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ROSE POLYTECHNIC INSTITUTE - - - TERRE HAUTE, INDIANA

MARKS '35.

... COMMENCEMENT NUMBER ...

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Surveying This Issue

IN this month's lead article Mr. Wodicka tells of the chemistry of the manufacture of DuPrene, a synthetic rubber.

MR. Kasameyer points out some of the most important uses of air conditioning equipment.

ALUMINUM finds innumerable uses. Mr. Laughlin explains the reasons for the continually growing market for that metal.

MR. Bennett discusses the feasibility of steel dams. Steel has found many structual uses; why not steel dams?

COLD LIGHT, once regarded as nothing short of magic, is now produced in the laboratory and may be used as an illuminant.

THE articles for this issue were written by Tau Beta Pi members.

C. R. W.

THE ROSE TECHNIC

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THE ROSE TECHNIC

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RUBBERIZED ACETYLENE

Edward J. Wodicka, ch., '37

SINCE Charles Goodyear's achievement of vulcanization in 1839, rubber has been a widely used material. In view of this fact, it is natural that chemists have attempted, for practically fifty years, to synthetically produce rubber or a similar substance. In most cases this synthesis was based on the polymerization of a low-boiling compound known as isoprene and having the chemical formula C_5H_8.

The efforts to produce rubber in this manner were chemically successful; but the synthetic product was exceedingly more expensive; and, since it did not possess any extraordinarily useful properties lacking in natural rubber, the manufacture of synthetic rubber was stranded in the laboratory.

Probably the best synthetic "rubber" now prepared is not polymerized from isoprene but rather from a related substance, chloroprene, and is not chemically identical with natural rubber. To obtain an idea about the relation of natural rubber and DuPrene, as the product made from chloroprene is called by the developers, the DuPont Co., let us compare the compounds from which they are polymerized. Isoprene and chloroprene may each be considered as a derivative of butadiene, a compound having two double bonds and which can be structurally represented by the formula $CH_2{:}CH^*.CH{:}CH_2$. If the second hydrogen (marked by an asterisk) were replaced by a methyl (CH_3) group, the resulting compound would be isoprene; if it were replaced by an atom of chlorine, chloroprene would result.

Chloroprene can be cheaply prepared from acetylene. To Doctor Julius Arthur Nieuwland goes the credit for unearthing the procedure to obtain chloroprene from acetylene. As early as in 1906, he noticed that on passing acetylene into a concentrated solution of cuprous ammonium chloride and allowing the reaction mixture to stand, polymers of acetylene could be secured. Of these the trimer, divinylacetylene, could most readily be obtained in a good yield. This could easily be polymerized but did not yield a satisfactory synthetic rubber. In the meantime chemists of the Du Pont company found that a gaseous polymer composed of two molecules of acetylene and called monovinylacetylene could be made to react very readily with hydrogen chloride to produce a new volatile liquid. This liquid, now known as chloroprene, was seen to undergo rapid polymerization to a plastic which could be vulcanized by heating to form an elastic, non-tacky, tough material, if allowed to stand for a few days.

In December, 1925, the American Chemical Society held at Rochester, New York, its first Organic Chemistry Symposium. One of the addresses presented on that occasion was a review by Doctor Nieuwland of his researches on acetylene and its derivatives, in the course of which he discussed the formation of divinylacetylene by passing acetylene over cuprous ammonium chloride. Doctor Elmer K. Bolton, one of DuPont's chemists, was also present at this meeting. He recognized a possible method of cheaply producing the monovinylacetylene. Accordingly, a group of DuPont's chemists, under the leadership of Doctor Wallace H. Carothers, began an active coöperative investigation with Doctor Nieuwland. In the progress of this research a suitable catalyst and the correct conditions were developed to make monovinylacetylene the principal product formed by polymerizing acetylene.

In this reaction it is necessary to remove the product from the catalyst as soon as possible or the reaction will continue with the production of divinylacetylene. Accordingly, the gas is rapidly swept through the catalyst, and, through condensation and fractional distillation, the monovinylacetylene is separated from the unconverted acetylene, divinylacetylene, and other by-products. This separation requires cooling the gas stream to about seventy degrees below zero Centrigrade.

Let us stop here to see, to a minor extent, just what monovinylacetylene is. Acetylene may be represented as CH:CH. When two of these molecules polymerize, it is conceivable that one of the hydrogen atoms of one molecule leaves its carbon and that the hydrogen and the remaining part of the acetylene molecule break down the triple bond of the other acetylene molecule to give a product of the structure $CH:C.CH:CH_2$.

When hydrogen chloride is added to monovinylacetylene, the unsaturated bonds tend to be relieved of their strain, and since the triple bond represents the point of greatest strain, the resulting compound would be chloroprene, $CH_2:CCl.CH:CH_2$. Here again, since there are still two unsaturated bonds, the gases must be swept through the catalyst to prevent the addition of further hydrogen chloride. If this did occur it might put a chlorine atom on the end carbon, and for this reason and since the unsaturated bond would be satisfied the chances for a good polymerization product would be reduced.

Chloroprene has been estimated to have a rate of polymerization seven hundred times that of isoprene. In polymerizing the chloroprene it can be changed to a semi-polmerized product, alpha-polychloroprene, by exposure at 35°C. to a Mazda lamp. This product can then be fully polymerized to the mu-polymer by being kept for 48 hours at 30°C. or heated for 5 minutes at 130°C. This last step is comparable to the vulcanization of natural rubber, which many chemists believe is essentially a catalytic polymerization process.

The value of this outstanding achievement can best be measured by comparing the properties of DuPrene with those of natural rubber. At the present time DuPrene, selling at $1.00 per pound, is more costly than natural rubber. However, the Hon. Frances P. Garvan, president of the Chemical Foundation Inc., says, "We consume 65% of the world's production of rubber. In 1926, we imported 925,878,000 pounds at an average price of 54.6 cents a pound, for which we paid $505,-818,000. This year (1934), we are roughly importing the same amount for which we will probably pay an average of 14 cents a pound at a cost of $130,000,000. In 1926, under the Stevenson Plan the price was driven as high as $1.25 per pound. In 1934, the Stevenson Plan has been revived, and the only reason, as announced in the English press, that the price is not driven up to our people, as it was in 1926, is the fear of encouraging the development of DuPrene. In other words, this discovery even now is possibly saving us $375,-000,000 a year."

Although it does cost more, DuPrene lends itself to many uses for which natural rubber is unsuited. It is particularly valuable in filling the need for a rubber-like material with greater resistance than natural rubber to gasolene, oils, kerosene, ozone, air, and acids, as well as to the deteriorating and distintegrating effects of the heat and oxidation. All contrasts do not favor DuPrene, however, because the tensile properities of this material fall off with the rise of temperture far more rapidly than do those of natural rubber.

In conclusion, to show that DuPrene is a reality, it might be cited that the DuPont Co. recently installed a second new plant to accommodate the demand which has increased from 8,000 pounds per month in 1933 to almost 100,000 pounds per month at the present time.

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Applications of Air Conditioning

William E. Kasameyer, m., '36

MANY different uses have been discovered for air conditioning units during the last few years. They are being used to a great extent in different ways and for various reasons.

Hospitals are installing systems because they add greatly to the comfort and health of the patients. The pure clean air of an air conditioning unit tends to remove many types of germs.

Although air conditioning units are expensive at the present time, some of our wealthier citizens are building them in their homes to add comfort to their luxuries. Many theaters are finding it necessary to install systems so that their customers may receive the maximum amount of comfort and consequently be more easily satisfied with inferior performances. Automobiles and passenger cars on trains are being air conditioned to give the customers an increase in comfort during their travels.

Various types of industries are taking advantage of the use of air conditioning. Textile factories have realized that if they could control the humidity of the air in the building they could increase the value of their product. It it essential to this type of industry to have a fairly high relative humidity. This has been accomplished by the installation of air conditioning units. In the manufacturing and processing of some materials there are one or more stages in which the moisture must be removed from the substance. This is true in the production of artifical silks, photographic films, and tobaccos. In these above mentioned cases the final moisture content determines the value of the product to a great extent. Thus, by the use of air conditioning units, the value of the finished product may be easily regulated. Other industries, such as confectionery, printing, and lithography, require a definite humidity throughout the entire year. Before air conditioning was introduced to these factories, the manufacturing was limited to certain portions of the year. However, now these industries are regarded as steady occupations.

Many executives have realized the value of comfort to their employees during working hours. They realize that it is only human nature to work at a greater degree of efficiency under comfortable conditions. As a result, the leaders of industries are installing units to increase this comfort. The Department of Interior Building at Washington was recently air conditioned by the government. The International Business Machine Corporation has air conditioned its plant at Endicott, New York. Henry Ford, probably one of the world's best known industrial leaders, has realized the importance of air conditioning and has installed units in several of his factories.

Many people are learning the value of air conditioning as a means of increasing the sales of articles. Hamburger stands throughout the country are installing systems in order to draw people to their buildings for comfort and then sell them food. Hotels are also following this same line of thought. It is obvious that a crowded ballroom would not seem comfortable under the same conditions as a room in a hotel. Therefore, the owners of the hotels are installing units so as to overcome this handicap.

From these various examples it should be clear that air conditioning may be applied for many different reasons. The units may be used to a great advantage for the health of patients, for the comfort of people, for the improvement of products, for the welfare of workers, and for a means of sales.

Cooling Tower
—Cut Courtesy Heating and Ventilating

Aluminum and Its Present Uses

Raymond R. Laughlin, m., '36

ALUMINUM was isolated only a little over a hundred years ago. It remained a very scarce product until the latter part of the nineteenth century. Before that time it ranked along with platinum in scarcity as well as in price and was used almost entirely as settings for jewels and fittings for expensive opera glasses.

The price of aluminum in 1852 was $545 a pound, in 1856, $34 a pound, and by 1859 it had dropped to $17 a pound. This continual decrease in price was due entirely to certain minor changes in the method of extracting the metal. But it was not until the discovery of the electrolytic method of separating the pure aluminum from its compounds, by Charles Martin Hall in 1886, that the costs of manufacturing the metal were decreased to such a degree that it became possible for aluminum to have commercial value. Even then, using Hall's process of producing the metal and with the price of aluminum first at $5 a pound, then reduced to $4, and finally to $2 dollars, there was no market for the metal. This was an entirely new metal trying to compete with iron, copper, and other commercial metals which had been known and used for hundreds of years; consequently there was no call for a new untried metal like aluminum, even though an inexpensive method of producing the metal with a high degree of purity had been discovered. Aluminum, of course, had certain advantages over the other metals, such as lightness combined with strength, great ductility, high heat conductivity, malleability, non-corrosiveness, and a high degree of resistivity to certain acids; but the metal working industry was afraid of a new metal about which little was known. Therefore the next few years were spent in collecting valuable data concerning aluminum and aluminum alloys, concerning the rolling, casting, and working of aluminum, and also to what uses it could best be put. This research work was carried on tenaciously by Charles Martin Hall, who had an undying faith that aluminum would some day take its place among the commercial metals of the world.

About the first manner in which aluminum was used was in the manufacture of cooking utensils. Later, because of its lightness, the use of aluminum in the household was extended to sweepers, washing machines, and all kind of electrical appliances.

The next field that aluminum entered was that of the transmission of electricity. Copper had long been the universal standard in this field. Although the electrical conductivity of aluminum is 61% of that of copper and for equal resistance per unit length the cross-sectional area of the aluminum must be 59% greater, the weight using aluminum is decreased 52%.

With the modern trend in architecture toward lightness and brightness, aluminum has found another almost inexhaustible field. It is being used extensively in modernizing store fronts, in spandrels, windows, ornamental trim, elevator enclosures, and stair railings. In this field among the first uses made of aluminum was in the casting of a 100 ounce cap for the Washington Monument in 1884. In 1933, when the monument was cleaned, the aluminum cap was found to have been unaffected after fifty years exposure to the sun and winds.

In the transportation field the uses of aluminum are unlimited. Airplanes are constructed of strong alloys of aluminum. Pistons and cylinder heads of motor cars are of cast aluminum. Trucks and busses made of aluminum are able to cut operating costs by the elimination of dead weight. This saving in dead weight can be applied directly to the pay load, or if this is not possible by decreasing the maintenance costs.

Transcontinental Air Liner

—Cut Courtesy ALCOA

Railroads and street car companies realized the importance of decreasing the weight of their rolling stock, thus lessening operating costs and the costs of maintenance of equipment. In 1923 the Illinois Central built 25 suburban cars which were partially aluminum. Later all aluminum cars were built, and finally the Union Pacific in 1934 built an all aluminum train which broke all existing records for transcontinental rail travel. The tendency of the railroads has been toward lightening their passenger cars; however there would probably be a greater saving realized if they would decrease the weight of their freight cars as well as of their passenger cars. There is no doubt but that in the future more will be done along this line as soon the existing rolling stock becomes worn out.

Aluminum in the form of aluminum foil is widely used for packaging such commodities as chewing gum, cigarettes, candy, cheese, tea, and photographic films. Collapsible aluminum tubes are used for toothpaste, shaving cream, and many other things.

In the brewing industry aluminum is used for fermenting tanks, wort coolers, yeast utensils, brewing kettles, storage tanks, dispensing coils, and beer barrels.

In dairy farming, aluminum is applied to storage tanks, milk truck bodies, milk cans, coolers, balance tanks, filters, and in heating and piping.

Aluminum paint is used as a prime coat for the protection of wood and other metals, the aluminum keeping the moisture and destructive ultra-violet rays of the sun from the surface covered.

Since aluminum can stand hard knocks, it has been used in the booms and buckets of dragline excavators used in strip mining. The booms made of aluminum increase the reach 15% to 20% and the capacity of the buckets are increased from 20% to 25% without affecting the mobility or stability of the excavator.

In 1933 aluminum was first used in bridge structures. The flooring system in the Smithfield Street bridge in downtown Pittsburgh was reconstructed using an aluminum alloy. This bridge was 51 years old and its safety was becoming doubtful, but with the new aluminum flooring system and the subsequent elimination of 750 tons of dead weight the bridge was again made useable with a saving to the taxpayers of $70,000 each year and an increase of 25 years to the life of the bridge.

So the aluminum market has rapidly increased from no market at all to a vast market extending into every branch of engineering and innumerable industries

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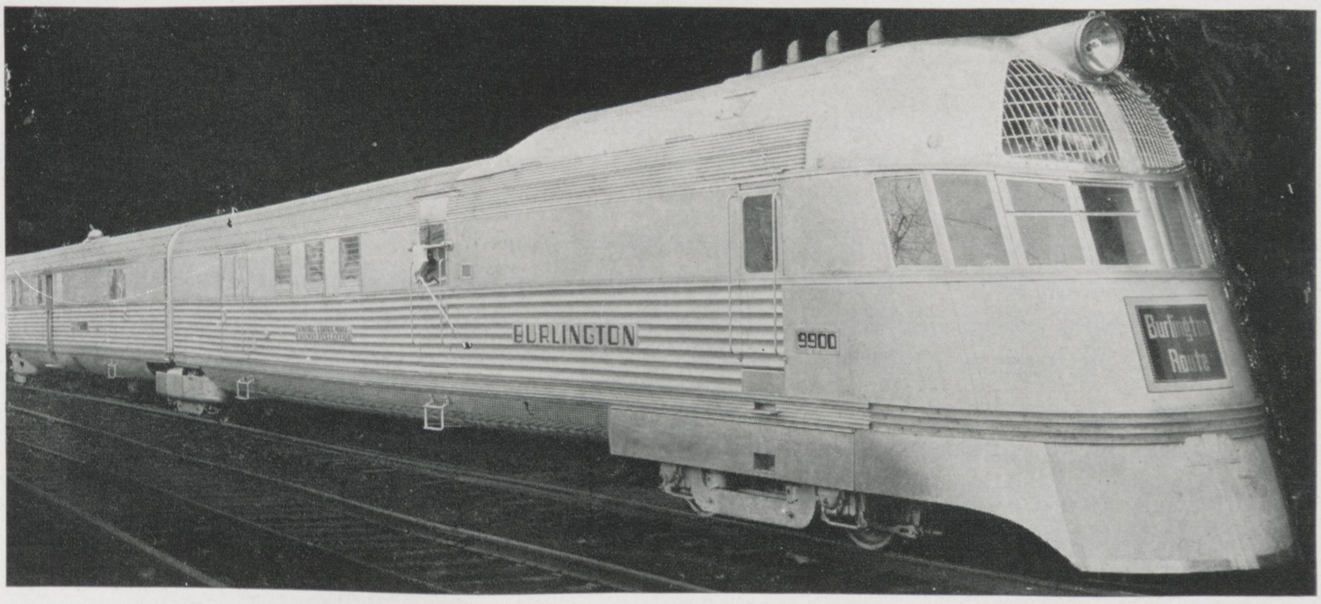

Aluminum on the Rails

STEEL DAMS

Paul D. Bennett, c., '36

STEEL construction has been successfully applied to many types of gates, shutters, and other devices which may be classified as movable dams, but up to the present time only three complete steel dams have been built, and all three of these were built over 30 years ago. These dams were all of the same general design and construction.

The Ash Fork Dam was constructed for the Atchison, Topeka, and Santa Re Railroad, near Ash Fork, Arizona, to impound water in a dry canyon. The steel portion of the dam, founded on rock, had a length of 184 feet and its greatest height was 46 feet. The framing consisted of triangular-shaped bents of steel members spaced 8 feet on centers on concrete foundations, with a slope of 45 degrees on the upstream face, which was formed of steel plates riveted to the bents. The crest was constructed to function as an over-flow weir.

The second steel dam was constructed in 1901 for the Atlantic Mining Co. at Redridge, Michigan. This structure was also used as an impounding reservoir for water supply. The steel portion of this dam has an overall length of 464 feet and a maximum height of 74 feet, including the concrete base proportioned to resist overturning and sliding. The general design of the structure was similar to that of the Ash Fork Dam.

Between the years of 1905 and 1907 the Hauser Lake Dam was constructed across the Missouri River near Helena, Montana, for the Helena Power & Transmission Co. The steel part of the dam was 630 feet long, 500 feet of which was spillway, with a maximum height of 81 feet. This dam was constructed on a gravel foundation. One year after the completion of construction a break occurred in the dam, resulting from underwashing of the foundation. The dam failed and was replaced with a concrete gravity section. There are no indications that the failure was in any way due to the steel construction.

Several types of design can be applied to steel dams, all of them consisting of three parts: (1) a watertight skin plate supported upon (2) some form of framed structure which transmits the water load from the plate to (3) a suitable foundation.

In comparing the competitive position of the steel dam, consideration must be given to material, design, efficiency, watertightness, construction, permanence, and cost.

Steel is a standardized product manufactured in a shop under control. It permits inspection and testing prior to erection; consequently a uniform product can be obtained.

The design is more determinate than that for almost any other material, since a steel dam would be made up principally of framed structures, which may be readily analyzed and designed by existing methods.

In general a steel dam uses the material more efficiently than is possible in massive structures, in that the material is used to carry stress rather than to provide weight.

With available methods of welding and calking, the joints of the skin plate may be made 100 per cent watertight. Steel is an impervious material, and with the joints made tight there can be no leakage. Watertightness should be one of the strong points in favor of the steel dam.

The comparison of construction features is principally concerned with speed of construction. The fabrication of a steel dam is a shop process and may be easily speeded up sufficiently so that the supply of material to the field will be ahead of any erection schedule. This decreased time has another advantage in that it lessens the hazards of river work, because the dam may be more rapidly brought above dangerous flood stages.

Proof that maintenance is not excessive and that steel dams are relatively permanent is available in the records of the Redridge and Ash Fork dams. Recent reports on these structures indicate that maintenance has been limited to painting every four or five years and to minor repairs of a local nature. Bearing in mind that these structures are now over 30 years old, one can scarcely say that steel dams cannot be relied upon.

The cost of a steel dam is dependent upon the type adopted and upon the local conditions under which it is constructed. While there is danger in making general statements as to cost, there are indications that in many instances the steel dam is materially cheaper than equivalent concrete structures.

After studying and weighing this evidence, it seems very strange that more of these structures are not being built or at least planned.

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COLD LIGHT

J. Robert Penisten, ch., '37

SINCE the time of the first firefly, the idea of producing light without heat has had an attraction for man. The production of light by the firefly and all the other natural sources of such light have been closely scrutinized. But in spite of all that science has learned regarding such light, there has remained a popular notion that the entire process is still a mystery, and that the idea of synthetically producing a light without heat is as chimerical as the elixir of life. This is far from the truth. The chemistry of the firefly's light has been worked out, and although this particular compound has not yet been synthesized, cold lights have been produced in the laboratory which far outshine that of any natural source.

Light and heat have been so long associated, that they seem inseparable. Practically all efforts at producing more efficient lights have been directed toward attaining a higher temperature. All of our lights used today give off large amounts of heat. This heat is not only a drawback; it is a waste, a waste so great that in the ordinary tungsten lamp it represents about 98 per cent of the energy supplied the lamp. Even the most efficient sodium vapor lamps convert only about 12 per cent of the energy into light. This, then, is the main reason for so much research on cold light.

Problems Involved

Light and heat are essentially the same thing. They both consist of electromagnetic waves differing only in their frequency of vibration. Heat waves are caused by the vibration of atoms and molecules, and vary in frequency from $1x10^{12}$ to that of red light, $38x10^{13}$. Light is caused by vibrations of the valence electrons, and varies in frequency from $38x10^{13}$ for red light to $77x10^{13}$ for violet light. The range of heat waves is about 9 octaves, while the range of visible light waves is only about one octave. It is also apparent that as heat waves are caused by atomic and molecular vibrations, all bodies will emit heat waves unless they be at the absolute zero of temperature. Thus it is impossible to entirely divorce heat and light. According to the Bohr theory, light is emitted when the valence electrons of an atom slip from an orbit of high energy level to one of lower energy level. The problem of producing cold light, then, devolves into one of producing changes in the energy levels of the valence electrons of an atom without speeding up the atom or molecule itself. This is rendered more difficult by the narrow range of frequencies which produce visible light, compared with the range of the infra-red, or heat producing, waves. As far as the light itself is concerned, cold light is exactly like any other light. It may be reflected, refracted, and polarized, and it will affect photographic plates. It is stopped by materials which stop similar wave-lengths from any other source.

Methods of Production

There are two general means of producing radiation at ordinary temperatures, called fluorescence and phosphorescence. Fluorescence consists of the transformation into light of energy supplied from some external source. Phosphorescence consists of the transformation into light of energy contained within the body. Together these are spoken of as luminescences. The most promising field is that of chemi-luminescence. Numerous organic compounds are known which will glow in a water solution with only a few thousandths of a degree rise in temperature. Such reactions appear to be those of oxidation. This is the type occuring in the firefly and the numerous other luminous animals. The active agent in these animals is a compound called luciferin. Its exact composition is not known, but a great deal is known about its reactions, and its synthesis will probably be only a matter of time. The oxidation of luciferin is catalyzed by another compound called luciferase. The oxidation products are not carbon dioxide and water, but a compound which is easily reduced to luciferin. During the oxidation of the luciferin, the luciferase molecules pick up some of the energy and the electrons are excited enough so that they emit light when returning to their original energy level. The oxidation and reduction of luciferin is carried on simultaneously. This is comparable to burning a candle and at the same time recombining its products of combustion to form a new candle.

Future Possibilities

While the cold lights so far produced are not brilliant when compared with our present lights, they would do perfectly well as illuminants. It has been calculated that an area of firefly light six feet in diameter on the ceiling of a room nine feet high would give ample illumination for reading or drawing on a table three feet high. While this may seem a long way from lights of a practical value, the nature of the problem has been realized, and it remains only for further research to develop the answer.

THE ROSE TECHNIC

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Commencement

At this season of the year Rose bids goodbye to its seniors. How often we hear it said that this man or that will be sorely missed. It is true that individual personalities as such will be missed; this is inevitable. But fortunately the places vacated by the seniors at graduation will be filled by present underclassmen. It is one of the purposes of Rose to develop character, and the absence of outstanding individuals particularly will be noted; but as the unending line of underclassmen progresses new characters are developed. With the heritage of organizations and traditions these new men are even better equipped to meet the requirements imposed upon them. In so short a time as a single generation the progress to present conditions is amazing. Aside from the changes attendant upon developments in the fields of science with which Rose is so vitally concerned, the whole aspect of campus life has changed. True, a generation back there were a few campus organizations and, of course, traditions; but compared to those now, they were few. At present there are firmly established upon the Rose campus organizations for the development of a well-rounded life. Many, among them fraternities, develop the lasting assets of college friendships, which become inseparable from the graduate. It is to such things as these that the seniors, soon to join the alumni of Rose, must say a final goodbye, but to which they will unconsciously turn henceforth.

The Rose student body wishes to extend its most sincere sympathy to Tom N. Wells, e., '37, in the passing of his mother.

College Leadership

What is a college leader? I am inclined to believe that he is first of all somewhat a fool. To be considered a leader in college a man must undertake all sorts of activities which no one else will do. He spends almost all his time doing nothing, figuratively speaking. Most of his time is spent in running around with his fingers in some outside activity. Because he wants to please everyone he tries to do everything but study. He loses his control over the larger purpose of life by worring about the trifles of a committee meeting, the supply of wet towels on the field, a rifle score, or a glee club rehearsal. Instead of getting a laboratory report in, he struggles with a petition for the good of all, or with a *Modulus* write-up. Does he produce the best grades of which he is capable? Does he get the proper returns from his school work? Of course not, and all because of his desire for popularity and leadership.

After school, what? His activities are through, but his grades and returns remain as a permanent record of his ability.

A real college leader should know when to say "No." He should have a clear sense as to what is worth while and what is not. A proper balancing of extra-curricular with curricular activities should be his goal. This combination produces a man who becomes a real leader.

Rose Technic

This issue is the initial work of the Technic Staff for the year 1936-37. To the six freshmen who are members of the staff it is also their first contribution to a college publication.

The entire staff realizes the responsibility which it has assumed. This responsibility is to the students, alumni, and the school. Since the *Rose Technic* is the only school magazine produced by the students, it must represent them to those outside. Three hundred high schools receive the magazine monthly, and from it the readers form their conception of Rose Tech. Alumni depend upon it for maintaining contact with their alma mater. About one hundred colleges and universities exchange copies with us; and Rose either rises or sinks in their estimation, depending on the quality of the magazine.

In the past the record of *Rose Technic* has been excellent and above criticism. The present staff intends to maintain this enviable record and is confident that it can produce a magazine of which the school, the students, and the alumni can justly be proud.

...but the squirrels were disgusted

TELEPHONE engineers had to find a way to stop gray squirrels gnawing holes in the lead sheath of telephone cables. Even a tiny hole may let in moisture—short circuit the wires—and put a number of telephones out of service temporarily. ¶ Many ideas were tried, but the squirrels gnawed on. Finally the cables were painted with black asphaltum and sprinkled with sand. The gnawing stopped. ¶ Not a major engineering problem, to be sure. But thousands of strange *little* problems, too, have been solved in order to assure you the world's fastest and most reliable telephone service.

Why not call your folks more often? For lowest rates to most points, call station-to-station after 7 P. M. daily or any time Sunday.

BELL TELEPHONE SYSTEM

RESEARCH AND PROGRESS

edited by
L. J. Giacoletto, e., '38

Biggest Shovel

WE, here at Rose, are indeed fortunate in having the biggest shovel in the world so near to us. Perhaps everyone in Rose has inspected this gigantic shovel. However, a few statistical facts will better explain why it is the largest shovel in the world.

The shovel was built by the Bucyrus-Erie Company for the Binkley Coal Company. It is used for stripping operations in a coal mine at Seelyville, Indiana, about five miles east of Terre Haute. Its total weight, 2,000,000 pounds, necessitated its being shipped in parts; it took three months to assemble. It has an all-over height corresponding to a 14 story building. The dipper is all welded, alloy-steel, and is capable of carrying thirty cubic yards. It can easily hold seventy-five men.

The shovel can take dirt directly in front of it, lift it seventy feet, and dump it 215 feet away. The dipper has a lifting force of 300,000 pounds. This force is not all applied by the electric motors, but comes in part from a large counterbalance behind the shovel. The "dipper stick" is a large cylindrical piece working back and forth, much like a piston within a cylinder.

The energy to run it comes from a 4,000 volt A. C. line from the local Dresser plant. By the use of built-in generators, this 4,000 volts A. C. is changed to 550 D. C. The D. C. voltage is used to run thirty motors which are capable of developing a total of 2,500 horse power. An interesting feature of the electrical setup is the method of speed control. The system used is the Ward Leonard System of control. This system, by controlling the field of the generator, gives an automatic and uniform variation of speed from a maximum in one direction through zero to a maximum in the opposite direction. The installation of this system, together with the large counterbalance, speeds up operation considerably.

Four large caterpillar tractors allow the shovel to move forward or backward on its own power. On each corner of the rectangular base are large hydraulic jacks. A separate motor operates each jack. These motors are automatically controlled so that the base, as the shovel moves, is constantly kept on a level.

The entire shovel has been exceptionally well designed and built. It operates smoothly and efficiently, having an excavating rate of from 2,000 to 3,000 cubic yards per hour. Only two men are necessary to control its various movements.

Even with such a large shovel and the most modern equipment, it is estimated that it will take between 15 to 20 years to remove all the bituminous coal present in that district.

Reducing the Weight

During the time of the depression it became necessary for manufacturers to reduce the dead and excessive weight on their products. It is for this reason that metal welding became so popular in the different processes of manufacturing.

Metal welding reduces the weight of the finished product in three ways: (1) it does away with the bolts, nuts, and rivets necessary for joining pieces; (2) it eliminates rivet holes, thereby increasing the strength, which means smaller pieces; (3) welding also makes possible the use of high strength steels in place of castings, which permits the decrease in the number of re-inforcing pieces.

Today, we can hardly turn around without noticing the applications of welding. The present low price car is an excellent example. There are more than 3,200 welds necessary in the manufacture of a car; this has decreased the weight of the car and has made it safer for traveling. In airplane construction, weight is an all important problem. The China Clipper is a masterpiece of welding art. The engine mounting which weighs only 74 pounds supports an 800 horse-power engine weighing 2,380 pounds!

The realm of metal welding has by no means been fully developed as yet. New methods of manufacturing will bring up new problems, but metal welding will play an important part in solving these problems.

Atomic Transmutation

For years scientists have attempted to unlock the secrets of atomic structure by means of atomic transmutation and atomic disintegration. The first attempt was made with the use of radio-active metals. This proved to be a rather costly and none too satisfactory method. Several years ago attempts to break down the nuclear structure were made with the use of high potentials. A high-voltage electrostatic machine, developed by Dr. R. J. Van de Graaff, was used for this purpose. One of these machines set up at Round Hill, Massachusetts, for the Massachusetts Institute of Technology, can develop a potential of 10,000,000 volts.

The most recent and perhaps the most successful apparatus used for this purpose is the cyclotron developed by Drs. E. O. Lawrence and M. S. Livingston of the University of California. Briefly, the apparatus accelerates a charged particle by repeated falls through a potential difference. The manner in which it accomplishes this is very interesting. Two semi-circular halves which resemble two halves of a pill box are alternately charged by means of a radio transmitter. The particles are admitted at the center of the semi-circular halves. These particles immediately accelerate toward that half which is of opposite polarity. The polarity now changes and the particles travel toward the other side. By means of a strong magnetic field a circular motion is imparted to the particles. The resultant motion is an accelerated spiral path. As the particles approach the wall of the container, they possess the greatest energy; they are then allowed to strike the material to be transmuted. The advantages of the cyclotron are quite distinct, as has been shown by its duplication at various universities. The effect obtained by the accelerated particles is equal to that given by a potential difference of 2,000,000 volts.

Dr. R. J. Moon and Prof. W. D. Harkins of the University of Chicago are at present working on an improvement for the cyclotron. Whereas in the previous setup energy was imparted to the particle only twice for each trip around the apparatus, Dr. Moon and Prof. Harkins by the use of three-phase alternating current hope to give three or even six distinct accelerations to the particle as it moves around the apparatus.

While there has been much written about the tremendous effect the particles ejected by the cyclotron have on the atom, not much has been said about the possible effect the particles may have on human beings working nearby. The same Dr. Lawrence, working with his brother Dr. J. H. Lawrence of Yale University School of Medicine, found that the particles are ten times more dangerous than X-rays. They obtained their results from experiments on white rats. Their statement has been confirmed by tests on sprouting grains of wheat. These tests were carried on by Dr. R. E. Zirkle of the University of Pennsylvania and Dr. P. C. Aebersold of the University of California Medical School. The warnings, if properly heeded, should make improbable the tragedies that followed the discovery of X-rays and radium.

Electrical Coupling

In the Triborough bridge, which will link the boroughs of Bronx, Manhattan, and Queens in New York city, it was necessary to synchronously raise and lower the two ends of the bridge. Rather than use a mechanical coupling between the two ends, an electrical coupling in the form of Selsyn motors was used. The Selsyn equipment makes it possible to link together the two motions with the least equipment and the highest degree of sychronism. In this case the electric motors on both sides of the bridge are controlled by the Selsyn equipment so as to raise and lower the bridge the same amount on both ends.

Colloids

Fifty years ago a British chemist, David Graham, laid the foundation for what is today the vast field of colloidal chemistry. Colloidal chemistry is the science that deals with chemistry of minute particles.

Recent discoveries have added a new impetus to the further study of this interesting subject. Dr. Fredricks Macy, one of the country's outstanding bacteriologists, has demonstrated the connection between the colloidal state of matter and its effect on the human organism. By the use of colloidal metals Dr. Macey has performed experiments that remind one of rejuvenation. An old withered orchid more dead than alive was treated with colloidal copper. In a short time the dried yellow thing was a beautiful purple orchid, blooming with new life. Colloidal metals have been successfully used for the treatment of nervous disorders, goiter, and cases of alcoholism. Dr. Steinmetz, the wizard of electricity, originated the utilization of colloids for the treatment of sinus trouble. Many deadly poisons, such as iodine and arsenic, become not only harmless but beneficial when reduced to a colloidal state. Dr. Macy actually drank 740 grains of colloidal iodine. This amount in the ordinary form would be enough to kill 300 men.

The properties of a substance change considerably when reduced to the colloidal state. The approximate diameter of a gold colloidal particle is 10^{-6} cm. A better idea of the size of the particles can be obtained when we realize that one cubic centimeter of matter when reduced to the colloidal state would cover ¾ acre. Is it any wonder that the inherent properties of matter, such as surface tension and electrostatic attraction, increase immensely in their effect. Upon this latter mentioned property, electrostatic attraction, is dependent much of the previously discussed effects. The theory is that the colloidal particles attract the dead and broken-down cells, carrying them into the blood stream.

Campus Activities

edited by

William A. Reddie
ch., '39

New Technic Staff

Announcement is made of the members of the *Technic* Staff for the school year 1936-37. This new staff is composed of the following members: Editor, C. Wischmeyer; Business Manager, R. Averitt; Associate Editor, E. Coons; Assistant Editors, K. Buis and M. Scharenberg; Research and Progress Editor, L. Giacoletto; Alumni Editor, N. Wittenbrock; Campus Editor, W. Reddie; Sports Editor, R. Ladson; Humor Editor, G. Smith; Advertising Manager, A. Greenland; Assistant Advertising Manager, L. Davis; Circulation Manager, A. Foley; Assistant Circulation Manager, R. Kahn; Art Editor, M. Steele.

The position of General Manager has been dropped from the staff for the coming year because it was considered unnecessary. The new staff has already assumed its duties and is responsible for this, the May issue of the magazine.

Rose Professor Honored

Dr. Paul G. Hoel, Assistant Professor of Mathematics, was recently announced the winner of a fellowship from the American-Scandinavian Foundation. Dr. Hoel will leave late in June for Oslo, Norway, where he will spend a year in statistical research.

Dr. Hoel has both the M. A. and Ph.D. degrees.

On the trip Dr. Hoel will be accompanied by his wife and will spend most of his allotted year in Oslo studying under Professor Ragnar Frisch, Statistical Economist. His trip probably will also include travel in other European countries.

Rose Polytechnic wishes to congratulate Dr. Hoel on his success and is pleased to have one of its professors receive this honor.

Honor Keys Awarded

The folowing men have been awarded honor keys for their extra-curricular activities during the past school year: J. Campbell (4 years), L. Duenweg, H. Garmong, J. Hufford, W. Kasameyer, R. Laughlin (4 years), C. McDonald, P. McKee, A. Mewhinney, R. Shattuck, D. Overholser, J. Walker, R. Averitt, L. Carroll, E. Coons, T. Wells, C. Wischmeyer, E. Wodicka, and R. Ladson.

In order to be awarded an honor key, under the present honor point system, a student must earn at least twenty honor points during the year for which the award is made, or he must earn at least fifty points during four consecutive years of school work.

Only students of the highest character and qualifications receive these keys, and they should consider themselves highly honored.

Modulus Staff

Appointments to the Modulus Staff for 1936-37 were made recently. The members of the new staff are as follows: Editor-in-Chief—Tommy N. Wells; Business Manager—Paul E. Giffel; Assist. Editor—Clemens Lundgren; Assist. Business Manager — Clyde Cromwell; Sports Editor—Max L. Stanfield; Campus Editor—Lawrence Carroll; Assistant Campus Editor—James Hughes; Art Editor—Harry Halberstadt; Photo Editor — William Huff; Assist. Photo Editor—Robert Underwood; Advertising Manager— Robert Sears; Assist. Advertising Managers — Earl Cromwell, Charles Drieke; Humor Editor—Wayne Alexander; Senior Sales Manager —Don McCullough; Junior Sales Manager—Bob Pearce; Sophomore Sales Manager—Victor Peterson.

Faculty Members Present Papers

At a recent convention of the Illinois-Indiana Section of the S.P.E.E., held at the Lawson Y.M.C.A. in Chicago, papers were presented by Professor Bloxsome, Assistant Professor of English and History, and by Mr. Mann, Instructor in Chemistry. Professor

Bloxsome's topic was "Engineering Writing," while Mr. Mann's paper was on "Problem Courses for Juniors and Seniors." Other members of the faculty who attended the convention were Professors Stock, Chinn and Mssrs. Hoel and Gray.

Phil Brown Speaks

Phil Brown, Director of Athletics, recently delivered an address—we all know how Phil delivers—to the Vigo County Historical Society. His talk was about the history of Madison, Indiana. Miss Gilbert states that it was a very lively meeting.

A. S. M. E.

On Monday and Tuesday, April 20 and 21, there was held in Chicago the Fourth Annual Student Conference of the A.S.M.E. Professor Wischmeyer, Dr. Prentice, and fifteen junior and senior mechanical engineers made the trip. Papers on various engineering subjects were presented by students from many midwestern technical colleges. Prizes were given to those students presenting the best papers. Rose was very fortunate in having one of her students, James R. Marks, tie for third place. Mr. Marks' paper was "Design for Appearance—Redesigning the Commonplace." Congratulations, Mr. Marks!

Glee Club

The Rose Glee Club is now completing a very successful season under the able directorship of Mr. Clyde Bennett, well-known vocal instructor. The Glee Club has again been assisted by Miss Dorothy McCullough, talented young coloratura soprano. Mrs. Bennett is accompanist for the club.

Some of the club's past engagements follow. On April 15 they sang at the Elk's Club; on April 16 they sang over WBOW (Show Program); on the same day they entertained at the Indiana State Gym. On April 17 the club presented a program at Wiley High School; on April 21 they were again on a show program over WBOW; on April 30 the members were guests at a banquet in Martinsville, Illinois, after which they sang for a meeting of the Eastern Illinois High School Professors. On May 7 the club presented a program in Sullivan. The club also sang for the Rotary Club Luncheon meeting on May 12.

The tenative date for the annual Glee Club Concert is May 21. The club is also planning to sing at the Alumni Banquet, which is to be held Saturday afternoon, Commencement day.

The Glee Club now has twenty-four members. However, it hopes to increase both in number and in goals achieved next season.

The Junior Prom

The Junior Prom this year, as it always has been in the past, was one of the high lights among the social events of the year. The prom was held on Saturday evening, May 9, at the Country Club of Terre Haute in Allendale. Music for the evening was furnished by "Chic" Myers and his C.B.S. Radio Orchestra. The Junior Class was very fortunate in securing this orchestra as it has a national reputation, having played at such centers as Cocoanut Grove, Palais Royal in South Bend, Danceland in Cleveland, and various other popular and well-known places.

A. B. Foley acted as general chairman for the dance. The various committees included: F. Blount, chairman of the orchestra committee, assisted by R. Rotz and C. Wischmeyer; J. Hughes, chairman of the program committee, assisted by H. Halberstadt, and S. Smith; E. Cromwell, chairman of the finance committee, assisted by E. Coons and J. Penisten; L. Carroll, chairman of the decorating committee, assisted by D. McCullough, and J. Fox; and Carl Wischmeyer, chairman of the place committee, assisted by R. Averitt and A. Lotze.

The chaperons for the dance were Dr. and Mrs. D. B. Prentice, Dr. and Mrs. P. G. Hoel, Mr. and Mrs. J. L. Bloxsome, and Mr. Karl Spangenberg and Miss Helen Brown.

The club was beautifully decorated in pastel colors of rose and white. The programs were of the very latest style, having cellophane covers decorated with shiny bits of foil. There were a large number of alumni present at the dance. The Junior Prom will always be remembered as the one dance of the year which should never be missed.

R. O. T. C.

The final appointments of cadet officers in the R.O.T.C. Engineer Battalion have been announced by the Professor of Military Science and Tactics.

Battalion Headquarters now consists of Cadet Major W. E. Kasameyer — Battalion Commander, and Cadet Captain P. D. Bennett—Battalion Adjutant.

Other appointments were made as follows:

Company A: Company Commander—Cadet Captain H. E. Garmong; Platoon Commanders—Cadet First Lieutenant W. R. Creal and Cadet First Lieutenant C. D. Overholser.

Company B: Company Commander — Cadet Captain J. W. Campbell; Platoon Commanders—Cadet First Lieutenant L. Duenweg, Cadet First Lieutenant W. S. Sentman, and Cadet First Lieutenant J. H. Walker.

On May 18 the annual spring inspection of the Engineer Battalion will be held. The inspection this year is to be made by Colonel Charles R. Pettis, Corps of Engineers, who is the corps area engineer of the Fifth Corps Area. On the morning of inspection day Colonel Pettis will meet the military students for oral examination. In the early afternoon there will be close order drill followed by a review and an inspection. Following this there will be a field exercise illustrating a battalion in attack.

Although handicapped this year by an exceedingly small unit, the battalion has been practising hard and will do its best to make a good showing for the school.

In the past a saber, which is donated by the Terre Haute Chapter of the Reserve Officers Association, has been awarded to the outstanding officer at the spring inspection. This year medals are to be given to the most soldierly sophomore and freshman. The awarding of these medals will be based upon drill and tactical exercises, military appearance, observance of military courtesy, and leadership.

Rifle Club

The Rifle Club has just finished a lively season, during which much enthusiasm and interest developed among its members. The rifle team enjoyed a fairly successful season on their remodelled range, in that they won a goodly number of their scheduled matches. Though only postal matches were fired, there was present a keen element of competition in every match.

The following men, because of their faithful and successful work on the team, will receive sweaters: J. W. Campbell, E. A. Coons, J. Halberstadt, C. E. MacDonald, and V. W. Peterson.

There will be presented several medals for rifle marksmanship at the coming spring inspection of the R.O.T.C. unit. These medals are presented by the Fort Harrison Post of the American Legion and by Major D. B. Shourds of The Engineer Reserves.

Camera Club

Very recently the Camera Club purchased a new printing machine, which certainly suggests that the club is progressing. The club is now finishing a very successful season as an organization. During the past season there seems to have been an unusual interest taken in the club. Members of the club took various "shots" of many of the show exhibits. Some very interesting and humorous pictures were recently taken of a certain place on the runway, which suddenly developed quite an attraction for most of the signs that were used for the show.

Camera Club members sincerely hope to be able to purchase in the future more equipment for their dark room and to have even a better season next year.

Rose Show

On April 25 the fifth biennial Rose Show came to a very successful conclusion. Though now history, the show will long be remembered and talked about by the students who participated in it, by the faculty who advised and helped the students in every way possible, and by those who were fortunate enough to see such a spectacle of scientific wonders. The fact that there were 5689 paid admissions, 1316 more than in 1934, can only mean that those who came to see the show placed their unmistakable stamp of approval on the efforts of students and faculty.

All of the exhibits were so well shown and explained that, in fairness to all, no attempt to make reference to any exhibit in particular will be made. However, it may be said that three freshmen carried away the honors in the civil department by winning the prize which is given at every show by the civils for the best exhibit presented in their department.

Professor Knipmeyer should again be complimented on his excellent work as general faculty chairman, and much credit is also due Robert Shattuck, who headed the student administration.

Such an exposition as the Rose Show is not equalled elsewhere in this country. In fact, our shows have such an excellent reputation that in the past inquiries have come from technical departments in colleges hundreds of miles from Terre Haute when similar exhibitions have been contemplated. Though the citizens of Terre Haute formed the greatest part of our attendance, various groups and delegations of people came many miles to see the show. Mr. Owen, President of the Indianapolis Alumni Club, has informed this department that Harold Hood, '24, was solely responsible for the bringing the Indianapolis boys to the show. Mr. Hood acted as a committee of one to put the trip across, and he certainly did. The 1936 show was distinguished by meetings of members of the Indianapolis section of the A. S. C. E and the A. I. E. E., who came to Terre Haute on Friday, April 24, to hold their annual spring sessions here.

The Rose Show, as has been said before, is not merely a collection of scientific stunts. Every exhibit shown demonstrates fundamental principles of both science and engineering and of their diverse applications to practical work.

Probably the most important result of the exhibition is found here at school. All of the students are afforded an opportunity to demonstrate what they have been learning. In the show just concluded, as in shows heretofore, they rose to the occasion with extraordinary skill. Not only did the students design and build their own exhibits, but they were able to explain them clearly to mixed audiences.

Although preparation for a show is a tremendous and tiresome task, we Rose students are proud of our shows and of the things for which they stand. Let us hope that the tradition of presenting a Rose show shall never be broken.

Do "Rosies" Really Roam the Jungle?

At least Miss Mary Gilbert, Registrar, thinks so. In the recent show Miss Gilbert presented a very unique and ingenious exhibit in the form of a bookcase filled with miniature elephants, not the real ones, but Rose Poly elephants, of all sizes and colors. She drew a great deal of attention with her original display and has received many compliments on it. Miss Gilbert wishes to thank those who so willingly furnished the elephants for her display.

There is no short cut to an engineering education. More than one hundred and fifty accredited technical colleges in the United States require four years of study for the first degree.

Schools which advertise to train "engineers" in a few weeks or months are misusing the word. They doubtless produce high grade technicians but certainly not engineers.

Every young man who is interested in the profession of engineering should read "Engineering - A Career, A Culture" a publication of the national societies.

A copy will be sent on request by the Registrar.

ROSE POLYTECHNIC INSTITUTE

TERRE HAUTE, INDIANA

SPORTS

edited by

Robert N. Ladson, ch., '39

The Rose Poly football team during the past season was very seriously handicapped by lack of material. At the opening of the season the squad was so small that a scrimmage was impossible, but later in the season, with the occasional participation of Coach Brown in the play, enough men were available for two teams. Despite this physical handicap the team had a fairly good season—not so good as the school would have liked but excellent considering conditions. The team used an intricate system of shifting; and numerous lateral and forward passes served to consistently confuse the opponents, making possible many gains and touchdowns. This, the best dressed team in the middle west, was ably led by Jim Hufford, captain, quarterback, and veteran of four seasons. Major letters and sweaters were awarded to the following men: Captain Hufford, Campbell, Laughlin, Tait, Cavanaugh, Garmong, seniors; McCullough, Wodica, Fox, juniors; Fuller, Stanfield, sophomores; Montgomery, Krider, McKee, freshmen.

The team next year will be led by "Hammy" McCullough and Ed Wodica as co-captains. These two men are tackle and end, respectively, with plenty of experience. "Hammy", when approached with the question of prospects for next year, said, "We will have the largest team since 1931, and I predict a good year on the gridiron."

Ed Wodica, in reply to the same question, said, "We will be big in the line, small but fast in the backfield, and this combination should produce a winning team."

With such leaders the team should be a good one, but as usual football prospects at this time are unknown. In spring practice this year the turnout was larger than it had been for several seasons past, either in the spring or fall practices. The line will be unusually large, while the backfield will be small and fast, but the team will be considerably handicapped by lack of experience. Less than ten out of twenty-seven candidates for football this spring have ever played football before, either in high school or college. Putting basketball back in the athletic program has served as a stimulus to all athletics, and football will undoubtedly benefit from this new interest. The lettermen available for next year's team are: Co-captains McCullough and Wodica, Fox, Fuller, Stanfield, Montgomery, Krider, and McKee.

The list of games and scores for the past season follows:

Rose 7—Evansville 13
Rose 46—Holbrook 0
Rose 3—Wabash 60
Rose 6—St. Josephs 24
Rose 6—Earlham 15
Rose 21—Oakland City 6
Rose 0—Franklin 26

The schedule for next year includes:

Sept. 26 At Earlham
Oct. 3 Evansville here
Oct. 10 At St. Josephs
Oct. 17 At Wabash
Oct. 24 Holbrook here
Oct. 31 At Manchester
Nov. 7 Open
Nov. 14 Oakland City here

For the first time in four years Rose Poly was again represented by a basketball team. It was a team hampered by lack of experience and practice, but nevertheless a beginning in Hoosierdom's favorite sport. After a brief series of intra-mural basketball games between departmental teams, Coach Brown picked a squad of men and drilled them for only four days before the first game. The team developed rapidly after the first two setbacks and climaxed the season with a trip to Michigan. In defeating Lawrence Institute of Detroit and dropping a game to Adrian College, the charging el-infants broke even in the series. (This nickname is derived from the stature of the team members and not from their spirit. The team was consistently smaller than its opponents.) The final game of the season was played in the Rose Gymnasium before a crowd of cheering fans, who were pleased to see Rose win a second game from Lawrence. The list of games and scores follows:

Rose 28—Anderson 46
Rose 16—Indiana Law School 22
Rose 20—Anderson 17
Rose 21—Indiana Law School 22
Rose 24—Charleston Teachers 54
Rose 25—Lawrence Tech 23
Rose 29—Adrian College 37
Rose 16—Charleston Teachers 46
Rose 26—Lawrence Tech 16

At the close of the season the team members elected Albert Mewhinney honorary captain for the year. The team will lose by graduation Captain Mewhinney, Kasameyer, and Hufford. Next year's captain will be Ed Wodica. Major letters and sweaters were awarded

to Mewhinney, Kasameyer, Hufford, Wodica, Wolf, Eckerman, Smith, Ladson, and Manager Merriman.

The climax of the basketball season was a banquet in which the team members were the guests of Coach Brown. The object was to eat, and everyone enjoyed himself immensely by eating too much. However, the opinion of the coach indicates that the capacity of this year's team was much below the capacities in former years.

Basketball prospects for next year are fairly bright, because only three men from the entire squad will be lost by graduation. The short season just past was an agreeable surprise, and with the experience gained by the players, the team should be much better. The letter men returning are Captain Wodica, Eckerman, Wolf, Smith, and Ladson. With these men as a nucleus and additional men entering school, the team should win more than its share of games. Games have been scheduled with the following schools:

DePauw, 1 game
St. Josephs, 2 games
Lawrence, 2 games
Anderson, 2 games
Taylor University, 2 games
University of Western Ontario, London, Ont., 1 game

Enough additional games will be scheduled to round out a full schedule.

There will be no varsity tennis team this year because work on the Rose Show made it too late in the season to begin practice. However, there will be an intra-mural tennis tournament in both singles and doubles to select the best men in school. Interest is running high, and every clear day finds some students diligently practicing. Albert Mewhinney, last year's champion, is ceded number one in the standings, but several players will attempt to displace him.

There will be no intra-mural track meet this year due to lack of interest, and the fact that the Rose Show interrupted any probable plans. In the past the boys would not train for the meet, and more harm than good was done. The time will be taken up with tennis and baseball.

Coach Brown has made it optional with the student body whether they play softball or regular baseball in this spring's intra-mural diamond activities. A report from this is not available now since interest in both is very high.

To turn from outdoor sports to indoor sports, a great part of each student's leisure time at school has been spent playing those old favorites, ping pong and handball. With the new lounge such a nice place to play great interest has been shown in ping pong. Almost any time one can find someone batting the ball back and forth across the net or perhaps pursuing the elusive ball. As yet no school tournament to select a champion has been played but such a tournament is expected to begin at any time. Handball, while not quite so popular with the majority of students, still remains a great favorite with regular players.

ALUMNI

edited by

Norman G. Wittenbrock, ch., '38

Dr. P. W. Wilson, Ex, '26

Doctor Perry W. Wilson, who is now assistant professor of agriculture, bacteriology, and chemistry at the University of Wisconsin, has been selected by the Guggenheim Foundation to be the recipient of one of its fellowships.

The award will finance Dr. Wilson's research work in enzyme chemistry at the University of Cambridge, England, and consultations with leading European experts. In these studies he will continue an activity which has already produced definite results for Wisconsin farmers.

His problem in enzyme chemistry will be the nitrogen fixation of bacteria as it applies particularly to the cultivation of legumes, which constitute an important item to Wisconsin farmers.

Dr. Wilson, together with his wife, will leave for England in June and will remain there until early in 1937.

Dr. Wilson, who was a member of the class of '26, was a graduate student at the University of Wisconsin and later joined its faculty.

A. L. Pfau

Mr. Albert L. Pfau, Jr. of St. Petersburg, Florida, was unanimously elected vice president of the Florida Engineering society at a convention held in Daytona, Florida. He was also recently appointed by the governor of Florida as president of the state board of engineer examiners. Mr. Pfau was graduated from Rose in 1913.

Mr. Pfau is an acknowledged authority on questions of water front boundaries on the St. Petersburg peninsula, and his surveys are generally accepted as authority in all courts of action. He also specializes in the construction of sea walls.

Engagement

The engagement of Harold Johnson, '23, to Miss Alice Hunt of Lakewood, Ohio, has been announced recently.

Births

William C. Turner, who graduated from Rose in 1922, has announced the birth of a son, Robert Keith. Mr. Turner is a Sales Engineer with the Bailey Meter Com-Company at Chicago, Illinois.

John W. Trueb, Jr., a graduate of Rose with the class of 1930, is the father of a son, Richard Lee, born last month.

Wilton L. Brown, who graduated from Rose in 1933, recently announced the birth of a daughter, Barbara Helen. Mr. Brown is with the Peoples' Gas, Light, and Coke Company at Chicago, Illinois

Herbert A. McAninch, who graduated from Rose in 1934, is the parent of a daughter, born in April. Mr. McAninch is with the Link Belt Company at Indianapolis, Indiana.

Here and There With the Grads

'01 Harry A. Schwartz was reelected chairman of the Cleveland District Committee of the A. S. T. M. at the annual meeting on March thirty-first.

Mr. Schwartz is going to deliver the annual Sigma Xi lecture on May 29 in connection with the exercises of commencement week at Case School of Applied Science.

'11 William E. Baker recently became Vice President in charge of Manufacturing with the Servel Corporation at Evansville, Indiana.

ex'12 Frederick W. Kroemer is with Bernuth, Lembcke Company in the Cotton Exchange Bldg. at Houston, Texas.

'28 Morris Guggenheim has returned to his old job as Junior Metallurgist with the United States Bureau of Mines at Rolla, Missouri.

'29 John A. Derry, who is with the Pennsylvania R. R., has been transferred to Clarendon, Virginia.

'31 Ernest G. Hurst has accepted a position with the Illinois State Highway Commission at East St. Louis.

'32 Wayne Bovenschen, who is with the Terre Haute Brewing Company, has been transferred to their new plant at St. Louis.

'33 W. Franklin Crawford has a position with the Sun Oil Company in Detroit.

Russell A. Powell has a position with the Commercial Solvents Corporation in Terre Haute.

'34 Albert L. Yates, who is with the Pennsylvania R. R., has been transferred to Derry, Pennsylvania, where he is Assistant Supervisor.

Albert G. Morrison has taken a position with the Indiana State Highway Department.

'35 Claude C. Dierdorf is working in the Metallurgy department of the Illinois Steel Company at Gary, Indiana.

William S. Pratt has a position with the Terre Haute Boiler Works in Terre Haute, Indiana.

Harold Reintjes has a position as Research Assistant with the Corn Products Company at Pelsin, Illinois.

Obituaries

Mr. Edgar B. Powell died March 31, 1936, in a hospital at The Dalles, Oregon. Mr. Powell, who graduated from Rose in 1902 as an architectural engineer, was one of the first architects to design sky-scrapers. Mr. Powell has made his home in Oregon since 1912.

Mr. Edward M. Brennan died recently in Columbus, Ohio. Mr. Brennan was graduated from the mechanical engineering course at Rose with the class of 1909 and for some time was employed by the Pennsylvania railroad at Terre Haute. At the time of his death Mr. Brennan held the position of President and General Manager of the Armstrong Furnace Company at Columbus, Ohio.

Mr. Clarence W. Sproull died May 31, 1935, at Stoughton, Massachusetts, after an illness of seven months. A letter was received just recently from Mrs. Sproull, telling us of Mr. Sproull's death. Mr. Sproull was formerly Chief of Design in the research department of the Champion Coated Paper Company.

Anniversary Meeting Planned

The members of the class of 1897 are planning to hold a meeting during the Commencement exercises in June, 1937, the fortieth anniversary of their graduation. The class of '97 numbered 26 at the time of graduation, but time and death have not been so generous, and there are only 17 surviving members of this class. We would like to wish the members of this class who are directing this meeting lots of success, and we promise them that they are sure to be given a hearty welcome when they return to Rose.

Rose Tech Club Meeting

The Detroit Rose Tech Club held its first regular meeting in several years on the evening of March 16, St. Pat's Eve, at which twenty-one alumni were present. Following the dinner an election of officers was held with the following results: Herman E. Mayrose, '15, President; Robert S. Roach, Secretary. During the meeting plans were discussed concerning the placement of graduates and the securing of prospective freshmen. Several of the older alumni gave brief talks, and the meeting was concluded with reminiscences of St. Pat's celebrations of past years.

FRATERNITY NOTES

MARKS.

Blue Key

As a result of the Spring elections of Blue Key, Mr. Hufford of the senior class and Mr. Averitt of the junior class are now members of the fraternity. These men were initiated on April 3, at a banquet held at the Elks Club. Due to the overcrowded social calendar, the annual spring dance has been postponed from May 1 to some, as yet undetermined, future date.

Alpha Tau Omega

Gamma Gamma chapter of ATO held its annual election of officers on April 21. Robert Averitt was elected President, while Giffel, Wischmeyer, Snedeker, Coons, C. Cromwell, Sears, and Stineman were elected to the other offices.

At the culmination of hell week, which was held April 30 and May 1 and 2, a formal initiation was conducted on Sunday afternoon, May 3, for eight men. Gamma Gamma takes pleasure in congratulating the following new brothers: Edward Eckerman, Robert Pearce, Norman Wittenbrock, Logan Davis, Robert Kahn, William Seymour, Edward Spahr, and Malcolm Steele.

In conjunction with the initiation, a state conclave was held Sunday morning and afternoon. Representatives from all ATO chapters in the state met at the chapter house with the Chief of Province, J. J. Maehling.

The annual Spring Formal will be held May 22, at the Terre Haute House ballroom, in honor of the recent pledge class.

Theta Kappa Nu

On Thursday, April 2, the thirteen pledges of Theta Nu were very unlucky. This date heralded the advent of "rough week" and the formal pledge initiation. For three nights the pledges were set at various tasks and were allowed to disport themselves at Seventh and Wabash. We wish to congratulate our pledges on the fine spirit which they displayed during this hectic time and to welcome them into the ranks of the fraternity as pledge brothers.

Friday night, May 1, found pledges and actives "swinging it" to the tunes of Wayne McIntyre and his orchestra at the annual Pledge Dance. This formal affair was held in the main ballroom of the Terre Haute House. Programs were in the fraternity colors. Prof. and Mrs. Child and Mr. and Mrs. Mann were chaperons. Those attending voted the dance a complete success and a memorable event in chapter history.

On Sunday, May 3, Theta Kappa Nu initiated four men, comprising the remainder of last year's pledge group, and Schilling and Wise of this year's group. There will be another initiation later in the spring for members of this year's pledge class who wish to become active.

Sigma Nu

Beta Upsilon will hold initiation services for the new pledges on Sunday, May 10.

A large number of alumni members were guests of the chapter during the Rose Show, including Robert Dowen, John Heltsly, John Richardson, Bob Roach, Earl Butler, and Jay Hall.

Alpha Chi Sigma

Due to a misunderstanding, Alpha Chi Sigma news has not been written for Technic publication for several months; hence some of the items mentioned here will be rather antiquated.

At the January meeting the following officers were elected to serve through this semester: George Cavanaugh, Master Alchemist; Ed A. Coons, Vice-Master Alchemist; Daniel Overholser, Recorder; Ed Wodicka, Reporter; Earl T. Cromwell, Treasurer; and Henry Douglas, Alumni Secretary.

At a recent meeting Iota appointed its delegates and alternates to the Fourteenth Biennial Conclave which is to be held June 16-20, 1936, at the Netherland Plaza Hotel, Cincinnati, Ohio. Those appointed were Ed A. Coons, Delegate; Ed Wodicka, First Alternate; and Earl T. Cromwell, Second Alternate.

With the completion of present plans, Iota will place an electric clock, in the shape of a hexagon, over the door of the office in the Chemistry Laboratory. This project will be accomplished through the combined efforts of twenty pledges under the direction of pledge captain Bill Wolf. It is felt that this will fill a rather urgent need, as there is no permanent clock in or near the Chem Lab.

HUMOR

edited by

George W. Smith
ch., '39

PAINFUL

"Gosh, you're dumb. Why don't you get an encylopedia?"

"The pedals hurt my feet."

I sat by the Duchess at tea,
It was just as I feared it would be;
The rumblings abdominal
Were simply phenominal,
And of course they all thought it was me!

—*Yale Record.*

Prof. Gray: "Describe the mechanism of a steam shovel."

John Stineman: "Don't kid me. You can't carry steam on a shovel."

Frosh at First Sorority Party: "May I have the pleasure of sitting on your right hand at dinner?"

His Gal: "I'd rather you'd hold it, when I'm not needing it to eat with."

A definition of strategy:

A method of keeping from the enemy the fact that you are out of ammunition by continuing to fire.

—*Arkansas Engineer.*

"Bill" Reese (arrested for speeding): "But, your honor, I am a college boy."

Judge: "Ignorance doesn't excuse anybody."

She: "That funny step. I simply adore it. Where did you pick it up?"

Ed Coons: "Funny step, the mischief! I'm losing my garter."

—*Oregon State Tech.*

AND HE'S EXPERIMENTING WITH CARBON BLACK

Prof.: "What is the outstanding contribution that chemistry has given the world?"

Student: "Blondes."

—*Oregon State Tech.*

Very briskly the dapper young fellow stepped up to the hosiery counter in the department store and inquired: "May I see the thinnest thing you have in silk stockings?"

Sarcastic Clerk: "I am very sorry, but this is her lunch hour."

"Really, I'm not lying! I do sell underthings to nudists."

"What do you mean; underthings to nudists?"

"Yes, cushions."

Prof.: "Why, I can work this test in ten minutes."

Student: "Who in the ——— couldn't if he made it out?"

We wonder—if this could happen.

Scene: Room with dim lights.
Characters: Young couple.
Dialogue:
He: "Give me a kiss."
She: (Silent)
He: "Please, give me a kiss."
She: (Still silent)
He: "Please, just one. Please."
She: (Still *very* silent)
He: "Are you deaf?"
She: "Are you paralyzed?"

NO PRIVACY

Finals, finals everywhere,
With drops and drops of ink,
And never a prof who'll leave the room
And allow a guy to think.

—*Chicago Phoenix.*

SURE ENOUGH

Our notion of wasted energy is telling a hair-raising story to a bald-headed man.

YEH, WHAT IS IT?

Lecturer: "I speak the language of wild animals."

Voice in Rear: "Next time you meet a skunk, ask him what's the big idea."

Once there was a farmer who fed his cows on bird seed—and sold cheap milk.

Indignant Mama: "Are you kissing that young man, Kay?"

Kay: "No, Mother, I'm only brushing my teeth on his mustache."

History Prof.: "Who was Talleyrand?"

Student: "A fan dancer, and cut the baby talk."

RUN DOWN

Patient: "Doctor, I feel in a run down condition."

Doctor: "How far do you wish to run down?"

Patient: "Well, I was thinking of Florida."

G-E *Campus News*

"DON'T TALK BACK"

YOU can't argue with an officer. One G-E engineer learned the truth of this modern proverb when he was detained by Panama Canal authorities and the radio tubes he carried were impounded. The officers were convinced that the unfamiliar objects were bombs. And when an officer has made up his mind, that settles it. The tubes were carted away.

Some years ago, I. R. Weir, of the General Electric Radio Engineering Department, was en route to Tegucigalpa, capital of Honduras, Central America, to install a radio transmitter. He carried with him two of the first large, part-metal radio transmitting tubes which had been developed by General Electric.

"Upon arriving at the Panama Canal," he relates, "I was surprised to find that I was detained for investigation on suspicion of carrying bombs. After much argument it was decided that I should have to leave my radio vacuum tubes in the ammunition dump during my stay in the Canal Zone."

CLEAN DIRT

SOAP and water will still be needed to clean Junior's face and hands, but if Junior's father is a florist he will welcome this clean dirt.

Florists and specialty growers wage a never-ending battle against weeds, insects, and plant parasites which flourish in greenhouse soil. But reinforcements have arrived. Clean dirt may now be economically obtained by means of electric equipment developed by General Electric scientists.

Electric heating units, arranged in a wooden bin, heat a quantity of soil to a temperature of 160-180 F. Heating sterilizes the soil by a process which resembles the pasteurization of milk, and weed seeds, insects, and fungi which are dormant in the soil are killed during the sterilization process. In the resulting germless dirt, plants can attain a vigorous, uniform growth, free from the competition of weeds and the inroads of other plant enemies.

"AH, WATSON, AN INDUSTRIAL CRIME"

THE "corpus delicti"—a broken resistance wire; the suspect—a defect in the wire; the detective—a microchemist. With microscope and analytical apparatus of incredibly small dimensions this industrial superdetective finds tiny crystals of sulphate near the break. The trail leads to a nearby furnace giving off sulphurous fumes. Thus the wire is cleared of suspicion of having been defective, and the criminal fumes are eliminated.

This analysis is typical of many industrial "micro-mysteries" that have been solved in the Research Laboratory of General Electric. A development from methods devised in the fields of biology and medicine, microchemistry has become an indispensable servant to industry, with accomplishments as great as the quantities with which it deals are small.

With thimble-sized beakers, and test tubes as small as 1/50 of an inch in diameter, the microchemist analyzes quantities of material 17,000 times lighter than a drop of water. He has defined a new unit of mass, the gamma, one millionth of a gram. A streak of dirt, a smudge, a minute pit mark—all these can be taken into the laboratory with a reasonable assurance that the microchemist will be able to provide the answer to the problem.

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GENERAL ELECTRIC