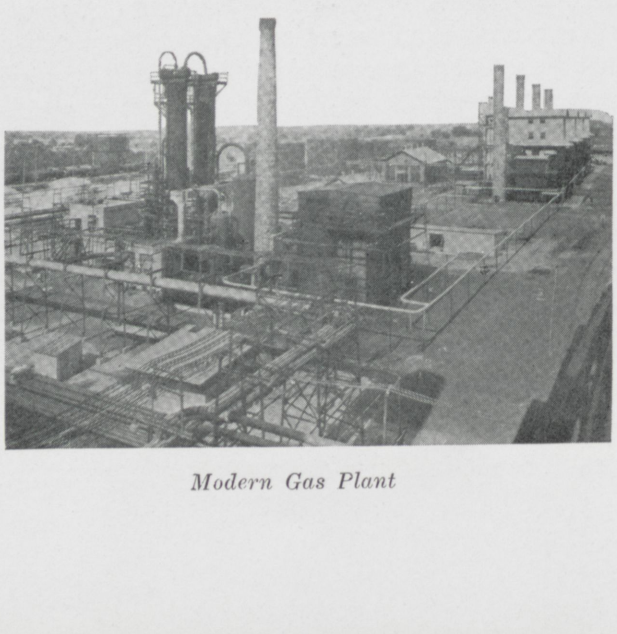
The most valuable of the gaseous fuels is natural gas. It is found, for the most part, in Pennsylvania and in the southwestern regions of the United States. Natural gas is obtained from certain rock formations in which it usually occurs with petroleum, and for a number of years it was considered of uncertain value and allowed to escape into the atmosphere. In origin, natural gas is closely associated with petroleum, for both are the derivatives of the decay of organic matter. Natural gas may be classified into two distinct classes—the wet gases and the dry gases. The former are those gases which contain members of the paraffin series in sufficient quantity to render casing head gasoline upon compression. The latter are those which do not contain enough to make extraction of gasoline profitable. At present the United States produces about 98 per cent of the world's natural gas. Natural gas contains more heat units per unit weight than any other of the gaseous fuels. At standard conditions it contains about 1015 B.T.U. per cubic foot. However, the supply is rapidly diminishing in the present producing fields.

Coal Gas

In the class of the prepared gaseous fuels, coal gas is probably the most important. Coal gas is formed in the manufacture of coke, and is, in one sense of the word, a by-product. It is a result of the destructive distillation of coal. As early as in 1691 it was known that a highly inflammable vapor could be produced from coal. But it was not until the latter part of the 18th century that a young Scotch engineer named Murdock succeeded in demonstrating that it could be made a valuable aid in the advancement of civilization. Murdock was a superintending manager for the historical old firm of Boulton and Watt at the time. He conceived the idea of using coal gas for lighting purposes. His experiments along this line proved so popular and successful that in 1798 he lighted the principal buildings of Boulton and Watt's engine works, and performed numerous experiments on the distillation of coal. Murdock, however, never received any reward for his discovery. A German named Windsor perfected a process by which the lighting gas was produced by the distillation of wood. Windsor came to London and secured a charter for a Gas Light and Coke Company, against which Murdock fought bitterly. For the most part, coal gas is made from bituminous coal and from ctnnel coal for its enriching qualities. At standard conditions coal gas, or coke oven gas as it is sometimes called, contains about 560 B.T.U. per cubic foot.

Producer Gas

Another of the prepared gaseous fuels of considerable importance is that known as producer gas. It is made by passing air, or steam, or a mixture of air and steam through a bed of incandescent carbon. Coke is usually the source of the carbon. When steam alone is passed through the carbon, the resulting gas is often called water gas. The heat value of producer gas is very low, but the manufacturing cost is also very low. Water gas is an effective fuel in many metallurigical operations, and finds some use in welding and other engineering operations. The discovery of producer gas is usually attributed to Fontana in the latter half of the 18th century, but it was not until 1875, after almost 50 years of attempts, that Lowe and DuMotay inaugurated carburetted water gas for lighting purposes. Carburetted water gas

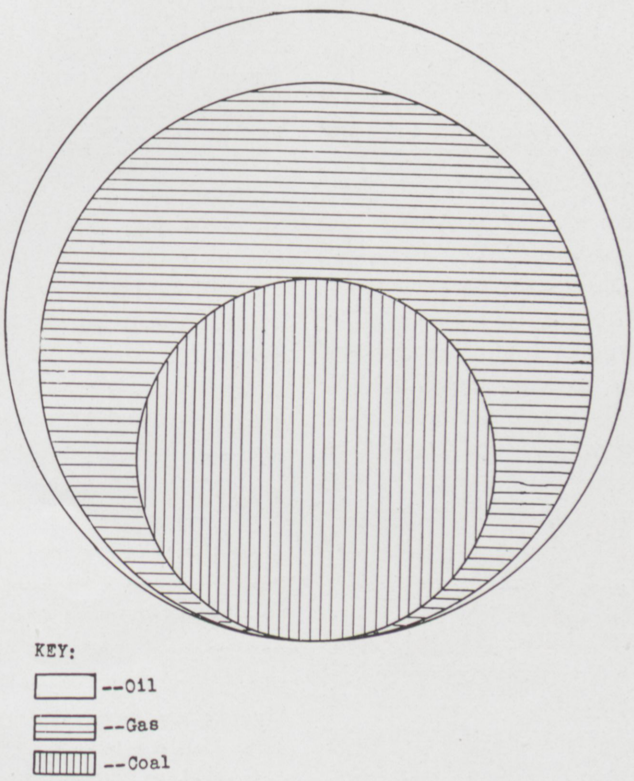


Modern Gas Plant

is formed by mixing water gas with the gas resulting from the destructive distillation of certain fuel oils. At standard conditions producer gas contains about 155 B.T.U. per cubic foot.

Blast Furnace Gas

The third of the most important gaseous fuels is that known as blast furnace gas. It is a by-product of the blast furnace operation used in iron refining. As a result of the several reactions taking place in the blast furnace at the occurrence of the blast, the gas leaving the furnace contains carbon monoxide, carbon dioxide, nitrogen, and hydrogen in a very small percentage. Because of the high percentage of inert gases in blast furnace gas, it is rather slow to ignite and requires special furnaces and burners. Many of the steel refining plants use the gas for the generation of steam because of the fact that it is a by-product of one of their operations. The heat value is very low. At standard conditions, one cubic foot of blast furnace gas will contain about 100 B.T.U.



Gas for Illumination

The flame produced by the complete combustion of gas is colorless and unsuitable for illumination. It was found that incandescence could be brought about by introducing a solid substance into the flame. The solid substance is called the gas mantle. In 1880 Dr. Carl Welsbach of Belgium developed a very satisfactory mantle, composed for the most part of thorium oxide and a very small percentage of cerium oxide. The first installation of gas for illumination in the United States occurred in Newport, Rhode Island, in 1806. Municipal gas illumination first occurred in Baltimore in 1817; however, 50 years later municipal illumination by gas was widely prevalent throughout the country.

Gas for Heat

Gas, either natural or prepared, is a convenient and clean fuel. Because of these inherent properties, it is used principally for domestic purposes. In some communities, special heating rates are offered by the gas companies to encourage its use, since the cost of prepared gas is high as compared with that of the liquid or solid fuels. In regions where natural gas is found, the cost is comparatively small, and the quality of the fuel from a heating standpoint is far greater than that of any of the prepared gases. The use of gas, either industrially or domestically, requires specially designed furnaces and boilers. This fact is more than compensated for, since ti is found that gas furnaces operate with an efficiency of about 80 per cent as compared with coal furnaces, whose operating efficiency varies from 50 per cent to 65 per cent. Further than that, gas is much more simply fired than either a liquid or solid fuel.

The Fuel of the Future

The accompanying diagram indicates the relative amounts of gaseous, liquid, and solid combustibles produced annually. Hence it indicates annual consumption in the United States.

It is evident from the statistics which show our present rate of fuel consumption that at some time in the future we are going to use up our source of chemical potential energy. After that, some other source of energy must be tapped if the civilization of that age is to continue. Many conjectures have been brought forth suggesting a future source. Some have suggested that the energy distributed by the sun should be utilized. Others have suggested that the kinetic energy of the celestial system should be harnessed. However, at present such conjectures seem rather far-fetched and impractical. Whatever the source of energy, its supply will have to be almost unlimited, if one is to judge from the present increasing rate of consumption.

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THE ROSE TECHNIC

Member Engineering College Magazines Associated

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Extra-Curricular Activities

Apparently few students realize the benefits which are derived from extra-curricular activities. Occasionally these outside activities prove to be more valuable to a man than the subjects which are the primary requisites of an education. As a matter of fact, many students choose their vocations from extra-curricular work which they found to be particularly interesting.

A recent survey on extra-curricular activities made by Mortar Board, National Senior Women's Honor Society, shows that "the college campus is suffering from a serious condition of over-centralization of activity." Approximately one-half of the activities are carried on by less than one-tenth of the student body.

Students should be urged, therefore, to enter this work which is beneficial not only to themselves and their fellow students, but to the school in general. However, one should revaluate these activities occasionally and decide which are worthwhile and which are not.

The amount of time which one is able to devote to what may be classed as extra-curricular activities is only limited at best, and what one does with that time depends upon his inclinations and upon his obligations. There are many kinds of service to which one may bend his energies and in which one may feel that he is playing a worthwhile part. Some find pleasure in club work, others in the associations of church circles. Still others, with a less serious bent, while away their time in other forms of activities, in which, besides deriving a certain satisfaction, they shoulder some of the responsibilities.

Earning A Reputation

When hard times followed the boom of 1920, there were many in desperate straits who could not raise a dollar to avert complete disaster; but there were others, insolvent and in debt, who were able to obtain all the credit and all the cash they desired.

These favored ones had earned their advantage. Their word was good. They had kept their word in times past, regardless of cost, and thus had built a reputation that banks would accept as sound collateral.

Men of that kind have always been scarce, and it is the scarcity of such people that makes the world value them so highly. There are few experiences more satisfying than that of dealing with one who is absolutely trustworthy.

The whole world appreciates integrity. In an era of broken faith, and treachery, and falsehood, people still have a profound respect for one whose words are always true and whose pledges are always kept.

And thus a reputation for incorruptible honor becomes in time of trouble an asset more valuable than any others which one can possess. Money, and fame, and power are easily lost, and fair-weather friends desert, but the right reputation honestly earned is like a friend that never fails in time of need.

Time will wing its way with pleasure for him who plans for himself just a little more than he can do. "To be occupied and not to exist amount to the same thing," said Voltaire, perhaps the most vigorous intellect of all times and certainly the busiest.

St. Pat's

St. Pat's is a day which is celebrated by all engineering schools. In the past Rose has always celebrated this occasion too.

Formerly Rose students paraded down Wabash Avenue in Terre Haute with artificial snakes half a block long. The people of Terre Haute enjoyed these fantastic designs and its population was always well represented on the sidewalks watching the engineers' antics. Also at one time, the engineers put on a vaudeville act of their own at one of the local theatres.

These are some of the ways which were formerly employed in celebrating this day which has been set aside in commemoration of an engineer, St. Pat himself.

During recent years Rose students have been contented to celebrate the occasion with a dance known about by only the students and the members of the faculty. Terre Haute and its vicinity hardly realize that Rose even celebrates St. Pat's anymore.

With the passing of just such traditions, there has been a decided decrease in school spirit.

SPORTS

Edited by

Kenneth Buis, m.e., '38

Basketball

The Rose varsity basketball squad opened its season on January 7,, in a game with Anderson College at Anderson, Indiana. The Engineers were not successful in winning this first encounter, but they deserve a world of credit for the battle they put up. The Engineers had held only five practice sessions previous to this game, and lack of practice is a handicap to any team. The final score was 46 to 28, with Rose at the little end of the horn. In commenting on this score one should keep in mind that Anderson ranks very high in the Indiana conference, having won seven and lost three games.

Mewhinney was the leading scorer for the Engineers with a total of six points, while Kasameyer, Wolf, and Ricketts tied for runner-up honors in this game. Each one scored two field goals and one free throw.

The lineups:

Anderson (46)	F.G.	F.T.	P.F.
Gray, f	0	1	1
Fayerweather, f	1	1	1
Frost, f	4	0	2
Hall, f	0	0	0
Falker, c	4	1	0
Byrd, g	8	4	2
Herchenholy, g	0	0	0
Pletcher, g	1	0	0
McKensey, g	1	1	1
Totals	19	7	8

Rose Poly (28)	F.G.	F.T.	P.F
Kasameyer, f	2	1	3
Wolf, f	2	1	2
Wodicka, f	2	0	2
Ricketts, f	2	1	1
Eckerman, c	1	1	1
Mewhinney, g	1	4	0
Ladson, g	0	0	0
Smith, g	0	0	1
Hufford, g	0	0	0
Totals	10	8	10

The Rose squad played its second game at home in the Rose gym with the Indiana Law School. Again the Engineers were not successful in scoring a victory, but they did make a good showing. In the game played with Anderson, the Engineers were weak on defense and did very well on offense. However, in the game with Indiana Law School the situation was reversed. Kasameyer was the leading scorer for the Engineers, with three field goals and one free throw. Mewhinney was next high with two field goals and one free throw.

The lineups:

Indiana Law School (22)	F.G.	F.T.	P.F.
Conner, f	2	3	3
Grimes, f	0	3	2
Serbanthom, f	0	0	0
Ratts, c	2	1	0
Reed, g	1	2	3
Ritzman, g	1	1	3
Totals	6	10	11

Rose Poly (16)	F.G.	F.T.	P.F.
Wolf, f	0	3	3
Kasameyer, f	3	1	3
Wodicka, c	0	0	2
Eckerman, c	0	1	0
Smith, g	0	0	0
Hufford, g	0	0	0
Mewhinney, g	2	1	3
Ladson, g	0	0	3
Totals	5	6	14

The engineers were to have played Eastern Illinois at Charleston on Jan. 22, but due to bad weather the squad was not able to get to Charleston and the game was postponed until Feb. 6. The basketball squad will take a trip to Detroit on Feb. 25, for a game with the Lawrence Institute of Technology. Coach Brown is trying to arrange for another game in that vicinity so as to make the trip complete.

The Engineers are doing right well when you consider that they have played but two games and have held only seven practice sessions.

The following is the schedule as to date:

East. Ill.—Feb. 6, (there)
Anderson—Feb. 14. (here)
East. Ill.—Feb. 18 (here)
Lawrence Tech—Feb. 25 (there)

ENGINEERING AND MANAGEMENT

From the large percentage (fifty-three) of engineering graduates who ultimately reach positions of managerial responsibility in industry and business it is evident that technical training is excellent preparation for administrative leadership. These men are guiding the great industrial activities of the United States.

If you are interested in an engineering course which will train you as these industrial leaders were trained, write to the Registrar.

ROSE POLYTECHNIC INSTITUTE

TERRE HAUTE, INDIANA

Edited by Merton Scharenberg, m.e., '38

Brent Wiley

The Board of Directors of the Association of Iron and Steel Electrical Engineers elected Mr. Brent Wiley to the post of Managing Director of the Society, to be assumed January 1.

Cognizant of Mr. Wiley's leadership, experience, and executive ability to carry on the work that was instituted by previous occupants of that position, it is the unanimous opinion of the Board of Directors that Mr. Wiley is well suited to discharge the duties of the Managing Directorship of the Society.

Mr. Wiley graduated from Rose in 1898 with a B.S. degree in Electrical Engineering, and, in 1902, was awarded a Master of Science degree. He has been closely associated with the steel industry since his graduation.

After leaving college, he spent one year in the Electrical Department of the Ohio Works of the Carnegie-Illinois Steel Corporation, later going to the Homestead Works of the same company as the Assistant to the Electrical Superintendent.

Leaving that corporation in 1904, Mr. Wiley became associated with the Wellman-Seaver-Morgan Company in Cleveland as Electrical Engineer. In 1906 he joined the Westinghouse Electric and Manufacturing Company, with whom he spent the next 25 years. While affiliated with this company, his duties were largely confined to the field of the development of the electrification of the steel industry.

Carl Kiefer

Carl J. Kiefer, consulting engineer, who has designed many large distilleries throughout the country, was recently elected Vice President in charge of plant construction and maintenance of the Schenley Products Company, New York.

Mr. Kiefer graduated from the Department of Electrical Engineering of Rose in 1903. Two years later, he received the degree of Master of Science. In 1908, the degree of Electrical Engineer was conferred upon him. Since then he has been actively engaged in engineering fields.

Distillery design has received the greater part of Mr Kiefer's attention in recent years. He has supervised more than five miles of plant construction for the Schenley Company, in addition to important supervisory work for other companies.

Two of his greatest undertakings were the Old Quaker Distillery at Lawrenceburg, Indiana, and the Joseph R. Finch plant at Schenley, Pennsylvania, which rank among the largest distilleries in the country. The Finch plant alone embraces one mile of buildings.

Mr. Kiefer became a consultant engineer at Schenley's shortly before repeal, after a special study of distillery design. Since then he has designed and supervised large improvements at the Schenley plants.

He is credited with having introduced numerous improvements in distillery operations throughout the country.

Here and There with the Grads

'94 Edward D. Frohman, accompanied by his sister, has sailed on a cruise around the world.

'01 Albert C. Lyon is sales engineer with the Midland Chemical Laboratories, Inc., Kansas City, Mo.

'03 Albert A. Krieger is Resident Engineer Inspector of PWA at Shephardsville, Ky.

Chester L. Post is a member of the Engineering Advisory Committee of the Procurement Division of the Treasury Department, Washington, D. C.

'08 Samuel E. Mitchell is Sales Manager for W. H. Tierney Electric Company of Seattle, Wash.

'09 George E. Markley recently became Sales Engineer for the North American Manufacturing Company in Cleveland.

Captain Richard L. Smith has returned from Paris, where he was a Military Attache of the U. S. Embassy, and is now Assistant Professor of Military Science and Tactics at Louisiana State University, Baton Rouge, La.

'10 Henry M. Shaw has accepted a position with the Winthrop Chemical Company of New York.

'14 Charles F. Harris is affiliated with Clayton Mark and Company of Chicago as Field Engineer.

'19 Herschell A. Hearn, who is with the Elliot Company, has been transferred to Kansas City.

'22 A. R. Watson is Vice President and General Manager of the Arkansas Utilities Company of Helena, Ark.

'27 Raymond R. Davis is Sales Manager for C. F. Pease and Company, Chicago.

'28 Homer E. Holmes is connected with the Bureau of Power and Light, City of Los Angeles.

'29 Theron S. Bell has taken a position as Lighting Specialist with the Newsōm Electric Company of Tampa, Fla.

John C. Cooley, with Reynolds Metals Corporation, is now in New York.

'30 Maurice L. Piker, with Eastman Kodak Company at Rochester, N. Y., is now Assistant Supervisor of the Chemical Plant Laboratory.

'32 William A. Haynes is Signal Apprentice with the Pennsylvania Railroad at Canton, Ohio.

George O. Howson is an aviation cadet at the Naval Air Station, Pensacola, Florida.

Clifton A. Pratt has been promoted to the rank of First Lieutenant, Engineer Reserve, and is located at Fort Knox, Kentucky.

'33 Edmund A. Schroeder, with F. W. Woolworth Company, is now assistant Manager of the Terre Haute store.

Edward G. Weinbrecht, with G. E., has been transferred to Bridgeport, Connecticut, where he is Methods Engineer in the Radio Division.

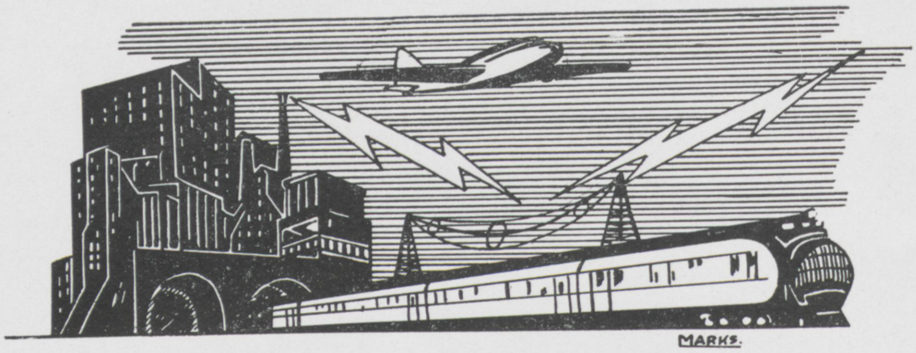
'34 Frank Mansur is Power Specialist of the Santa Ana Division of the Southern California Edison Company, Santa Ana, California.

Howard A. Staderman has accepted a position with the Collins Radio Corporation at Cedar Rapids, Iowa.

'35 E. A. Hamilton has a position in the Concrete Department of the Robert W. Hunt Company, Chicago.

Paul C. Montgomery is employed by the Illinois State Highway Department.

Fred W. Wiles is Apprentice Operating Engineer with the General Chemical Company at Cleveland.



Research and Progress

by
Charles Macdonald
m.e., '36

Engineering Feats of 1935

The premier engineering event of 1935, according to the National Geographic Society, was the completion of Boulder Dam.

Other public works projects of major importance cited were:

The bridging of the Mississippi River near New Orleans.

The "Little Belt" bridge in Denmark.

Electrification of the Pennsylvania railroad between New York and Washington.

Changing to standard gauge of 150 miles of the Chinese Eastern Railway between Harbin and Hsinking.

Inauguration of a great ship canal in Russia connecting the Baltic and White Seas.

Completion of a highway between Texas and Mexico, D. F.

Opening of the Moscow subway system.

Placing in service of the world's largest steamship, the Normandie.

Boulder Dam, which bars the Colorado River, contains 4,500,000 cubic yards of reinforced concrete. It rises 726 feet. Water was permitted to gather above the dam four months before the last concrete was poured on May 29. The water level has risen more than 260 feet up the face of the dam and has formed a lake reaching more than 80 miles upstream. Work is still being done on the power house, and it is not expected to be ready for operation for at least a year.

The newly completed New Orleans-Mississippi span, its official name being the Huey P. Long bridge, has railway tracks, highway lanes, and footpaths. It rises 135 feet above the high-water level. It is the most southern of the Mississippi River bridges.

On the Euporean continent, in Denmark, a bridge was completed to connect Jutland and the Island of Fyn. It spans the body of water known as the Little Belt. The structure, which is of the cantilever type, is 3,916 feet long, and serves as a combined railway and highway bridge.

Electrification of the Pennsylvania railroad, previously operated by steam, between New York and Washington was completed during the year. First electric passenger trains were operated between the two cities on the tenth of February. The result was a marked reduction in running time.

The long awaited highway from the Texas border to Mexico, D. F., capital of the Republic, was finished toward the end of the year; however, three bridges remain to be completed. Ferries are now in use.

The 7½ mile subway system in Moscow was opened on May 15.

Predictions

Some of the following changes will take place in the next fifty years, if there is any truth in the predictions made by A. W. Robertson, of the Westinghouse Electric and Manufacturing company.

Private airplanes will be so small that they will be carried around under the arm.

Moving stairways will be common. Sidewalks will also become moving.

Automobiles will be parked in an overhead apparatus, leaving the streets free for travel.

The air will be pasteurized. Air conditioning will make unbelievable advances. You probably will find it healthier to stay indoors than breathe fumes outdoors.

Artificial light will become a counterpart of sunlight. With the equivalent of the sun being produced indoors there will be no need for windows for light.

Highways will be lighted almost as brightly as they appear in the daytime.

Leisure may become so common that you will work to escape sheer ennui.

Tomorrow will depend more and more upon the vacuum tube to do the monotonous operations of industry. These tubes may see, feel, smell, and taste.

A Photographic Aid

The Eastman Kodak Company has announced a device which should be of great help to photographers when glare and reflections must be eliminated from the picture. This device is a practical application of the fact that light rays normally vibrate in all directions at right angles to the path of the ray, but under some conditions become polarized, meaning that all directions of vibrations but one have been stopped. This occurs in oblique reflection, and in the light from a clear blue sky.

This device, called the Polascreen, is made of a transparent sheet polarizing material, which is a substance having parallel, rodlike crystals that act as optical slits. This sheet material is cemented between glass plates in a holder which is placed over the lens. When the screen is rotated, the direction of vibration of the transmitted light is rotated and at a certain position the polarized light is absorbed and thus cut out of the picture.

Glare and reflections coming from glass, water, or any other reflecting surface can be eliminated by turning the screen. The use of a Pola-screen when photographing subjects against a blue sky gives remarkable effects by darkening the sky and permits considerable control of the relative brightness of walls and roofs in architectural pictures.

Around-the-World Air Routes

Around-the world passenger flights on a regular schedule of fifteen days are now being completed. Extension of service from Manila to Macao, China, and from Canton to Hanoi, within the next two months, will complete one world-girdling route. Proposed extensions from Hawaii to New Zealand and Australia will complete another.

With final links completed, Americans can board a plane in nearly any city in the United States and fly to San Francisco. From there, crossing the Pacific in Pan American Clipper planes, the traveler can proceed to Europe by Royal Netherlands Indies Air Service and Imperial Airways of Europe. From Singapore, he may choose three routes: to Amsterdam via the Dutch line, by Imperial to London, or by Air France planes to Paris.

Pending the inauguration of joint Pan American Airways-Imperial Airways flying boat service between Europe and the United States, via Bermuda and the Azores, or by way of the Great Circle route, the 1936 air traveler will be able to travel by air from Europe to Brazil via the German Lufthansa or the Graf Zeppelin, and from Brazil to Miami by Pan American Airways. Eastern Air Lines planes at Miami make air connections with transcontinental planes of American Airlines, Transcontinental & Western Air, and United Air Lines planes. During the year a new Zeppelin, larger than the Graf and now being completed at Friedrichshafen, Germany, is scheduled to be placed in operation from Germany to Brazil, and from Brazil to New York.

To facilitate the around-the-world air travel, American lines are now working out traffic interchange agreements. For his complete hop the traveler will be able to purchase a single ticket which will bring him back to the airport from which he started. It is possible that the first commercial globe-circling flights will be started near the twelfth anniversary of the first 'round-the-world flight, completed by American army fliers under the leadership of Capt. Lowell H. Smith in April, 1924.

Electron Optical Tube

Research work on cathode ray tubes has shown a new use for these versatile tubes. This use is changing ultra violet and infrared rays to visible rays. This makes visible a range of rays twice as broad as that of normal sight.

This tube is shaped like an overgrown electric light bulb. Its socket end is a new lens which picks up the infra-red and ultraviolet rays. Its bulb end is an artificial retina, a round frosted glass screen. On this screen things hidden in darkness and those of the colorless world become visible, in shades of greenish white and black.

The discovery was announced and the tube was shown to the American Association for the Advancement of Science by Dr. V. K. Zworykin and Dr. G. A. Morton, of the Radio Corporation of America Laboratories. Technically it is an electron optical tube. The invisible rays enter its lens end as in a telescope. The lens, of glass or quartz, is coated on the inside with caesium, a metal which gives off electrons when rays touch it. The number of electrons emitted is proportional to the amount of light. These electrons stream from the lens to the interior of the tube. Normally they would eddy and spiral, but this tube focuses them, causing them to act like light rays, and carries to the screen end of the tube the patterns of the object or scene toward which the tube is pointed.

THE ROSE SHOW
April 23, 24, and 25

Campus Activities

Edited by
Norman Wittenbrock
ch.e., '38

New Recreation Room

For some time a recreation room has been talked about at Rose. Last year a small room was contributed for this purpose. During the Christmas vacation the recreation room was moved to room A, in the southwest corner of the building.

The new room is much larger than the old one; and in addition to the ping pong tables already available to the students, a quantity of modernistic steel furniture has been purchased and placed in the room. The new room, which has just been refinished, is a combined ping pong room, card room, lounge, and smoking room.

The new furniture was bought with money made on the last two spring dances held by the Rose chapter of Blue Key National Honor fraternity and with money furnished by the school. Blue Key has previously furnished ping pong paddles for student use. This new recreation room is a most enjoyable and useful present to the student body.

Rifle Club

During the last few weeks the Rose rifle team has fired in several postal matches. The teams firing in these matches are selected on the basis of the scores of the previous week. Men firing in these matches were James Campbell, Edd A. Coons, Edward H. Eckerman, Lawrence J. Giacolletto, Paul E. Giffel, Harry J. Halberstadt, James A. Hughes, Charles E. MacDonald, J. Robert Penisten, Victor Peterson, Walter R. Snedeker, R. Schilling, Robert Underwood, T. Nathan Wells, William D. Wolf, and Lawrence Carroll. For each week until the middle of March there is an intercollegiate match scheduled for the Rose team. At the present time the indoor rifle range is being enlarged to twice its former size.

Interfraternity Dance

On January eleventh the fraternities on the Rose campus held their annual interfraternity dance in the college gymnasium. Bob Cashner and his Kings of Rhythm played for the dance. The gymnasium was artistically decorated in old rose and white, the school colors. Carved bone elephants were given to the guests as souvenirs. The dance was attended by a large number of the students. The dance committee, which was composed of one representative from each of the fraternities, consisted of Alden B. Foley, John W. Fox, J. Allan Greenland, and Tom N. Wells.

Debate Club

The debate squad to represent Rose in the field of intercollegiate debating for the current season has been chosen. The squad includes: Louis D. Duenweg, Warren S. Sentman, Robert Shattuck, all of the class of 1936; Robert A. Averitt, Edward A. Coons, Joseph A. Dillahunt, Alden B. Foley, all of the class of 1937; Conrad J. Clausen of the class of 1938; and Robert Kahn of the class of 1939. The final varsity teams will be chosen from the above squad. The first debate on the schedule for this year is the annual debate tournament at North Manchester college on February 21 and 22.

Student Assembly

The entire student body met in general assembly to commemorate the two hundredth anniversary of the birth of James Watt, celebrated English engineer who invented the steam engine. Doctor Donald B. Prentice was the speaker for the occasion. In the course of his talk Dr. Prentice pointed out that while Watt is best known for the invention of the steam engine, he should also be remembered as the inventor of other devices of importance. Rose's participation in the Watt Bicentennial was a part of the celebration throughout the English-speaking world. Universities and colleges throughout the United States held similar commemorative meetings.

Dormitory Activities

The students residing in the dormitory were entertained recently by a very interesting lecture and moving pictures given by Dr. Frank E. Wiedeman. Dr. Wiedeman's subject concerned a trip he had taken to Australia. His pictures showed scenes from the time he left home until his return. Many points of interest were shown, as well as pictures of the animals native to Australia.

On Friday, January seventeenth, the Dormitory Association held an open house for the residents of the dormitory and their guests.

A. I. E. E.

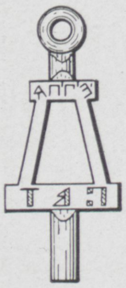
The Rose branch of the American Institute of Electrical Engineers met recently in the lecture room of the electrical department. Louis D. Duenweg, a senior in the department, gave an interesting report entitled, "Photoelectric Phenomenon and the Photo-Cell". Martin Long, president of the chapter, presided at the meeting. The meeting was attended by Professor Knipmeyer and Karl Spangenberg, and the juniors and seniors in the electrical engineering department.

Rose Show

A meeting of the Rose Show chairmen was held on January tenth. At this meeting plans for the show were discussed. Robert Shattuck has been appointed general chairman for the show. The students have been allowed to select the department in which they wish to work. The dates for the show will be April 23, 24, and 25.

FRATERNITY NOTES

Tau Beta Pi



Indiana Beta Chapter of Tau Beta Pi, national honorary fraternity, held a dinner meeting at the Elks Club Wednesday night, February 5, at which Dr. Donald B. Prentice, president of Rose Polytechnic Institute, was the speaker. Dr Prentice spoke on aeronautical research at the Imperial University, Tokyo, Japan. While in Japan recently, Dr. Prentice visited the laboratories, directed by Baron Shiba.

Tau Nu Tau

Tau Nu Tau military fraternity held an initiation at the Institute during the week-end following final examinations.

At that time the following men were initiated: Lieutenant Hawkins, Assistant Professor of Military Science and Tactics, Robert Averitt, Lawrence Carroll, Edd Coons, Clyde Cromwell, Earl Cromwell, Alden Foley, Paul Giffel, Harry Halberstadt, James Hughes, Walter Snedeker, John Sonnefield, and Thomas Wells.

The chapter wishes to congratulate these new men.

Alpha Tau Omega

On Friday evening, January 24, open house was held. The house was decorated in the fraternity colors, azure and gold. Chaperones for the evening were Professor and Mrs. Wischmeyer and Professor and Mrs. Knipmeyer.

The chapter wishes to thank the alumni, the mothers, and all others for their splendid cooperation during rush week.

The new pledges are: J. William Adair, Leon A. Conrath, H. Logan Davis, Richard T. Hardman, H. Scott Heer, William P. Ijams, Robert S. Kahn, Robert N. Ladson, W. Merritt Noel, William M. Seymour, George W. Smith, Edward O. Spahr and Malcolm A. Steele, all of the freshman class; Edward Eckerman of the sophomore class; and Hubert Wittenberg of the junior class.

Sigma Nu

Another successful rush season has ended and Beta Upsilon of Sigma Nu is very pleased to announce the pledging of the following men; William Butler, Santo Domingo; Charles Drieke, Saint Louis; Robert McKee, Noblesville; Roy Hawkins, William Krider, William Parker, Jack Rustamier, and Richard Weldele, all of Terre Haute.

The pledge banquet given annually in honor of these men was held at the chapter house on Friday, February 7; all members and old and new pledges attended.

The new men were formally pledged on Sunday, February 16. At this time Sam Tait was initiated. John Mann was initiated in January.

During the past rush week Beta Upsilon was visited by several alumni including: Charles McDargh, '25, Terre Haute; Louis Nattempeh, Washington, D. C.; Nicoson, Terre Haute; and J. Page Wheeler, Sioux City, Iowa.

The members of Sigma Nu extend their heartiest congratulations to the newly initiated men and to the new pledges.

HUMOR

Edited by

Bob Shattuck

ch.e., '36

Hi, Ho!

Today's best tabloid biography—high chair, high school, high stool. high finance, high hat, "hi warden."

Walked Home?

In reminiscent mood Credulous Tillie opines that coffee isn't the only thing that's fresh when dated.

—Springfield Union.

Scrambled

To be added to the lore of our nocturnal life is the story of the taxi-cab driver who was hailed by a speakeasy doorman the other night. The doorman escorted four men to the voiture, arranged them carefully within and then instructed the chauffeur:

"The man on the left goes to...... Park Avenue, the one next to him to........East Sixty-fifth, the one on the left front seat to........West End, and the other to........Riverside Drive".

The chauffeur nodded understandingly and drove away. In a few moments he was back, beckoning to the doorman.

"Say buddy," he said, "would you mind sortin' these guys out again? I hit a bump on Sixth Avenue."—New Yorker.

Many a man looks down at the heel, but simply because there's a trim ankle just above it.

Rotz: "I want a candy bar without nuts."

McKee: "Without what kind of nuts?"

Rotz: "Oh, without walnuts, I guess."

McKee: "You'll have to take it without peanuts. We haven't any without walnuts."

Nemo Blair drove his antique Whippit into a service station and told the attendant to "fill her up." After a long, long flow of gasoline into the tank, the attendant asked if his motor was running. He replied that it was. "Well," said the attendant, "shut her off, we can't gain on it."

Winter or Summer Grade?

Barber (to a plaster-haired sheik): "What'll you have, a haircut or just the oil changed?"

—Boston Globe.

Serving Time

"Yes," mused the Old Timer, "when a man's single, he's free. After he's been married a year, he's usually fastened to a bawl and jane."—American Legion Monthly.

One Office Stenographer to Another: "Dearie, how long should my skirts be?"

Second Stenog: "Let your chassis be your guide."

—Vest Pocket Magazine.

An angleworm is a caterpillar that played strip poker and lost.

Sure Fire

Success Expert: "What's your name?"

Greek Client: "Gus Poppopopupopulos."

Success Expert: "Get a job selling motorcycles."

—Masonic Craftsman.

"Is May in?"

"May who?"

"Mayonnaise."

"Yes, but Mayonnaise is dressing."

Faith

"Pahson," said Rastus, "will you pray for my floatin' kidney, nex' Sunday? Ah'd sho be powaful ableeged."

"Why, Rastus," said the Parson, "Ah cain't vey well do dat. It might embarrass the sisters and brudders ob de congregation."

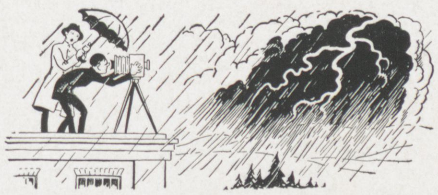
"Well, Ah doan see why, Pahson, being as how Ah heahed you prayin' for loose livers las' week!"

—Weather Vein.

Mistake Somewhere

Fraternity Man (pacing floor, tearing hair, in terrible agony): "My gawsh, brothers, my gawsh! We've got the old house paid for and are not even planning a new one!" —Wisconsin Octopus.

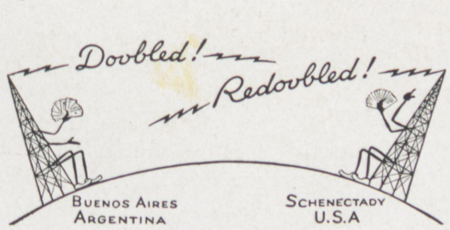
G-E *Campus News*



CRASH!

IT'S a thunderstorm sweeping over Pittsfield, Massachusetts. But G-E engineers, instead of hiding under the bed, go up on the roof to be nearer the lightning. On one of the buildings of the Pittsfield Works they have built and equipped a lightning observatory. By means of an ingenious periscope and a high-speed, motor-driven camera, any lightning flash occurring within many miles—north, south, east, or west—can be automatically photographed. Its characteristics, as recorded on the film, can then be compared with those of the artificial flashes produced by the 10,000,000-volt lightning generator in the laboratory.

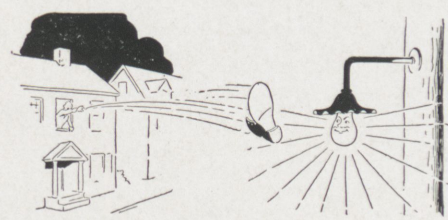
An observatory has to have a hole in the roof. This causes astronomers no embarrassment, because they can work only in clear weather. But with lightning observers it is different—when there is lightning there is also rain. So, to keep the rain from falling on the 12 lenses of the new camera—and from running down the engineers' necks—compressed air is blown upward through the aperture. When next the thunder rolls over the Berkshires, and timid citizens are cowering under the bedclothes, these General Electric engineers will be up on the roof taking elaborate notes on Jove's own brand of lightning.



GAME BID

DOUBLED! Redoubled! North led, but the dummy was 6000 miles away. Psychic bids flew thick and fast when a North American contract-bridge team, including Mr. and Mrs. Ely Culbertson, played a "bridgecast" tournament with a high-ranking team from Argentina. The North Americans were seated on the stage of Rice Hall in the General Electric Company, at Schenectady, N. Y., while the Argentine team played at the Casabal Club in Buenos Aires. The plays were carried by the short-wave stations W2XAF and LSX, of North and South America, respectively.

W2XAF, in Schenectady, used a feed-back circuit so that short-wave listeners all over the world, tuned to the one station, could follow the playing with as great ease as the 500 kibitzers who jammed Rice Hall. This was the first international bridge broadcast in which the principals were all recognized experts. The North American team, captained by Culbertson, won by a margin of 1030 points.



BEDROOM PRIVACY

MANY a man has shinned up a lamppost to daub paint on a street lamp that shone in his bedroom window. Many another light sleeper, of lesser climbing prowess, has tried throwing shoes and hair brushes at the offending light. Now there is hope that this war will soon be over.

Adequate street lighting is, of course, a necessity. G-E illumination engineers have perfected a new fixture that directs the light where it is needed—on the street—and keeps it from trespassing on the pillow. A concealed light source and a reflector designed along new optical lines have removed street lamps from the list of public enemies of sleep. Motorists, too, will welcome these new luminaires. Because the reflector extends below the incandescent source, the driver's eyes are protected from direct glare—he can see the road better.

96-227DH

GENERAL ELECTRIC


Sun-curing Turkish leaf tobacco. The tobacco is strung leaf by leaf and hung on long racks like you see here.
Chesterfield
CIGARETTES
LIGGETT & MYERS TOBACCO CO.
CHESTERFIELD
The aromatic Turkish tobaccos used in Chesterfield cigarettes give them a more pleasing taste and aroma.
CHESTERFIELD—A BLEND OF MILD RIPE HOME-GROWN AND TURKISH TOBACCOS