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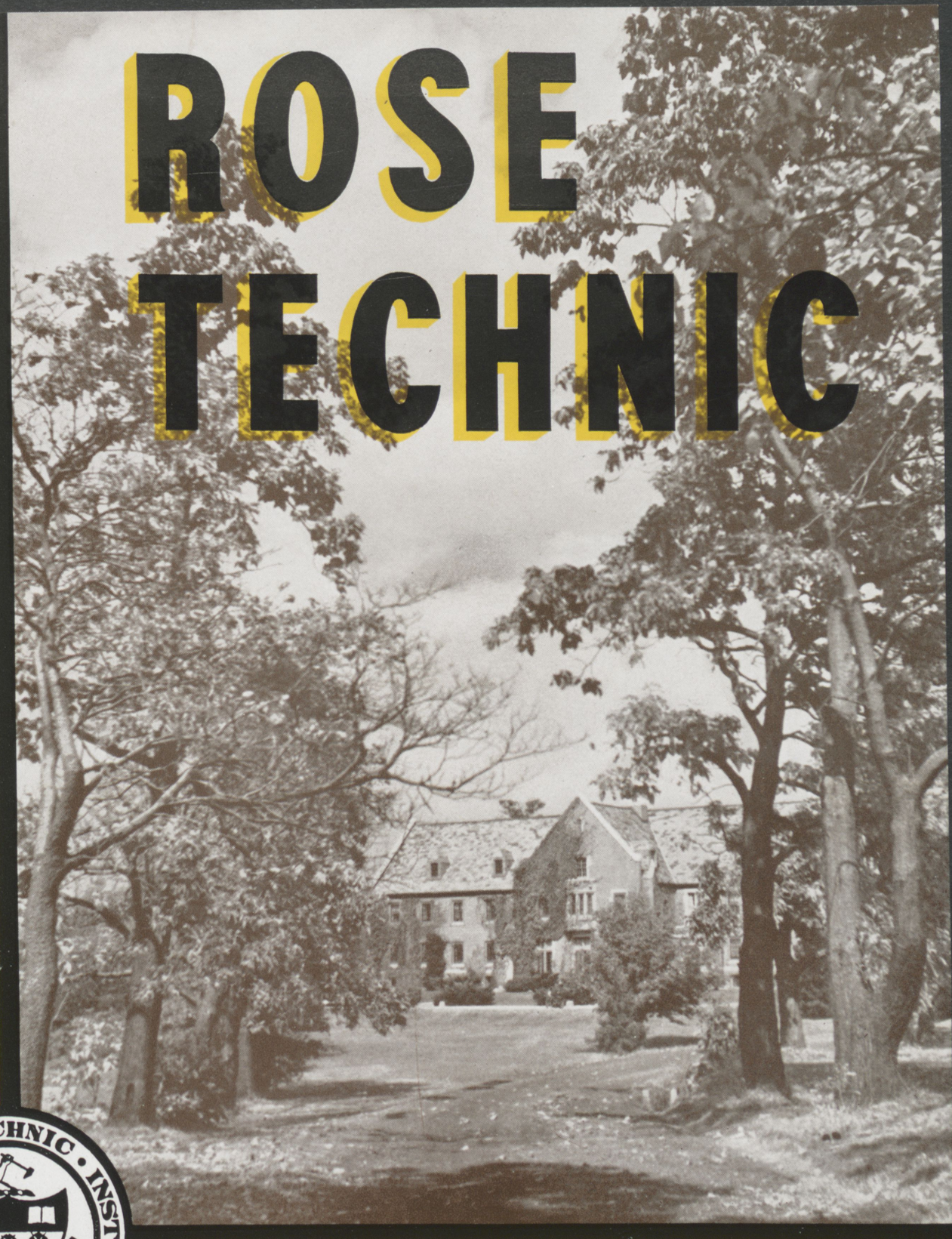

ROSE POLYTECHNIC INSTITUTE
LABOR ET SCIENTIA
1874

NOVEMBER, 1938

MEMBER ENGINEERING COLLEGE MAGAZINES ASSOCIATED

STEELE '39

Education is constantly changing and growing. An educational institution must change and grow with the methods and materials it uses. The new laboratories of the department of civil engineering are the most recent evidence of growth at Rose. In a few months, when equipment has been installed, the work of this department will be definitely strengthened, and students of all courses will benefit from it.

ROSE POLYTECHNIC INSTITUTE

TERRE HAUTE, INDIANA

Surveying This Issue

THE *Technic* is especially proud to present as its lead article this month Mr. Barrick's original work on the heat of formation and combustion of organic compounds. The method developed and set forth by Mr. Barrick is, so far as we have been able to determine, the simplest and best method yet devised for such determinations. Every chemical engineer should read it.

HYDROGEN cooled electrical equipment, once a laboratory curiosity, has become one of the more promising methods for increasing efficiencies. Mr. Smilanic tells how hydrogen cooled generators operate and why they are better.

FAME and fortune await the man who can make fuel briquetting commercially feasible in the United States. Mr. Pies explains what work has been done in this field and what obstacles must be overcome to make fuel briquetting a successful industrial operation in this country.

THE COVER, a photograph of Deming Hall taken by Mr. Howard White, is one of the finest campus pictures taken at Rose for many years.

—*R. S. K.*

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NOVEMBER 1938

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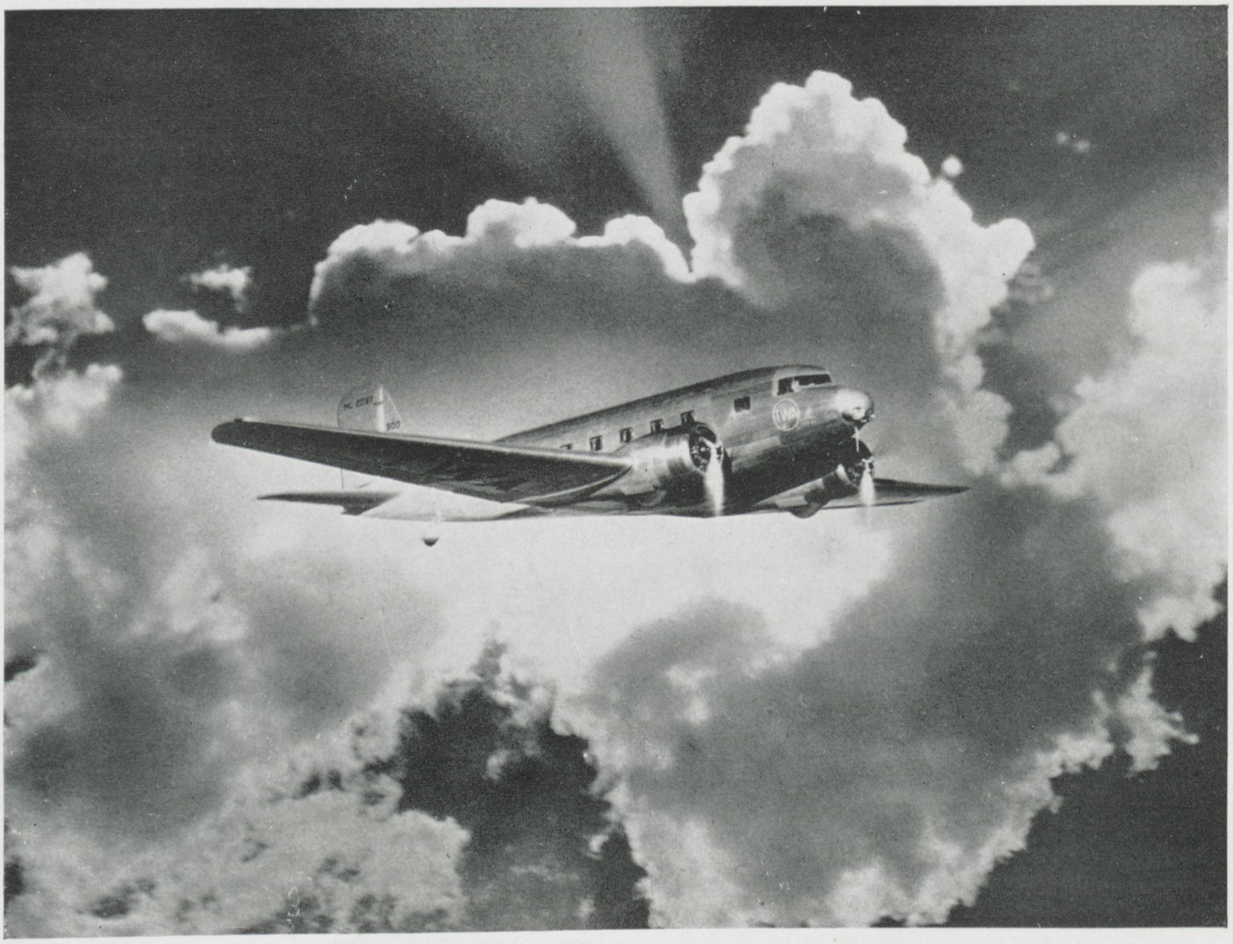


MASTER OF THE SKY

Heat of Combustion and Formation of Organic Compounds

by Gaylord L. Barrick, ch., '39

IN 1925 Dr. M. S. Kharasch announced a method by which the heat of combustion of an organic compound could be calculated from its structural formula. This method was based on the assumption that the heat of combustion of any organic compound is equal to the product of the number of electrons interdisplaced by oxygen upon combustion and a constant plus certain corrections for strained or abnormal structures. The constant and correction factors were arrived at by a critical study of an abundance of data on the heat of combustion of organic compounds furnished by a host of experimenters in the field. This method becomes somewhat involved for a complicated compound of high molecular weight where a large number of electrons must be counted and several corrections for structure made. The purpose of this paper is to present a method by means of which the computation of heats of combustion might be simplified and which will furnish a simple means of calculating heats of formation of organic compounds.

If one arranges the first few members of any homologous series with their corresponding heats of combustion in order of increasing molecular weight, it becomes evident that each addition of the homologue increases the heat of combustion by a constant amount. A mathematical expression for the heat of combustion of any member of the series would be of the form Q=ndQ+k, where Q is the heat of combustion of the member, n is some expression designating the member, dQ is the constant difference for the series, and k is a constant peculiar to the series. Since there are two unknowns in the above equation, the heats of combustion of at least two members of the series must be known in order to evaluate the constants. The heats of combustion of other members of the series, if known, may be used as a check on the equation.

As a demonstration of the method the equations for the alkane, primary alcohol, ketone, and benzenoid homologous series will be derived. The necessary data are contained in Table 1.

For the first time in print, the TECHNIC presents a simple method of calculating heats of combustion and formation of organic compounds. Mr. Barrick has developed these linear relationships from available experimental data and older, more complex equations. The methods outlined in this article should prove invaluable in future calculations of organic technology.

In all, about eighteen of these equations were developed by the writer. These will be included in Table 2.

As an illustration of the usefulness of these equations, the heat of combustion of the hypothetical alkane hydrocarbon $C_{100}H_{202}$ will be computed. The equation for this series is Q=156.3n+52.1, where n is 100 for the above compound. Substitution of this value into the equation gives a result of 15,682.1 kg. cal. as the heat of combustion of one mole of this substance. The method proposed by Dr. Kharasch would have required the counting of no less than 602 electrons for this compound.

These equations lead to a very simple method for computing heats of formation of organic compounds. By expressing the heat of combustion of the elemental constituents of a compound in terms of the number of carbon atoms in the molecule and subtracting from this the general equation for the heat of combustion of the series to which the compound belongs, a very simple equation giving the heat of formation of any member of the series is obtained. As a demonstration of the procedure, the equation giving the heat of formation of any member of the alkane series will be derived. The generic formula for this series is C_nH_{2n+2}. It is evident that the heat of combustion of the elemental constituents of this compound can be expressed as 94.4n+2x34.2n+2x34.2 kg. cal., where 94.4 is the heat of combustion of one atomic weight of carbon and 34.2 is the corresponding value for hydrogen. The result upon collecting terms above is 162.8n+68.4 kg. cal. per molecular weight. Subtracting from this the heat of combustion equation Q=166.5n+52.1 results in the heat of formation equation H=6.5n+16.3 kg. cal. per mole, where n is the total number of carbon atoms in the molecule. As an illustration of the use of such an equation, the heat of formation of stearic acid, $C_{17}H_{35}COOH$, will be computed. Reference to the table of heat of formation equations (Table 2) shows that the equation covering saturated aliphatic acids is H=6.5n+104.2 kg. cal. per mole. The total number of carbon atoms in a molecule of stearic acid is 18 so that the heat of formation of one mole of stearic acid is given by H=6.5+18+104.2=221.2 kg. calories.

These heat of formation equations lead to the simple calculation of the heat of formation of the various

TABLE 1.

ALKANE SERIES.

Name	*Formula*	*n*	*Q*	*dQ*	*Q—ndQ=k*
Methane	CH_4	1	208.4		
				156.3	
Ethane	C_2H_6	2	364.7		52.1
				156.3	
Propane	C_3H_8	3	521.0		52.1

PRIMARY ALCOHOLS

Methyl	CH_3OH	1	169.3		
				156.3	
Ethyl	C_2H_5OH	2	325.6		13.0
				156.3	
Propyl	C_3H_7OH	3	481.9		13.0

KETONE SERIES

Name	*Formula*	*n*	*Q*	*dQ*	*Q—ndQ=k*
Acetone	$(CH_3)_2CO$	3	423.3		
				2x156.3	
Diethyl	$(C_2H_5)_2CO$	5	735.9		-45.6
				2x156.3	
Dipropyl	$(C_3H_7)_2CO$	7	1948.5		-45.6

BENZENOID SERIES

Benzene	C_6H_6	6	781.5		
				152.8	
Toluene	C_7H_8	7	934.3		-135.3
				152.8	
Xylene	C_8H_{10}	8	1087.1		-135.3

Upon substitution of the above values into the general equation, the following formulas result:

Alkane	$Q=156.3n + 52.1$ kg. cal. per mole 18°C
Alcohol	$Q=156.3n + 13.0$ kg. cal. per mole 18°C
Ketone	$Q=156.3n - 45.6$ kg. cal. per mole 18°C
Benzenoid	$Q=152.8n - 135.3$ kg. cal. per mole 18°C

TABLE 2.

GENERAL EQUATIONS FOR HEAT OF COMBUSTION AND FERMATION

Name	*Formula*	*Q*	*H*
Alkane	C_nH_{2n+2}	156.3N+ 52.1	6.5N+ 16.3
Alkene	C_nH_{2n}	156.3N+ 13.0	6.5N— 13.0
Alkine	C_nH_{2n-2}	156.3N— 6.5	6.5N— 61.9
Cyclo-alkane	C_nH_{2n}	156.3N	6.5N
Benzenoid	C_nH_{2n-6}	152.8N—135.3	10.0N— 69.9
Benzenoid	C_nH_{2n-12}	152.8N—290.6	10.0N—119.8
Benzenoid	C_nH_{2n-18}	152.8N—433.9	10.0N—181.7
Alcohols (mono)	$C_nH_{2n+1}OH$	156.3N+ 13.0	6.5N+ 55.4
Aldehydes	$C_nH_{2n+1}COH$	156.3N— 38.8	6.5N+ 38.8
Ketones	$(C_nH_{2n+1})_2CO$	156.3N— 45.6	6.5N+ 45.6
Acids (mono)	$C_nH_{2n+1}COOH$	156.3N—104.2	6.5N+104.2
Acids (di)	$COOH(CH_2)_nCOOH$	156.3N—260.5	6.5N+192.5
Ethers	$(C_nH_{2n+1})_2O$	156.3N+ 19.5	6.5N+ 48.9
Esters	$(C_nH_{2n+1})_2COO$	156.3N— 87.7	6.5N+ 87.7
Acid anhydride	$(C_nH_{2n+1}CO)_2O$	156.3N—198.4	6.5N+130.0

bonds. For example, the heat of formation of the C-H bond can be found by dividing the heat of formation of methane by four. The heat of formation of the C-C bond can then be found by subtracting six times the value of the C-H bond from the heat of formation of ethane. In this manner it was found that the heat of formation of the C-H bond was 5.7 kg. calories per mole per bond and the value for the C-C bond was -4.9 kg. calories per mole per bond. The negative value indicates a heat absorption upon formation while the positive value indicates a heat evolution upon formation of the bond. Values for double, triple, and other types of bonds may be found in a similar manner.

It will be noted that no method for computing heats of combustion of compounds containing combinations of both aliphatic and aromatic groups has been mentioned. It was found that such a compound could be divided into simple groups and that the heat of combustion of the compound could be expressed as the algebraic sum of the heats of combustion of the constituent groups. It was found necessary to evaluate these groups in steps and to assign to a basic group a value to be used as a standard. It was found convenient to use the methyl group as a standard. Its value was found by dividing the heat of combustion of ethane by two. The OH group was evaluated by subtracting the value of the methyl group from the heat of combustion of methyl alcohol. The value of the benzenoid radical was found by subtracting the value of the methyl group from the heat of combustion of toluene.

As can be expected, this method of computing heats of combustion becomes quite involved for complicated molecules and leaves much to be desired. One factor which complicates the situation is that certain groups have a value when connected to a primary or secondary carbon that is different when connected to a tertiary carbon atom.

As a demonstration of the procedure in computing the heat of combustion of a mixed compound by this method, the heat of combustion of carvacrol will be calculated. The formula for carvacrol is $CH_3C_6H_3OHCH(CH_3)_2(1,2,4)$. It is seen that there are present three CH_3 groups, one CH group, one OH group, and one C_6H_3 group. By multiplying the value for each group by the number of times it appears in the molecule and adding, the heat of combustion is found. This value is found to be 1351.1 kg. calories per mole. As stated before, this method leaves much to be desired and is not to be recommended to any great extent.

Although other methods for com-

(Continued on Page 25)

Hydrogen Cooled Electrical Machines

by Nicholas A. Smilanic, e., '40

ENGINEERS responsible for the design, construction, and performance of electrical machines always have considered the problem of ventilating these machines to be important. The outstanding progress that has been made toward obtaining a better solution of this problem embraces two principal features: first, a material reduction of the losses; second, the development of more effective methods of dissipating them. From the beginning of the industry, air has been used almost universally as the cooling medium for all classes of rotating electrical machines. Since air is the most plentiful and the cheapest of all gases and an efficient heat transfer medium, it undoubtedly will continue to be used as the coolant for the major number of classes of such machines in the future.

The development of air-ventilation of the larger and more important electrical machines can be grouped chronologically into three main periods. During the first and earliest period, a continuous stream of cooling air was carried to the machine through intake ducts, passed through the unit, and discharged through the outlet ducts to regions beyond the source of supply. The principal disadvantage of such a system was that the air available at the site of utilization usually was contaminated with dirt and other solid impurities. In the second period, a move toward the alleviation of this difficulty was the introduction of the air filtering devices in the incoming air ducts. Such devices were reasonably effective, and actually they removed a large proportion of the solid impurities. Even with a relatively small amount of the dirt remaining in the air, the quantity of such material carried into the machine during a year's time was enormous, particularly in machines in fuel burning stations. In the third and present stage of the development, the closed circuit ventilating system with the surface type air cooler or heat exchanger is used. Since in this system the cooling air is recirculated, a relatively small amount of dirt is carried into the machine to clog ventilating passages, coat ventilating surfaces and reduce heat transfer coefficients, and be deposited on the surfaces of the coils. A further refinement of this system was obtained by introducing a make-up air filter at a low pressure zone in the ventilating system for filtering the air required to compensate for the outward leakage at the sections above atmospheric pressures. The use of the closed circuit ventilating system, with air coolers and make-up air filters, is considered to be a development of far-reaching importance in improving the performance of both the stator and rotor windings, and in reducing the maintenance expense and fire hazard due to winding failures.

Although air has been and probably will continue to be the coolant for the majority of electrical generators, hydrogen is becoming preferred in a great many installations. Hydrogen gas in a closed system may be so concentrated as to be non-explosive, and it admittedly permits better and more efficient operation.

Ventilation Problems

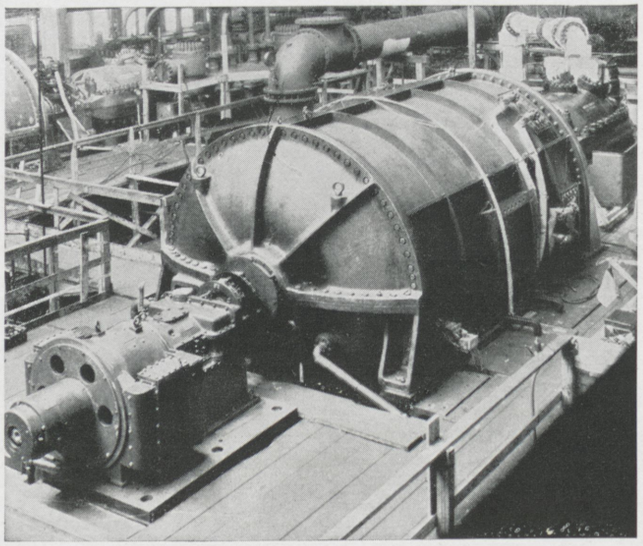
The three most important factors that are closely related to the problem of the ventilation of electrical machines are: loss per unit of weight or volume of material, loss per unit of output, and maintenance cost per unit of time. The use of gases other than air has been investigated by many during the past several years to determine their effect on these factors. Since it is possible to eliminate completely the item of uncleanliness by adopting a gas-tight housing structure, all gases can be placed on the same relative basis from this standpoint. In general, the use of gases having approximately the same densities as has air, or greater densities, contributes a negligible amount in increasing either efficiency or the unit output but may have a great influence on maintenance costs. Noninflammable gases such as nitrogen, carbon dioxide, and flue gas would eliminate completely the oxidation effects on organic materials and the fire hazard. In most cases the evaluation of the gains from this factor alone would not justify the use of these gases as coolants of rotating electrical machines.

Hydrogen vs. Other Gases

Hydrogen and helium are the two common gases that are appreciably lighter than air. Helium is inert and non-inflammable and in these considerations would be an ideal ventilating medium. Because of its scarcity and cost, however, it cannot be considered as an available cooling medium. On the contrary, hydrogen can be obtained in unlimited quantities at relatively low cost, and it is a more desirable cooling medium than helium because of its lower density and better thermal characteristics. Commercial hydrogen has, moreover, the degree of purity desired and needed for the cooling purposes. It is inert, nonexplosive, and will not support combustion. In general, it may be stated that at present hydrogen is the most desirable gas that can be used as the cooling medium for certain types of rotating electrical machines. The relative values of the principal characteristics of air and hydrogen that intimately concern the ventilation problem are given in the table below:

Cooling Gas	*Air*	H_2
Thermal conductivity	1.00	6.6900
Density	1.00	0.0696
Specific heat	1.00	14.3500
Heat capacity	1.00	0.9960
Heat transfer	1.00	1.5100

A clear visualization of the possible reduction in losses may be obtained by considering a particular type of machine operating under the load conditions in air and in hydrogen, with the volume and pressure of the gas under static conditions maintained the same for both conditions. In the machine losses will be $(e+b)$ per cent of the output, where the term b represents the windage, friction, and ventilation losses, and the term a represents all other losses. Since the windage, friction, and ventilation losses depend directly upon the density of the cooling medium, these losses will be reduced ninety per cent when the machine is operated in hydrogen because the gas density is ten per cent of that of air. This is a fundamental relation that applies to any type of machine.



Cut courtesy General Electric
Hydrogen Cooled 2500-kw Generator

Elimination of Explosions

Since a mixture of hydrogen and air is explosive over a wide range of proportions, the design of the machine and the operating procedure are such that explosive mixtures are not possible under any conditions. A mixture of air and hydrogen will not explode if it contains less than 9.5 per cent or more than 74 per cent of hydrogen by volume. The explosive range is then from 10 per cent of hydrogen and 90 per cent air to 75 per cent hydrogen and 25 per cent air.

In order to provide for some unforeseen condition brought about by the failure to follow the defined procedure, it has been deemed advisable to design hydrogen cooled machines to be explosive safe. Although the danger of an explosion is admittedly remote, it may be worth the while considering what the results would be. The total energy available of hydrogen in the shell of a 15,000-kva condenser, containing the most explosive mixture of air and hydrogen, is about equivalent to that contained in seven pounds of coal. With this mixture at approximately atmospheric pressure and starting with normal operating temperature, it is estimated that the explosive pressure cannot exceed 100 pounds per square inch. The product of the explosion is water, and unless its temperature is maintained by a continuing input of energy, condensation and consequent reduction in pressure will occur.

It is necessary in fixing the design features and operating procedure of hydrogen cooled machines to follow conservative and safe practices. The four principal requirements of the hydrogen control equipment are determined by the running, standstill, gas filling, and gas emptying conditions. In filling or emptying the housing, it is considered necessary to use an inert gas such as carbon dioxide or nitrogen to make the initial displacement, so that there will not be any mixing of hydrogen and air in performing these operations. The primary functions of the hydrogen control equipment are to provide for manual scavenging and filling the machine housing with hydrogen, to maintain a predetermined purity and pressure of hydrogen in the machine housing by admitting hydrogen to the equipment, and to give warning of improper operation and failure. A diagram of typical control equipment is given in Figures 1 and 2.

Machines Suitable for Hydrogen Cooling

Electrical machines that operate at high speeds and have high windage, friction, and ventilation losses are suitable inherently for cooling with hydrogen. This classification includes synchronous condensers, frequency converters, and turbine generators. From the construction standpoint, these types of machines can be arranged in two groups, one in which the complete unit can be enclosed in a metallic housing, and another in which it is necessary for shafts to extend through the housing. Synchronous condensers and frequency converters are complete units in themselves and can be completely enclosed, whereas turbine generators require shaft extensions for mechanical connection to prime movers and have entirely different cooling requirements.

Hydrogen cooling has been used for synchronous condensers for several years, and the units now giving satisfactory service have a total capacity of several hundred thousand kilovolt-amperes. With this class of equipment, in which there is no energy transformation, the principal stability requirement is that synchronous relations with the system be maintained during operating conditions and under reasonable transient system disturbances. It is not necessary to build such machines with high synchronizing or pull-out capacity. Hence, synchronous condensers offer the greatest possibilities with hydrogen cooling for obtaining maximum output per

unit of material and minimum losses per unit of output. Actual experience in design, manufacture, and operation of hydrogen cooled synchronous condensers has demonstrated that a housing structure can be fabricated from good quality steel plate with permanent joints made gas-tight by electric welding.

The frequency converter gradually is supplanting direct generation as the method of obtaining special frequencies for transportation and industrial applications. The principal frequency converter application has been the conversion from 60 to 25 cycles per second, for which a synchronous speed of 300 rpm is required. At this speed the windage, friction, and ventilation losses with air cooling are lower than for the synchronous condenser that can be built for the higher speeds, and the use of hydrogen results in a smaller saving in losses. The economic factors that justify the use of hydrogen cooling for frequency converters are the same as for synchronous condensers. At the present time there are a number of hydrogen cooled frequency converters in service, and it is expected that the use of hydrogen cooling will become standard practice for large units of this type in the future.

Interest in the application of high-temperature, high-pressure turbines superimposed on existing generating units has increased rapidly during the past few years. This type of steam turbine is easier to build for 3600 rpm than for a speed of 1800 rpm because smaller masses and dimensions can be used. As a result, development of this type of turbine has made it necessary to build 3600-rpm generators for ratings much larger than previously were considered feasible. Hydrogen cooling of 3600-rpm turbine generators is of outstanding importance because of the present need for ratings larger than can be obtained with air cooling. Hydrogen cooling, together with its improvement in cleanliness, introduces possibilities for making significant improvements in construction and ventilation. On the basis of the present status of hydrogen cooling for 3600-rpm turbine generators, machines rated as high as 75,000 kva, 0.8 power factor, and with unity short-circuit ratio can be built; and, from investigations in progress, it is expected that it will be feasible to build a machine of any rating that may be required in the immediate future.

The Advantages of Hydrogen Cooling

In conclusion, the principal advantages resulting from the use of hydrogen as a coolant are as follows:

1. The density of hydrogen is approximately 7 per cent that of air. Since windage losses are directly proportional to the density of the gas, the losses caused by a body rotating in hydrogen are only 7 per cent of those for a body rotating in air.

2. The thermal conductivity of hydrogen is about seven times that of air. Consequently, heat passes across small spaces between insulation and core and between the laminations themselves much more readily than with air-cooled machines. As a result, for a given heat transfer the temperature rise from core surface to the copper is less in hydrogen than in air.

(Continued on Page 27)

Briquetted Fuels

by John R. Pies, e., '39

BRIQUETTING is the forming of a cheap fuel of generally low heating value into a fuel of high quality by proper treatment and subsequent compressing into brick-like forms.

The briquetting industry has been chiefly developed in foreign countries; the most important developments have been made in Europe and England. In Germany briquetted fuel is undoubtedly one of the main fuels. The magnitude of the industry in that country may be shown by the fact that in 1910 Germany produced 19,561,494 metric tons (21,575,000 short tons).

Canada has also considered developing the briquetting industry.

Although coal briquetting has been commercially successful in Europe, it has never really passed the experimental stage in the United States. This does not, however, mean that it never will. The technology of coal briquetting has reached a point where it borders on economic success, and it is very possible that a new solution to but one of the problems presented would supply sufficient impetus to change failure to success.

In normal times before 1921 western Canada purchased about 500,000 tons of anthracite costing the consumers about $6,000,000. Underlying Saskatchewan are large deposits of poor lignite. This lignite is an excellent source of fuel for briquetting. It can readily be seen that the development of this industry on a large scale in Canada would help its inhabitants immensely although our anthracite markets would suffer.

Fuels Suitable for Briquetting

Almost any slack from various coals can be briquetted, but of major importance is lignite. Lignite is a brown coal of woody texture and is given to crumbling upon subsequent drying. This tendency to crumble along with the high moisture content which renders the fuel low in Btu rating makes lignite a poor fuel of little value as it is mined. Yet with proper briquetting the fuel can be made equal to the best of

coals and superior to many.

The lignite states, North Dakota, South Dakota, and Montana, as a general rule have no other solid fuel. Coal is shipped 1000 miles. If briquetting could be introduced, a saving of $800,000 per year could be made in freight charges alone. The movement of 1200 engines and 50,000 cars would be avoided. The railroad tonnage does not, of course, include the 1,500,000 tons of anthracite which are shipped most of the way via the great lakes. These figures are enough to indicate the scale on which the industry could be developed in our own country and the tremendous saving that could be introduced for the people of these particular states.

Choice of Binders

The choosing of a binder should be governed by good economics and consideration of the material at hand. The problem of briquetting is not always to produce the best possible briquet, but to produce at a profit a briquet of satisfactory grade for the use intended.

The qualities desired in a binder are:

A. It must be cheap and allow profits.
B. It must bind strongly and produce a briquet sufficiently hard but not too brittle.
C. It must hold the briquet together satisfactorily in the fire.
D. It must produce a briquet sufficiently waterproof for the use intended.
E. It should not cause smoke or foul smelling or corrosive gases or foul the flues.

Asphalt is the cheapest binder, about four per cent being sufficient, its cost ranging from forty-five to sixty cents per ton produced. Asphalt can be had in California, Texas, and adjacent territory.

Water gas tar pitch comes second with a cost of from fifty to sixty cents, and is available in oil producing regions.

Coal tar is next with a cost of from sixty-five to ninety cents. It is widely available.

Other binders of local importance are natural asphalts and tars and products obtained from wood distillation.

Lignite, generally being hard to briquet, is best briquetted by use of one per cent starch or sulfite liquor from paper manufacture or inorganic magnesia as a binder.

Standard Tests and Properties

Various tests for briquets have been devised. Physical tests determine the hardness of the briquet and its resistance to weathering. The weathering test consists of placing the briquet out in the weather and observing it from day to day and noting the length of the period before the briquet begins to show signs of weathering.

The lignite can be tested for natural binding matter by use of a Soxhlet apparatus in which the material is dissolved in carbon disulfide, and analyzed quantitatively.

A proximate analysis of a briquetted lignite shows moisture 8.07%, volatile 37.31%, fixed carbon 35.87%, and ash 18.75%. This analysis will vary according to the binder used and the particular lignite chosen.

Good briquets are characterized by: (a) coherence such that loss incurred by handling does not exceed five per cent; an increase in binder and briquetting pressure increases the coherence and incidentally the cost also; (b) hardness and toughness depend upon use; a very hard briquet is also very brittle; (c) density is generally specified at 1.19; (d) weathering qualities should be such that long exposure is not harmful; the denser briquets are more resistant; (e) absorption of water should not exceed 3%; (f) in burning there should be a clear intense flame free of smoke, and the briquet should retain its shape.

Advantages and Commercial Aspects

Briquets possess many advantages as a fuel. Regular and thorough combustion is obtained along with less smoke. The fuel does not cake and cut off the supply of air to the upper burning surface of the coal bed. The ash is fine and free of clinkers, and less care of the fire is required. The evaporative power is greater than ordinary coal, and steam can be more quickly and easily generated. Higher rates of combustion are possible. Loss by breakage during shipping is less than run of mine coal. The spontaneous combustion danger is eliminated. The block shaped briquets can be piled to occupy less space than run of mine coal.

In spite of the advantages of the fuel the industry has failed to obtain strong footing in the United States for reasons that are not a fault of the fuel itself. Many of the plants were promoters' schemes, no attempt being made to build the plants. Attempts were made to develop a new binding material or a new press without proper appreciation of the principles involved. Plants were poorly situated for marketing briquets, and the briquets produced were often inferior. Considerable sales resistance was encountered since dealers were afraid that the new fuel would supplant the old. Some even insisted that briquets were dirt and of no heating value. Uncertainty in the supply of raw fuel for binder caused much trouble. Lack of proper technical supervision played its part. Another of the major causes of failure was the cheap relative price of bituminous coal, especially the small difference between the price of lump and slack.

It may be inferred, however, that there is still a great opportunity for the development of the industry in the United States by considering the situation in the western lignite states. Here a saving of several hundred thousand dollars could be effected on freight charges yearly. Undoubtedly some of this saving could be used for the development of the industry. Consequently it seems that there is still ample opportunity for those properly interested and technically trained to develop this industry to a point where it will be of great importance.

FROM THE PRESIDENTS PEN

The Editor of the *Technic* has very kindly offered space for informal discussions of college and other matters. The offer is sincerely appreciated and accepted with thanks. There will be no attempt to compete with the humor page, but it is hoped that the paragraphs will not be too dry. If there is a dearth of ideas, the column will be abbreviated or omitted. And in any event I can assure you this will not be a complaint bureau; if I cannot find anything else, I most certainly will not find fault.

The agreement to outlaw the traditional guerilla warfare between Rose and State is the most constructive and sane piece of legislation the students have passed in many years. The Student Council, and especially its chairman, Edd Coons, deserve great credit for preparing and presenting the resolutions to the undergraduates. All those who addressed the meeting had important shares, also, in carrying the proposal through to unanimous adoption. At the present writing there has been no opportunity, on account of holidays, for the students at State to consider the agreement, but there is reason to anticipate a cordial reception and favorable action.

A short period of genuine observance of the spirit of the agreement will build up a feeling of friendly rivalry between the two student groups, and the seeming antagonism which occasionally provoked dangerous struggles will be a thing of the past. College trained men must provide a major part of the leadership in this democracy in the years ahead, or there will be little hope of solving the complicated problems of government and industry. It is prophetically promising, therefore, when undergraduates act courageously and intelligently on a difficult problem of intercollegiate relations.

The railroads have received a rebuff in connection with their proposed fifteen per cent reduction of wages. Weaker roads are failing to earn fixed charges, and sometimes actual operating expenses are not covered. Receiverships have a history of long, difficult, and expensive readjustments. More are to be avoided if possible; there are too many now.

It is probable that each railroad should be permitted to work out its own solution and be granted special treatment by the Interstate Commerce Commission. Uniformity of I. C. C. rulings is not necessarily fair or wise. Wage reductions may be required and reasonable in some instances; in other cases they might be only temporary expedients. Some railroads undoubtedly should abandon unproductive mileage regardless of local protests. Some should combine to offer joint or supplementary rather than competing service. Some should scale down their debt to lessen the burden of fixed charges, and bondholders would do well to accept reasonable proposals from the managements rather than to become involved in receiverships.

The purpose of these remarks is to emphasize the complexity of the railroad situation and to urge the students to follow news releases closely. The rail transportation problem is a major difficulty in American industry, and every engineer should be familiar with its current status.

D. B. Prentice

THE ROSE TECHNIC

Member Engineering College Magazines Associated

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Bed-Time Story

That curiosity which was so hard on the cat will not get you. No indeed, not if we can help it. We are going to satisfy right here and now that burning curiosity you have always had as to how and why the TECHNIC is so expertly and efficiently published. (Hold your damn tongues for at least another paragraph, gentle engineers.)

It's really very simple. Immediately after an issue has been distributed, the entire staff—even as so many beavers—gets to work, tidies up shop, and very promptly goes forth in search of *new* material. A veritable wealth of copy and advertising is invariably harvested from students, alumni, faculty members, and innumerable other sources and presented to the editor *always* substantially in advance of the deadline. The editor selects only the very best parts of the copy for use in the magazine and discards the rest. This cream of the copy is given to the printer, who immediately shouts, "Drop everything—here comes the TECHNIC," and almost simultaneously appears with the galley proofs, which are the first impressions of the type, printed in long narrow columns. The editorial staff promptly forgets everything else and makes exacting corrections on these sheets, which are practically flawless. After being corrected, the galley proofs are clipped to the desired length and pasted on blank page-sized sheets, forming the dummy copy. This is again sent to the printer who eagerly composes the pages according to the dummy. He returns the page proofs, and once more the proof-readers function smoothly and catch the few small errors which occasionally appear. The pages, as usual, all come out even. The errorless page proofs are then returned to the printer, the forms are corrected, and the editor gets his daily ten hours of sleep.

Almost before we know it, the TECHNIC is out a week ahead of time. The circulation department snaps into action and dispatches copies to subscribers, advertisers, other colleges, exchange bureaus, and high schools. During this time the business manager, who has efficiently managed his department, prepares and turns in a statement to the effect that advertising revenue is growing by leaps and bounds, and the magazine is making money faster than it can possibly spend it. With this fact in mind, the editor returns to his studies of the finer points of journalism.

The standards and efficient operation of the TECHNIC are possible only through the fine cooperation received from its readers. Without the vast quantities of editorial contributions and constructive criticisms given us, we could scarcely operate.

This, an accurate rendition of the facts concerning the TECHNIC, was prepared in order that you might better understand and appreciate your magazine.

—*J. E. T.*

Anyone believing this rot will please stand on his head in front of the main entrance between the hours of three and four o'clock some Sunday next December and prepare to be interviewed by the squirrels.

—*The Editor*

A College Flag

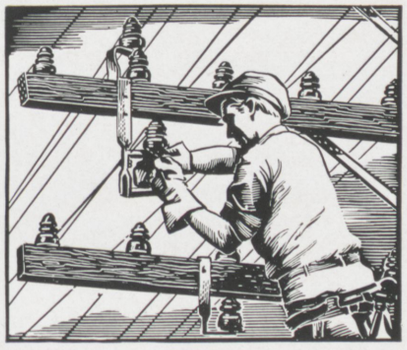
During the windstorm of the fall of 1936 the flag pole donated to the school by the class of 1927 was broken off near its base. Between then and now some effort has been made to replace the pole, but it seems that there has been much laxity shown by college officials in the matter. Some definite action should be taken soon.

When we do again have a pole upon which to demonstrate that the college recognizes the United States Government, we could also express a little pride in our school by having a school flag fly under the United States flag. A not too elaborate flag would be inexpensive and would at least inform the world that we have a flag. It would also show that next to the United States Government the college comes first in our thoughts, actions, and loyalties. To an outsider the pride thus displayed in our school could seem nothing else but pride that was thoroughly justified.

—*E. A. C.*

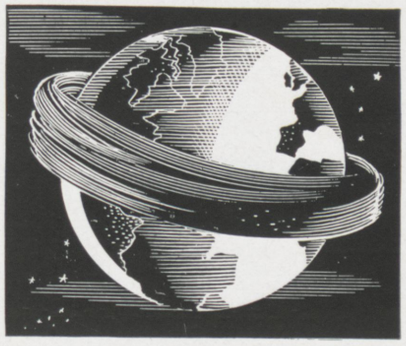
RIGHT OR WRONG?

A 2-minute test for telephone users



1. The current used to transmit the voice by telephone is the most delicate current in common use.

RIGHT ☐ **WRONG** ☐

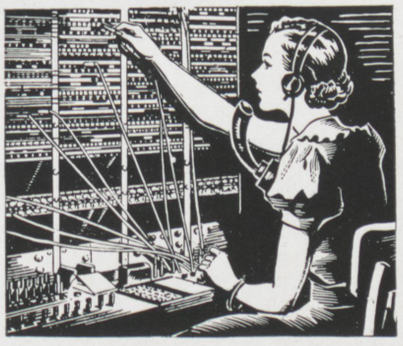


2. Wire in use in the Bell System would go around the world more than 3000 times.

RIGHT ☐ **WRONG** ☐

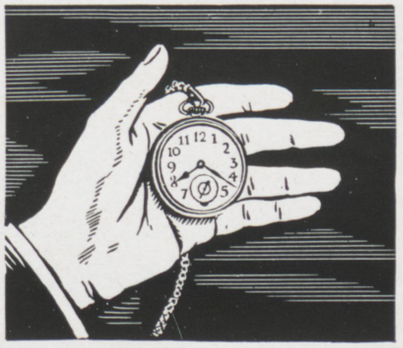
3. Old telephone directories are collected in order to sell them for waste paper.

RIGHT ☐ **WRONG** ☐



4. Any Bell telephone can be connected with more than 90% of the world's telephones.

RIGHT ☐ **WRONG** ☐



5. The average time for making long distance telephone connections is 3 minutes.

RIGHT ☐ **WRONG** ☐

6. Low rates for out-of-town calls to most points are available after 7 P. M. and all day Sunday.

RIGHT ☐ **WRONG** ☐

ANSWERS . . .
DON'T LOOK NOW!

1. *RIGHT.* It is so delicate that Dr. Bell once talked through the bodies of six college professors hooked up as part of the circuit.

2. *RIGHT.* It would go around the world more than 3200 times.

3. *WRONG.* Many changes in telephone numbers are constantly being made. Old books are collected to eliminate sources of wrong information.

4. *RIGHT.* You can talk to some 70 foreign countries and a score of ships at sea—93% of the world's telephones.

5. *WRONG.* The average is 1½ minutes.

6. *RIGHT.* Why not telephone home tonight?

BELL TELEPHONE SYSTEM

Around The Campus

with

Chuck Howlett, e., '41

Homecoming—October 29

Celebration of homecoming started a little earlier than usual this year, when some enterprising seniors contrived to get the majority of the students excused from classes Friday afternoon to decorate the campus. Yea, and verily, even though many of ye loyal seniors did desert us for points townward, the campus was decorated by nightfall in our colors of old rose and white and in maroon and white for the opposition, Earlham.

Friday night the R Men's Association held a dinner at Deming Hall. The alumni letter men were issued invitations and those that came enjoyed an excellent chicken dinner. Following the dessert of ice-cream and cookies, Bob McKee, the president of the association for this year, introduced the oldest grad present, W. Arnold Layman, class of '92, who showed some interesting programs of the track meets for the years he was in school. At that time Rose was the champion of the state. Each alumnus was then asked to introduce himself to the group, giving his sports and years in school, and saying anything else he wished to. President Prentice then spoke briefly on the merits of football, and the meeting was adjourned for the parade and bonfire.

The parade went off smoothly, whereas in the past the custom of taking "Rosie" through town has often resulted in minor skirmishes. The parade this year, however, consisted mainly of cars, and so moved faster so that the people could get back in time for the bonfire. There was plenty of noise, and the fact that quite a few of the fellows had dates added to the size of the parade and added a certain feeling of improvement to the atmosphere of the occasion.

The bonfire this year was a masterpiece. The freshmen worked on it for parts of two weeks, and having much of the wood blown down on the campus by the tornado, were able to construct a sizable pile. The little house which adorned the top of the fire, as a gesture of friendship this year, was not decorated with epitaphs to the usual victim, Indiana State Teachers College, but to Earlham, the team we were to meet. Refreshments in the form of cider and doughnuts were served by the R Men's Association and the Senior Class. Having the fire the night before the game had the one big advantage that the football team was able to see and enjoy it.

Photo by Davis

Homecoming: Rose kicks off to Earlham

Saturday morning dawned to a chorus of groans from the dormitory freshmen, who were roused early by the necessity for replacing all the decorations on the campus. The dampness of the night before had ruined them. They worked all morning, and the finishing touches were added to the grounds and the gymnasium just before game time.

Saturday afternoon featured excellent weather for the spectators although it was a little warm for the players. The weather was clear, the

sun was shining, the Rose Military Band was playing, and the colors of the two schools fluttering in streamers all about made the homecoming game a great scene. The largest crowd that has watched a Rose game in years turned out to fill Lost Creek Stadium and to see a brilliant victory by Rose over Earlham. In a last half surge to supremacy the Rose team made the final score 14-6 to make complete the happiness of the Rose partisans.

Following the game cider and hotdogs were supplied for the crowd by the local chapter of Tau Beta Pi.

That night, to finish the celebration, the student body turned out almost en masse for the Homecoming Dance. The dance was held in the Rose Gymnasium, which was very expertly decorated in a rustic manner with corn shocks and a rail fence between the tables and the dancing floor. The walls were covered with rose and white bunting, the lights with streamers, and the orchestra stand was faced with streamers bordering a picture of the

Photo by Drieke
Freshmen salaam to their sacred idol during Homecoming

front of the building painted by Malcolm Steele. Altogether, the decorating committee did an excellent job in the preparation for the dance, and a large crowd attended to dance to the music of Kenny Woods.

Merrit Noel was the General Chairman of the dance, and Malcolm Steele and Richard Weldele as co-Chairman, with Gene Petty, William Reddie, Paul Stark, and Franklin Doenges, handled the decorations. John Yaw was chairman of the finance committee with Robert Burger, and the orchestra committee consisted of Robert McKee, chairman, Robert Ladson, and Robert Underwood.

Class Elections

The opening weeks of school at Rose seemed to have featured elections. At least it seems that some organization has been holding one almost every other day. The majority of them are over now, and a survey of the four most important, the class elections, follows:

In the Senior Class George W. Smith was elected President; Charles G. Fuller, Vice-President; and Franklin G. Doenges, the Secretary-Treasurer. Robert P. McKee and Edward O. Spahr were elected as Athletic Representatives.

The Junior Class elected John W. Quinn for its President; Robert S. King for Vice-President, and Lloyd O. Krause for Secretary-Treasurer. The Athletic Representatives were Chancellor Montgomery and Frank G. Pearce.

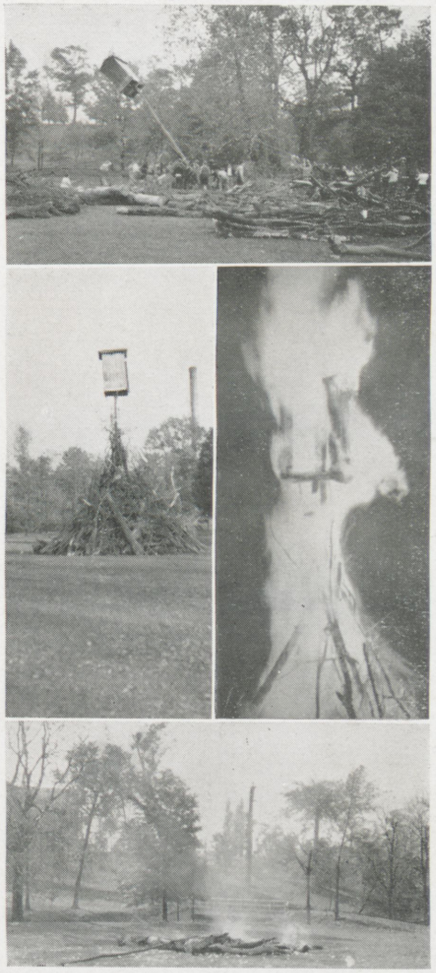
John L. Combs was elected the President of the Sophomore Class for the coming year, with George C. Harper as Vice-President, and George R. Schull as the Secretary-Treasurer. Joseph W. Dreher and Jack W. Giddens were elected Athletic Representatives.

The Freshman Class, initiated for the first time to the complex Hare system of voting used in our elections, chose Robert D. Parr for its President, Harold E. Bowsher for Vice-President, and Harris E. Murchison for Secretary-Treasurer. The Athletic Representatives are James Van Pelt and Earl F. Michaels.

Besides the honor of being elected a class officer, honor points are given to each of these men, and the four presidents are given seats on the Student Council. Therefore, the Rose Technic wishes to take this opportunity to congratulate these men.

Sergeant Burgess

Sergeant William Burgess has been assigned the positoin recently vacated by Warrant Officer Sylvester Kearns. He was born in North Carolina, and after completing his high school work, he attended Guilford College, Guilford County, North Carolina. He was a member of the



Photos by Drieke
The Homecoming Bonfire—from Friday afternoon to Saturday morning

Debating Club and ran the 220 yd. dash while on the track team. He then enlisted with Co. A of the Fourth Engineers. When the unit was disbanded in 1930, he was transferred to the Fifth Engineers at Fort Belvoir, Virginia, where he remained until his present assignment.

Sergeant Burgess is qualified as an expert in rifle marksmanship. His likable personality will make him a popular instructor at Rose.

A. I. E. E.

The Rose branch of the American Institute of Electrical Engineers held its first meeting of the year Wednesday, October 12. Mr. Byron Kelso, of the Class of '08, the speaker of the evening, was introduced by Professor Knipmeyer after a short business discussion. Franklin Doenges, the chairman of the A. I. E. E. at Rose, gave a brief explanation of the national organization. Professor

Knipmeyer then gave a plea for larger attendance, criticizing especially the Sophomores, to insure the success of the meetings.

Mr. Kelso was a very intersting speaker, having spent thirty years as a civil engineer and globe trotter, and included in his talk many experiences with which to prove and illustrate his points. His talk was largely on his work in South America, and he displayed a small vase of Aztec pottery and a gold piece which he has carried in his pocket for over 20 years. His friends, he related, have warned him that he shouldn't just carry it around in such casual fashion as it is worth about $1500. Nevertheless, he has continued to do so even throughout his service in France during the World War. These objects and the story of how Mr. Kelso obtained them were of especial interest.

In opposition to the popular idea that South America is the place for the college graduate to go to make his fortune, Mr. Kelso emphatically advises us not to go unless on contract with some company in the United States. Mr. Kelso also advises that the engineer spend more of his spare time on the cultural subjects and those subjects on which he is most uninformed.

The talk was very well received, and the students seemed to be unwilling for Mr. Kelso to stop talking, but finally all retired to the laboratory for refreshments.

While the group munched on peanuts, Mr. Kelso regaled them with several more stories. Altogether, a very enjoyable evening was spent at the meeting, and anyone concerned with electrical engineering should not miss the future meetings.

Radio Club

The Rose Tech Radio Club held a regular meeting during the assembly hour, Thursday, October the thirteenth. Franklin Doenges, chairman, opened the meeting by starting a discussion of the progress on the reinstallation of the code radio station. The club, by working on Saturday mornings, has taken down the old bent pole, and is working toward the erection of a new mast. The Radio Club hopes to have the station in operation this fall.

An inspection tour of the equipment followed. Professor Moench put the club's phone station W9NAA on the air and contacted a station in Greencastle to show the fellows the general procedure followed in calling and talking to other amateurs. The group then went through the club room in the basement, making a general inspection of the equipment with which the club works.

Plans have been made for the Rose Radio Club to meet in conjunction with the Wabash Valley Radio Club the first Friday in November. During this meeting the efficiency of station W9NAA is to be tested, and a smaller station, such as J. W. Dreher's, will probably be tested in comparison. Quite a bit of valuable information will be available to anyone interested in radio, and anyone curious to meet with a group of "hams" should come out.

Franklin Doenges related an interesting incident in connection with amateur radio. It seems that Prof. Moench has been wanting to impress upon Frank the practicability of the amateur's radio station, so when Frank went home to Fort Wayne Saturday, Oct. 22, "Hermie" decided to call him. Frank did not have a station, so Prof. Moench contacted an amateur, Bob Long, who lives about four blocks from the Doenges home, who in turn relayed the message. The message and the reply were completed in a little longer time than it would have taken to telephone, but Frank said it was a great surprise to receive a "radiogram"; he didn't think it could be done so easily.

Rifle Club

The Rose Tech Rifle Club held its election of officers Thursday, October 13. Bill Schilling and Ed Coons were nominated for President, and Ed Coons received the majority of the votes to become president of the club for the coming year. Stanley Craig was unanimously elected Vice-President by virtue of having held the position last year, and Maurice Fleming was elected Secretary-Treasurer.

Maurice Johns was appointed manager of the team for the year, and since then he has been kept busy issuing challenges and scheduling matches. Plans are being made for the Rose team to participate in about 35 postal matches, and it is hoped that some intercollegiate shoulder-to-shoulder matches can be scheduled.

The school's indoor range, under the able supervision of Sergeant Burgess, is to be opened for firing the fifth of November. The first two weeks that the range is open will be devoted largely to the Freshmen. After that the competition for the team will be opened and scores shot each week. The team consists of the ten high scoring men for each week, and to make a letter in this sport it is necessary that a man make an average of 345 points, shooting four positions, in at least 75% of the matches. The first match is to be in January.

Rose is doing something new this year by entering a team in the Wabash Rifle League. The teams in the league are industrial teams, and even though they shoot only two positions, offhand and prone, they will afford the Rose team a chance to compete in shoulder-to-shoulder matches against some stiff competition. This will put an emphasis on competition which was lacking in the postal matches as shot last year. Rose plans to enter a team in this league November 26.

A. S. M. E.

Thursday, October 6, the Rose branch of the American Society of Mechanical Engineers, expanded its chapter by the addition of 14 new members. This made a registration of 100% of the Junior and Senior Mechanicals. Malcolm A. Steele is the student chairman for the year, and during the meeting a program committee to consist of George W. Smith, Robert Underwood, and

Maurice Fleming was appointed.

The group holds meetings once a month, and is open to only the Juniors and Seniors. Plans were advanced for holding a joint meeting with the A. I. E. E. for a special program sometime in the near future. It was announced at the meeting that a State dinner meeting of A. S. M. E. will be held at the Rose Deming Hall on Wednesday, November 16.

At each regular meeting in the future a speech will be given by some student. The student making the best speech is to be entered as the representative from Rose in the competition at the meeting of the Midwest Division of the Society in Chicago next spring.

Farewell

The Sophomores recently doffed their hats and waved a fond farewell to another member of '41. David Roach, one of the more popular members of the class, has recently withdrawn from the school to take advantage of an excellent opportunity of going to California. Roach was a bit of a spark plug in the Sophomore Electrical group and will be missed. However, Dave, we wish you the best of luck, and here's to seeing you soon.

The Incident of the Lions

Possibly you have heard that we won our first football game. If you read the newspapers or go to Rose Tech you will have heard that we have won several games. But the first game was important. After coach's dubious pep talk before the game the victory came as a surprise, especially to the Freshmen. It put them in a jubilant spirit, they decided to celebrate, and thence it led to intrigue and much tomfoolery.

The plot thickened. The scene was the dormitory; the time was 3:00 A. M. All was quiet when suddenly noises were heard, and there entered into the peaceful night a truck. It was a heavily loaded truck, loaded with swarming human beings grouped around two majestic lions. Stone lions they were, which even through a thick mass of smoke and soot and dirt accumulated through long years in town showed the true majesty of those great animals.

Great changes, however, were to occur. Came the dawn. No longer were the lions dirty, no longer did they have that dingy color and cringing attitude as if ashamed of their appearance. Indeed they dominated the scene. With bodies of white, eyes of green, and flaming red mouth and claws, they looked fully fit for the name King of Beasts as they roamed about the Rose campus.

But all good things must come to an end, and so did this when the college authorities, not appreciating the artistic effort, ordered those involved to "clean them up and take them back". The fun was over. The lions were moved from their place of honor to the loading platform in back of the building where they were to be cleaned.

That, however, was not to be; in the night, even more quietly than before, the lions were spirited away and carried back to their home on the drive at Indiana State. At least it is reported that they were seen there the following morning.

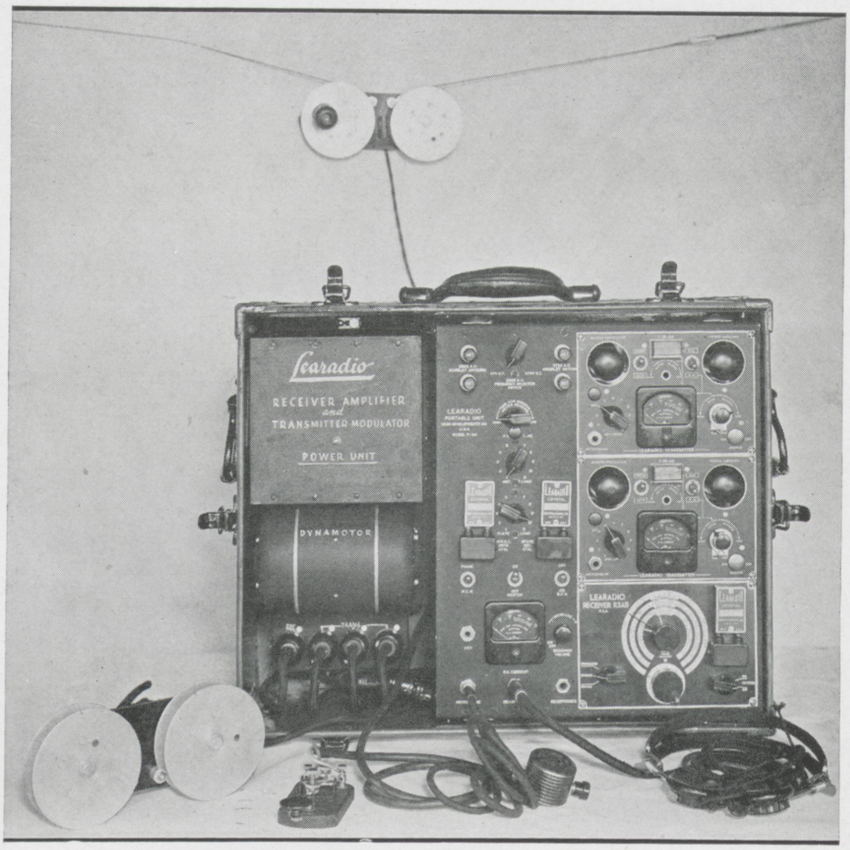
And so rests the incident of the lions.

Photo by Moench

This little lion was a bad little lion—

Glee Club

The Glee Club gave its opening concert of the year at an assembly of the student body on November 17. This concert was followed by another on the following evening before the faculty of Indiana State Teachers College. Both recitals were received with much apparent enthusiasm.



Cut courtesy Aviation

Transmitter, receiver, power—all in one box

Research and Development

edited by

Lloyd O. Krause, e., '40

Portable Station

A complete portable radio station, suitable for use in connection with aircraft, has been developed and recently announced by Lear Radio of Roosevelt Field, New York. The station consists of two units, a gasoline driven generator unit weighing 65 lb. complete in a carrying case, and a transmitter-receiver unit weighing 67 lb., mounted in a similar case. The gas generator consumes about one-half pint of gasoline per hour, and delivers a maximum of 250 watts at 12 volts. Voltage regulation within 5% by means of a double compound winding on the generator does away with the necessity of "floating" a battery across the line, although this can be done if so desired.

The transmitter operates on any one of three fixed frequencies; 375 kc., 2895 kc., and 5780 kc. The transmitter is off and the receiver on at all times except when the microphone button or the key is depressed. A doublet-type antenna is used to minimize the difficulty of obtaining ground in portable locations. Reliable communication at all frequencies is claimed up to a distance of 150 miles.

Five Thousand Years from Now

As part of the activities at the New York World's Fair Westinghouse has buried 50 feet in the ground a tube made of a special alloy, harder than steel and durable as copper, with an inner container of glass. This tube is the so-called "time-capsule" which contains a history of the present time. The container is supposed to remain buried for 5000 years, and then be dug up, in 6938. Within the container are inclosed some representative articles characteristic of our civilization, among which are copies of significant books and documents, and some motion picture film. Aside from attempting to enclose in a space only 15 inches in diameter and six feet long articles that would give to a future people a concrete picture of the cultural development of man up to the twentieth century, and finding materials that would last such a length of time, the planners of the project had to face the problem of making certain that the container could again be found and recovered.

In order to insure that the capsule might be recovered even though all landmarks and survey references about New York were gone in 6938, the cooperation of the U. S. Coast and Geodetic survey was requested for the location of the spot in such a manner that it would be recoverable. A scheme of triangulation, therefore, was executed in connection with existing stations of the national net in the vicinity of the New York World's Fair grounds. Observations were corrected by least squares, and the position of the center of the "time-capsule" was computed. The latitude, north of the Equator, and the longitude, west of Greenwich, England, are given to thousandths of a second—one-thousandth of a second representing a little over an inch on the earth's surface. This position is in coordination with, and bears a rigid relation to the more than 50,000 stations of triangulation of the net extending over the whole country.

It is only necessary that the seventeith century engineer locate any one

of the fixed points in this net, and then extend a scheme of triangulation to the approximate vicinity of the buried capsule. When he knows the latitude and longitude of the approximate point and of the capsule, the problem is reduced to one of measurement of azimuth and distance. As an added precaution, in case none of the stations can be recovered, a nearby station has been located by astronomical measurements.

The geodetic coordinates were furnished and will be included in a book to be published and distributed to all the principle libraries and scientific institutions of the world. The book will also contain a brief description of the methods of geodetic surveying as used today, and will explain the method of using the geodetic coordinates to locate the capsule.

Radios That Remember

The latest contribution to the modern electrically controlled home is the so-called "time-tuned" radio. The "time-tuned" radio is a radio equipped with an "electrical-memory" device recently developed by commercial radio engineers. Briefly, it means that the action of the radio can be predeterminately controlled for every 15-minute period throughout the 24-hour day.

The time-tuning device is an automatic master of ceremonies in the household. It will turn on the radio in the morning, or shut it off at the appointed time at night. Selected programs will automatically be tuned in during each 15-minute period during the day, or the radio will shut itself off in between times if it has not previously been directed to continue. It is a common frailty among average listeners to forget to tune in on a specific program. The electrical-memory device is infallible—it can't forget.

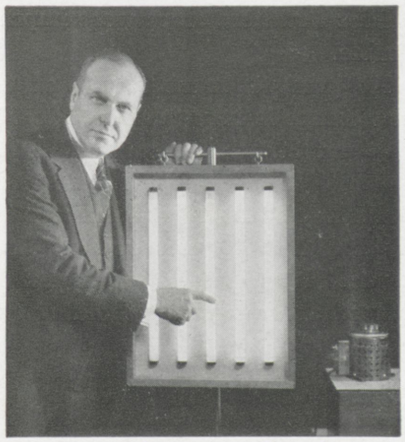
The new development consists simply of an ingenious radio time-control unit which permits preselection of favorite programs through 24 hours, day and night, on five different stations. The preselector is divided into ninety-six 15-minute intervals. In practice a user consults a catalog of programs for any one day and then moves the various slider-contacts into position according to the programs he desires to preselect. The automatic control then takes complete charge. The cycle is repeated every 24 hours unless a further change in setting is made. A self starting electric clock automatically controls the time-tuner, and insures absolute accuracy once it (the clock) has been set and the electrical connections been made.

The pretimer does not in any way interfere with the ordinary operation of the receiver, and the radio can be manually controlled at any time during the day. Afterwards the radio will revert to its prearranged schedule.

Fluorescent Mazda Lamps

Invisible sunrays, imprisoned within tubular glass bulbs and bombarding chemical powders which serve as energy transformers, can now be used to produce cool light sources that duplicate all the pastel tints of the rainbow. Known as fluorescent Mazda lamps, the new light sources provide hitherto unobtainable tints of colored light with as much as 120 times the illumination for the current consumed as filament lamps of the same color and only a fraction of the heat. One lamp produces the nearest approach to natural daylight ever achieved by an artificial illuminant.

The new light sources were shown in perfected form in New York recently by Engineering Director Ward Harrison of the General Electric Company's Incandescent Lamp Department, and they will soon be available to the lighting industry. Because of their ability to produce any desired color and amount of light with greatly reduced heat, they are expected to affect materially many phases of present lighting practice.



Cut courtesy General Electric

Ward Harrison Demonstrates New Fluorescent Lamps

Fluorescent powders, compounded in the Nela Park laboratories and specially heat-treated, hold the secrets of efficiency and color-producing qualities of the new lamps. Activated by ultraviolet light rays and functioning as transformers, the powders absorb the short, invisible ultraviolet rays and reradiate this energy in the higher wave bands that comprise the color range of the spectrum. Each powder has its characteristic wave band, with which it responds to the ultraviolet light, thus forming its own particular color of emitted light.

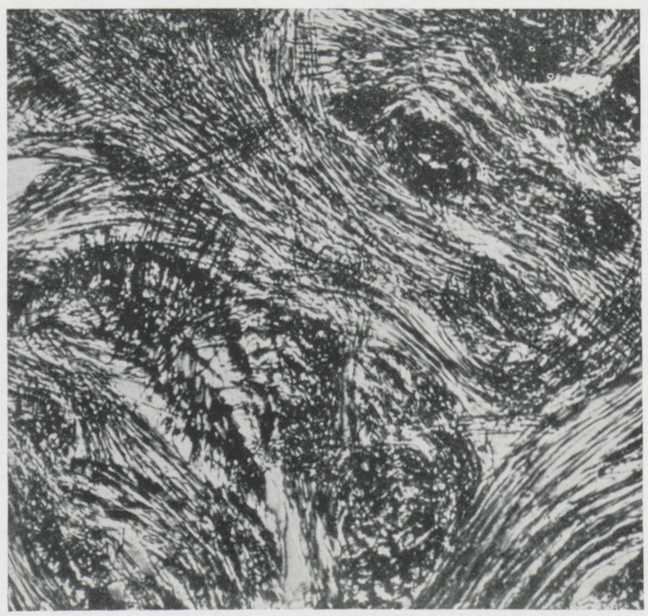
Within the lamp bulb is a trace of mercury, a small amount of argon at low pressure, and a coating of the fluorescent powder. When the current is turned on, the argon serves as a "starter", and in a fraction of a second a feeble blue light with a large component of invisible ultraviolet radiation is generated inside the tube. The ultraviolet radiation strikes the fluorescent coating and is reradiated in the visible range of the spectrum. Like all electric-discharge light sources, the lamps require special transformers, or chokes, which serve as valves in controlling the flow of electricity. Unlike some other types of mercury-vapor lamps, however, they attain full brilliancy in a few seconds.

For decorative lighting fields where colored or tinted light is desirable, the fluorescent lamps open entirely new and interesting possi-

bilities that heretofore were impracticable.

At present, manufacture of the new lamps is being confined to 15-, 20-, and 30-watt sizes, in 18-, 24-, and 36-inch lengths, respectively. Bulb diameters are one inch for the 15- and 20-watt sizes and 1½ inch for the 30-watt size. At each end the lamps have metal caps holding two base pins, similar to those on radio tubes. These pins are inserted into a new type of slotted socket; a quarter turn fastens the lamp securely in position.

Bacterially damaged leather belting. Fiber structure eaten away by microbes



Cuts courtesy Power

Well interlocked fiber structure of bacterial-free belting

Bugs About Belting

The epigram "A chain is no stronger than its weakest link" may well be paraphrased to "A belt is no stronger than its weakest spot." Two rolls of belting manufactured from the same grade of leather may perform very differently when put into service. One may give very good service, the other stretch and fail after a comparatively short period. The mysterious offender has been found to be a microbe.

Chas. A. Schieren Co., in its research laboratory, determined to uncover the factors that were responsible for the excessive stretch and low tensile strength of apparently high-grade leather. The search led right back to the tannery where the hides were received. Brief study showed that some of the hides were bacteria tainted. Such tainting is brought about by excess manure resulting from improper cleaning of the hides when removed from the animal. The excess manure prevents the preservative salts from properly protecting the hides, and bacteria attack the fibers.

Hides that had been attacked by bacteria showed under the microscope large areas where the fiber bundles had been eaten out, thus weakening the structure. Tests on such belting revealed a stretch of 14.7%, and failure of the belting resulted under a load of 3750 lb./in^2.

Over 2000 hides, part bacteria free, part bacteria tainted, were studied under every type of condition from the time they were received until they were finished belting. The studies very definitely revealed a relationship between bacterial damage and the quality of the finished product. The company is now able to classify its belting into two definite groups, one having low stretch and a tensile strength of about 5500 lb./in^2, and the other having high stretch and a tensile strength of about 3700 lb./in^2. Government specifications require in belting an average tensile strength of 4000 lb./in^2, with no sample falling below 3000 lb./in^2, and with a maximum allowable stretch of 15% when the belt is subjected to six or eight times the stress of normal working load.

All of the trouble experienced with leather belting cannot, of course, be attributed to bacteria. Parts of hide used, tanning processes, and other facts must also be considered; but the fact remains that unless the hide is properly preserved before tanning, no amount of treatment will make high grade belting stock of it.

The Flame that Slices Steel

Great sections of steel up to 4 ft. thick today are being cut by the oxy-acetylene process. The oxy-acetylene flame, which is the hottest flame known to industry (about 6,000 deg. F.) is produced by burning a closely regulated mixture of oxygen and acetylene in a suitably designed blowpipe. The flame is focused upon the surface of the steel until it becomes red hot. Then a jet of oxygen is released upon the heated spot. The oxygen jet cuts through the steel in an instant, and by moving the blowpipe, the flame makes an effortless slice through the tough metal. This process is being used today to shape-cut thousands of tons of iron and steel.

Sports

edited by

Robert N. Ladson, ch., '39

Photo by Davis

Rose fumbles and recovers

Before beginning the report of last month's games, it might be well to review the progress the team has made this season and to speculate on the possibilities for the rest of the year. Rose Poly has a very excellent chance to share in the highest honors in the Indiana Conference. At the time this was written, Rose was in a three-way tie with Butler and Hanover. One conference game is left, and it is with Wabash College. Wabash was beaten 25-0 by Evansville College, a team defeated by Rose at the opening of the season.

Photo by Drieke

Evansville throws a pass

A brief account of the team might be of interest to students and alumni. Beginning in the backfield, we find George Smith, captain and right half, who has played for three years at Rose and is truly an excellent leader. Injuries this season have slowed "Smitty" somewhat, but he is beginning to hit his stride. Bob McKee, the other senior in the backfield, has been a regular quarterback for three years. He does the masterminding for the team and most of the passing. Bob Brittenbach, a junior, is the jackrabbit of the team and has been the high scorer and ground gainer since he was a freshman. At fullback Brown and Klatte, both underclassmen, are showing up well. Harper, sophomore halfback, shares the duties of Brittenbach and does some of the passing and kicking. Coach Brown has uncovered a wealth of talent in Harold Bowsher, right halfback. He is an excellent blocker and pass receiver. Micheals has been groomed to take McKee's place and is progressing well.

Colwell at right end is a junior and really a tower of strength at his position. He does the kicking and catches McKee's passes. Craig and Underwood are capably holding down the other wing position alternately. Hogan, the biggest man on the squad, is the block of granite who stops all thrusts at his side of the line. Combs and Montgomery are tackles who take care of these important positions in the line. Eder and Smilanic are guards who are almost permanent fixtures, as they have been playing their respective positions for the past two years. Mitchell is the center and a junior. He has been a regular for two seasons and a sixty minute man all this time.

This season is just the beginning as far as good records are concerned. There are only three seniors on the squad, and their graduation will leave quite a hole in the ranks, but there will be seasoned men to replace them. The school has shown more enthusiasm during this season than at any time in the past three years. Coach Brown, wearing a broad grin continuously, is definitely in the fight. He is leaving nothing undone as he prepares the team for each game. "Skull" sessions are held every noon period to plan the strategy of future games and to discuss the mistakes of previous games.

Rose vs. Shurtleff

Rose Poly's Fighting Engineers repeated their victory of last year over Shurtleff by a 14-0 score. The team scored in the first and last quarters to win the game and continue a good season.

The game started rather slowly and seemed to be a battle of two strong teams. After several exchanges of punts, however, Rose Poly launched a drive that was led by Captain Smith and Brittenbach. Starting on the Rose thirty-two yard line, the Engineers swept down the field to the Shurtleff one yard line where they were momentarily halted. Brittenbach took the ball off

tackle at this point and scored. Eder place-kicked the extra point.

In the second period, some excellent punting by the Shurtleff team held Rose away from scoring territory until late in the period. Rose intercepted a pass and carried the ball to the Shurtleff thirty yard line but was stopped by the gun ending the first half. Harper tossed several passes during this period that were good for gains by the Engineers.

In the third quarter Shurtleff, inspired by the rest period, came back strong and drove the ball to the eight yard line and were well on their way to scoring. Harper intercepted a pass and stopped this drive, and Colwell punted out of danger. During the period Colwell's excellent punting gained many yards for the Engineers until they took the ball in midfield and drove to the Shurtleff eleven yard line. This drive was halted by a penalty.

In the fourth quarter Smith, Klatte, and Brittenbach took affairs into their hands and carried the ball to the Shurtleff thirteen yard line from which Klatte scored on two plays. Eder again converted for the extra point, and the scoring was over. The game ended soon after this drive.

Rose vs. Earlham

Homecoming, with all its attendant excitement and with its renewals of friendships, was very pleasing to the host of alumni and students. Rose defeated Earlham College 14-6 and advanced to within one game of an Indiana Conference title.

During the first half both teams played rather loose defensive football; but when the goal line was in danger, each team strengthened its defense. Brittenbach, diminutive left halfback, headed an early drive to the Earlham thirteen yard line. In this offensive, McKee also tossed a pair of neat passes to Colwell. Just as everybody was hoping for a touchdown, Harper fumbled and Earlham recovered.

By continually running the ends, Earlham moved the ball to the Engineers' eighteen yard line, but here the Rose line braced and stopped the next four plays.

During the second quarter, neither team was able to offer much in the way of an offense. Each team seemed content to run a few plays and then kick. In this exchange of punts, Harper seemed to have the advantage.

In the opening minute of play in the second half most of the exciting action of the day took place. Rose kicked to Earlham, and the Quakers pulled a confusing play to produce their lone touchdown. An Earlham back received the ball and started up the left side of the field. Midway in his flight, he slipped the ball to an end who streaked across the field and down the sidelines to score. McKee, Rose safety man, was no match for the four Earlham men who formed the interference. The try for point after touchdown was no good.

Earlham then kicked to Rose and Brittenbach, grabbing the ball on

the ten yard line, carried the ball behind great blocking to the Earlham thirty yard line. On the first play McKee tossed a long pass to Colwell who carried the ball the remaining ten yards to a touchdown. Eder's place-kick for point after touchdown went squarely between the uprights and Rose led 7-6.

The Rose defense by this time was much improved, and Earlham had a hard time making any yardage. Rose played conservative football and took no chance with its pet specialty, passes. Late in the game, Colwell intercepted one of Earlham's desperate passes and carried it to the twenty yard line. After two running plays were stacked up, Klatte drove the ball to the twelve yard line and Harper crashed over on the next play. Eder again converted, and the scoring was over.

Brittenbach was the Engineers' chief offensive threat, while Colwell and Smilanic were strong in the line.

Rose vs. McKendree

The Rose team displayed much of its great offensive strength to beat McKendree College 45-0.

As the score indicates, the game was all Rose Poly. Early in the first period, Rose advanced the ball by passes to the nine yard line and scored on two plays. Eder kicked the point. In the second quarter, McKee passed to Bowsher who jumped into the air and fell across the goal line with the ball still in his grasp. Eder again scored the next point. The half ended 14-0 in favor of Rose.

The second half was just a series of Rose touchdowns. Brittenbach scored on a twenty-three yard dash. The point after the touchdown was missed. Brown scored the next two touchdowns in quick succession. Both points after touchdowns were missed and the score was 32-0, Rose. At this point, Coach Brown inserted several substitutes, but the scoring avalanche still rolled on. Harper scored on an end run, and McKee carried the ball across the goal line on a quarterback sneak for the forty fourth point. Harper converted, and the game ended soon after.

Rose vs. Union College

On October 14, fresh from an impressive win over McKendree, the Rose Engineers journeyed to Barbourville, Kentucky, to play Union College of that city. They encountered some conditions detrimental to scoring and came back on the short end of a 14-0 score.

The play during the first half was rather of the see-saw type. Union took the ball to the Rose ten yard line where Rose held for four downs. On the fourth down, however, the officials called the Engineers for a slight misdemeanor, and Union received five yards free and another down. On this down they completed a pass to the Rose one yard line. Rose was determined, however, that its goal be untouched at this point and stopped all Union could offer.

Shortly after this the "Fighting Engineers" took the ball and initiated a scoring attempt of their own. Combining passes with sparkling running plays, they were able to advance to the Union five yard line but were then stopped cold. Only one other serious attempt was made by either team in the first half, and Union stopped Rose's invasion of scoring territory.

In the second half the play was fairly even, but Rose suffered several penalties, and Union took advantage of each one. Union completed a pass to the five yard line and after two plays finally scored. In the last quarter a Union back broke loose for a long run and just as he was about to be tackled, he lateraled the ball, and the recipient scored standing up. Both points after touchdown were made by place-kicks.

Rose was playing under several handicaps. The field was hard and hilly and much different from the grassy gridiron of Rose. The grandstand was on an angle with the field, and consequently the Engineers received many penalties for lining up offside.

Here and There With the Grads

edited by

Nick Smilanic, e., '40

Richard F. Bergmann

Richard F. Bergmann Receives Award

Mr. Richard F. Bergmann, Rose, '18, of Lakewood, Ohio, was among the individuals who received awards in The James F. Lincoln Arc Welding Foundation's $200,000 program in Cleveland, Ohio. The results of the program were announced September 15th by the Jury of Award.

To have Mr. Bergmann's work judged worthy of award by a jury composed of 31 engineering authorities from leading universities and colleges throughout the country is indeed a tribute to his ability. Below is a statement given by the Jury of Award on Mr. Bergmann's paper.

" 'Design in Welded Steel Construction for the Supporting Structures for Continuous Process Rayon Producing Machine.' Author shows how welded steel supporting structure permitted enormous savings over all other designs, with successful operation; shows magnitude of rayon industry; gives details of processing plant. Design given to be used in constructing 100 complete machines for new 11,000,000 lb. annual output plant. It is shown that cost of new equipment saves $630,000, welded steel over cast. Contract price for welded steel equipment, delivered, is $310,000. Author estimates gross savings of $7,440,000 per year."

Mr. Bergmann presently is the chief engineer for the Rayon Machinery Corporation in Cleveland, Ohio. He was previously, for 18 years, a mechanical engineer for the Link-Belt Company in Chicago. Mr. Bergmann is a member of the Theta Xi fraternity and the Lakewood Country Club.

The Frohman Gift to the Carnegie Library of Pittsburgh

Shelved around the walls of the Carnegie Library Reference Room are some seven hundred new books of an entirely different sort. These books, permanently displayed in illuminated glass exhibition cases, are labeled "The Edward D. Frohman Bequest, in Memory of Lewis Frohman and Fanny Friday Frohman, His Parents."

Notwithstanding his duties as vice-president and general manager of the S. Obermayer Company, dealers in foundry supplies, Edward D. Frohman, Rose, '94, had time to be an enthusiastic book collector. When he died during a world cruise, in Bombay, in February, 1936, it was found that as a bachelor and a loyal Pittsburgher, he had willed his entire library to the Carnegie Library.

Mr. Frohman's library consisted of 1,724 bound and 212 unbound volumes, the largest and most valuable gift of books which the Carnegie Library has received, and the first collection ever accepted with the provision that a substantial part of it be kept together as a unit. This part comprises the seven hundred books already alluded to, consituting the finest portion of the collection.

Because Mr. Frohman was something more than a collector, it is hard to define the scope of his library in a few words. To be sure, he treasured many a volume because some misprint or later-to-be-suppressed illustration proved it to be the first issue of a first edition. But, unlike many collectors, he also prized his books for their content and read them, and his taste was extremely catholic.

He gathered together the first editions and complete works of the leading modern English and American writers and bought early American and de luxe editions, samples of fine printing, and literary oddities. Charles Dickens, Theodore Roosevelt, and Mark Twain were among his favorites, and few of their works are absent from his collection. To be sure, the Frohman gift to the Carnegie Library of Pittsburgh is a priceless and esteemed treasure.

Weddings

Announcement is made of the marriage of Miss Helen Paine, daughter of Mr. and Mrs. Clinton C. Paine of Brooklyn, N. Y., to Arthur Reinking of Wellsville, N. Y., which took place April 15. Following the ceremony, Mr. and Mrs. Reinking made a trip to Havana, Cuba. The couple now resides in Wellsville, N. Y., where Mr. Reinking is connected with the Moore Steam Turbine Company. Mr. Reinking was graduated from Rose in 1927.

Announcement has been received of the marriage of Scott Heer, ex '39, to Miss Margaret Jean Hoag, on September 24 at Yuma, Arizona.

John Straw, Rose, '35, was mar-

ried August 27. He survived safely the hurricane and flood at Providence, Rhode Island, where he is now an instructor in mathematics at Brown University.

Births

Mr. and Mrs. Robert J. D. Finfrock announce the birth of a daughter, Ada Sue. The baby was born July 13. Mr. Finfrock is a Rose graduate of '32, and is now employed on the TVA project in Tennessee.

Obituary

A notice has been received of the death of Herman S. Heichert, class of '97. Mr. Heichert was the Heminway Medal man of his class.

We announce with much regret that Henry C. Fitch, Rose, ex-'31, of Youngstown, Ohio, was found shot to death on October 18. His body was found in his automobile in front of the police headquarters at nearby Struthers.

Mr. Fitch, age 31, was a member of a pioneer Mahoning Valley family and widely known throughout the valley. As a bachelor, he lived in one of the residential suburbs of Youngstown and operated the C. C. Fitch Hardware Co. When at Rose, Mr. Fitch was a member of the Alpha Tau Omega fraternity. Mr. Fitch's mother, Mrs. C. C. Fitch, is the only surviving member of the family.

What They're Doing

'99 George H. Likert retired from his position as fuel engineer for the Union Pacific System on June 1 because of serious illness. He has recovered and reports himself feeling fine. He now resides at 2761 California St., Omaha, Neb.

'03 James S. Brosius, with the Crawley-McCracken Hotel Company, is now at the Hotel Newcomb at Quincy, Ill.

'07 Warren W. Kelly with Atchison, Topeka & Santa Fe Ry., has been transferred to Chicago as general purchasing agent for the system.

'08 George H. Freers is sup't. and chief engineer with the Holcomb and Hoke Manufacturing Co. of Indianapolis.

Byron L. Kelso received an M.A. degree from Columbia in June for his work in industrial guidance and personnel.

'11 Thomas E. Maddex, with the Illinois Public Service Co., has been transferred to Springfield.

'12 William R. Bell is general sup't. of the Gulf Utilities Company at Baton Rouge, La.

Carl J. Krieger is chief inspector for the General Cable Corporation in New York City.

'18 John W. Mikels is chief production engineer at the New Castle plant of the Pennsylvania Power Co.

'20 Herman J. Lauterback is with the Coil Engineering and Manufacturing Company of Roanoke, Ind.

Walter L. Osmer is a representative for the Equitable Life Assurance Society. His office is in the Merchants Bank Bldg., Terre Haute.

'21 Samuel J. Minar has taken a position with the Western Electric Company in Chicago as an engineer on dial telephone equipment.

'22 Kenneth L. DeBlois is with the U. S. Bureau of Public Roads in San Francisco, Calif.

Ernest C. Scott is foreman of the dry starch dept., at the American Maize Company in Roby, Indiana.

'23 Richard W. Bledsoe, with the Graybar Electric Company, has been transferred to Chicago where he is to manage the power apparatus department.

Clyde G. Raeber is with the Indiana and Michigan Electric Company as a supervising cost engineer.

'24 G. Raymond Fitterer is head of the Metallurgical Engineering Department at Pittsburgh University and is president of the Fitterer Pyrometer Co.

William F. Lisman is vice-president and sales manager of the Leland Electric Company of Dayton, Ohio.

Alexander L. Sherwood is general sales manager for the Standard Radio (Electrical Transcriptions) Company in Chicago, Ill.

Dr. J. M. Skeeters, who received his degree of Doctor of Philosophy in chemical engineering from Purdue University, will act as assistant professor in the department of chemical engineering at West Virginia University at Morgantown, W. Va.

'25 Roger H. Bolin, with Westinghouse at Mansfield, Ohio, has been made merchandise advertising manager.

Orville M. Dunning is in charge of the research section, ediphone division, of Thomas A. Edison, Inc., at West Orange, N. J.

'26 C. Max Sherwood is an engineer for the city of Niagara Falls, N. Y.

'29 A. Wayne Dicks at Midland, Michigan, with the Bell Telephone Company, has been made superintendent of maintenance of the Midland area.

J. Robert Vendel is an attorney on the Special Board of Investigation for the Federal Trade Commission in Washington, D. C.

'31 Sam B. Dibble is the Kentucky superintendent of the Southern Continental Telephone Co., at Elizabethtown.

'32 C. L. Schultz with the Northern Indiana Public Service Company has been transferred to Monticello.

'33 R. L. Barr is sales manager for the Electronic Design Corporation in Chicago.

Thomas H. Batman is acting pub-

licity manager for G. M. Basford Company, industrial advertisers.

'34 Noble C. Blair has a new position with Spight and Hibbs, Architects, in Louisville, Ky.

Henry H. Douglas is a research chemical engineer with the Pittsburgh Plate Glass Company at Milwaukee, Wis.

'35 Louis W. Heck is an engineer for the Hickory Grove Coal Mining Corporation at Sullivan, Ind.

John J. Hager has a position as a chemist with the B. F. Goodrich Company at Akron, Ohio.

M. F. Meyers is with the Cities Service Oil Company at East Chicago.

Nelson B. Trusler is enrolled as a student in the Indiana Law School at Indianapolis.

'36 Paul D. Bennett is a junior officer at the CCC camp at Largo, Ind.

James D. Hufford, with the U. S. Gypsum Company, has been transferred to Chicago.

'37 Stephen Koos, with Joseph E. Seagram and Sons, has been transferred to Lawrenceburgh, Indiana.

Present at Homecoming

Among those present at Homecoming were the following:

Class of '92—Arnold W. Layman.

Class of '93—Arthur M. Hood.

Class of '96—Harry J. McDargh.

Class of '03—Marion W. Blair, Benjamin H. Pine.

Class of '05—J. Osborne Bland, Lorenz W. Klenk.

Class of '06—Henry W. Wischmeyer, Carl Wischmeyer.

Class of '08—Byron L. Kelso, H. Earl Schmidt, Orion L. Stock.

Class of '09—Ernest W. Klatte.

Class of '10—Arthur G. Butler.

Class of '11—John P. Fitzpatrick, Philip A. Newhart, Wilbur B. Shook, Harold O. Wimsett.

Class of '12—Alvin C. Rasmussen, Ralph R. Schoonover.

Class of '13—Warren H. Brewer, Chesleigh Gray.

Class of '14—Frederick J. Hoberg.

Class of '15—Ruel F. Burns, Hugh E. Wallace.

Class of '16—George G. Anderson.

Class of '17—Henry C. Gray.

Class of '18—John W. Bolton, Bert L. Combs, Ralph E. Price.

Class of '19—Richard P. Gillum.

Class of '20—Walter L. Osmer.

Class of '21—George R. Armstrong.

Class of '22—Sterling H. Pitman, Malcolm C. Scott.

Class of '23—E. Miles Griffith, Robert K. Price.

Class of '24—Clay P. Watson.

Class of '25—Herbert Gruesing, Hubert H. Merrill.

Class of '26—Wayne E. Watkins.

Class of '27—Walter L. Pennington.

Class of '29—Richard T. Markle, Herman A. Moench.

Class of '30—Clyde S. Marsh.

Class of '31—Richard E. Biller, Anthony G. Blake, Albert Ellis, Orville A. Evans, Robert T. Mees, Robert S. Roach.

Class of '32—Hans M. F. Fischer, George T. Hauer, Robert D. Moench, P. Joseph Schaak, P. Arvard Smith, John E. Tonetti, Howard L. White, Robert A. Wilson.

Class of '33—Merrill L. Bradfield, James W. Cantwell, Paul R. Dierdorf, John M. Phelps.

Class of '34—Jack H. Foulkes, Herbert A. McAninch, Paul R. Smith, Richard K. Toner, Ronald W. Updike, John A. Wilson, Albert L. Yates.

Class of '35—John A. Bradley, Gordon L. Burt, Earle B. Butler, Emmet J. Cody, Jr., Claude C. Dierdorf, William C. Eyke, John J. Fuller, John J. Hager, Jay F. Hall, Ezekiel A. Hamilton, Louis W. Heck, Albert L. James, John K. Loman, Louis S. Lyon, Albert V. McEowen, Carl Nelson, Emerald F. Newman, Bert L. Pearce, Carl W. Price,

Francis H. Richardson, Harry H. Richardson, Virgil E. Shaw, P. Byrne Terhorst, Nelson B. Trusler, Norman E. Tucker.

Class of '36—Francis M. Blair, James Campbell, George E. Cavanaugh, William R. Creal, Edward B. Denehie, Louis Duenweg, Harry E. Garmong, Raymond J. Harrod, Robert Hopewell, James D. Hufford, Raymond R. Laughlin, Paul H. McKee, John W. Mann, E. Kendrick Newton, Jack Roberts, Richard W. Spain, Joseph H. Walker, John B. West.

Class of '37—Robert A. Averitt, Lawrence B. Carroll, Alden B. Foley, Paul E. Giffel, Harry J. Halberstadt, Albert Lotze, Charles F. Rich, John W. Fox, Rhiman Rotz, Robert I. Sears, W. Stuart Smith, Walter R. Snedeker, John E. Sonnefield, Edward J. Wodicka.

Class of '38—Wendell E. Carroll, Robert W. Dispennett, Edward H. Eckerman, John R. Hayes, John E. Lindeman, Clemens W. Lundgren, John R. Merrifield, Robert E. Pearce, Adam H. Romeiser, Merton B. Scharenberg, Max F. Stanfield, John F. Wienbrecht, William D. Wolf.

Heat of Combustion

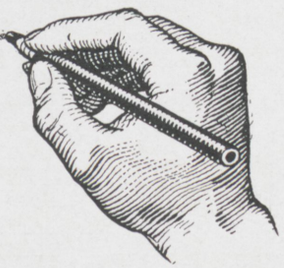
(Continued from Page 4)

puting heats of combustion and formation have been brought forth in the past, the writer feels that the methods treated herein have at least the merit of simplicity which would warrant their use in a great many cases.

HEAT OF COMBUSTION VALUES FOR FUNDAMENTAL GROUPS

	182.35	-O-	-32.60
	156.30		-58.60
	130.25	-OH	-13.05 (prim. & sec) -19.05 (nucl. benz.) -22.55 (tertiary)
	104.20		
	751.95	$-NO_2$	-9.55
	722.40		104.15
	692.85		78.10
	663.30		52.05
	633.75		26.05
	604.20	-CN	120.75
	162.80		62.15 (alkyl) 58.55 (aryl)
	153.05		45.50 (alkyl) 39.00 (aryl)
	127.00		28.85 (alkyl) 19.45 (aryl)
	110.70		
	58.60		
-CHO	91.15		

Fraternity Notes



Alpha Tau Omega

The Gamma Gamma chapter of Alpha Tau Omega is very proud to announce the initiation of six men on Sunday, October 9. The men initiated were Edward Taylor and Allen Wilson, class of '40 and Frank Beeler, Somers Blackman, Charles Howlett, and Todd Rockstroh, class of '41. With the initiation of these men the actives in the chapter total 35 in number.

On Tuesday evening, October 11, Quentin Jeffries of the class of '41, was formally pledged into the local chapter. We are indeed very proud to have Quentin as one of our pledge brothers.

During the past month there have been many activities at and about the house. Two open houses have been held, both of which were attended almost unanimously by the chapter. The previously mentioned initiation was held, and on Sunday, October 2, ten men went to the state conclave that was held at the Delta Alpha chapter house at Indiana University. At this conclave plans were made for the annual state dance which is to be held in March at the Hotel Claypool in Indianapolis. Those who attended the conclave were: George Smith, Ed Spahr, Bill Reddie, Frank Doenges, Merritt Noel, Malcolm Steele, Logan Davis, Bob Kahn, Jack Appel, and Bob Phelps.

Recently it was announced that two silver cups will be awarded at the banquet held in Indianapolis in the spring. One cup is to be presented for the chapter having the highest scholastic average, and the second cup will be awarded to the chapter rendering the best arrangement of a fraternity song. Our hopes are high because of the scholastic standing we have held at Rose during the past 12 semesters and because we have quite a few men in the glee club.

We wish to congratulate George Smith on his election as president of the Senior Class and also because he has led the football team to three victories in four starts. We are proud of Johnny Combs because he was elected president of the Sophomore Class and because he is a regular on the football team. Congratulations are also due brothers Coons, Ross, and Pearce who were pledged to Tau Beta Pi.

Sigma Nu

The Beta Upsilon chapter was honored on October 17 by the visit of Brother Malcolm C. Sewell, who is general secretary of the fraternity, and Brother Charles Messersmith, inspector for the five chapters of Sigma Nu in Indiana. They were glad to find the chapter in such fine shape.

The Sigma Nu's forged ahead in the class elections, getting four of the fifteen offices available to upperclassmen. John Quinn was elected President of the Junior class; Charles Fuller, Vice-president of the Senior class; and George Schull, Secretary-Treasurer of the Sophomore class. Robert McKee was elected Athletic Representative of the Senior class.

In a recent fraternity election C. Paul Stark was elected Lieutenant Commander; John W. Quinn, Treasurer; Charles B. Drieke, Chaplain; and Robert McKee, Rush Captain. McKee is also House President.

Theta Kappa Nu

The first meeting of the year was held at Brother Bob Underwood's home on North Tenth St. Active members, pledges, and four alumni members were present. After the business of the meeting had been completed, an educational talking picture was shown. It is the plan of the fraternity to have some interesting and educational entertainment immediately following each chapter meeting.

So far this school year, the chapter has had two dinner meetings. They will be continued throughout the year.

Our worthy Archon, Victor Peterson, represented the Rose chapter of Tau Beta Pi at the National Convention of Tau Beta Pi held in Cincinnati, Ohio, on October 6, 7, and 8.

Theta Xi

Kappa Chapter of Theta Xi takes great pleasure in announcing the pledging of Ross S. Pyle, '41, of Rockville, Ind.

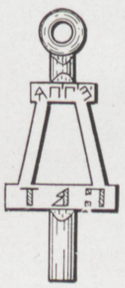
A pledge banquet in honor of the four new pledges, Anderson, Klatte, Pyle, and Wehle, was held on the night of Tuesday, October 25. This was the first dinner meeting of the year, and it gave Mrs. Grove, our able house-mother, a chance to prove herself to the

whole fraternity, as she has already done to the men living at the house.

Theta Xi is quite proud of its men who hold prominent places in school affairs. In the recent elections Bob King was elected Vice-President of the Junior Class and George Harper, Vice-President of the Sophomore Class. In football, Theta Xi has two lettermen, Hogan and Harper. Other Theta Xi's on the football squad are Klatte, Morrison, Wilkinson, and Anderson. Klecka is Sophomore manager. In publications, Theta Xi is represented by Edward Klecka, Assistant Campus Editor of the *Technic;* Milton Hosack, Assistant Photo Editor of the Modulus; and Vernon Whitehouse, Junior Sales-manager of the Modulus.

As colder weather approaches, the men living at the house are really appreciative of the foresight of their executives, especially that of Mr. Merrill, in providing a house with air-conditioning. This, together with other features, tends to make the members of Theta Xi prouder than ever of their new home.

Tau Beta Pi



Tau Beta Pi held its fall meeting for the election of new members on October 3. These elections were announced later in an assembly. Those elected from the Senior Class were Edward Coons and Ewing Ross. Frank Pearce, Lloyd Krause, and Willard Louthen were elected from the Junior Class.

Tau Nu Tau

On October 6 Tau Nu Tau gave a banquet in honor of Warrant Officer Sylvester Kearns at Mrs. Button's Tea Room. The following men attended: Captain F. H. Henney, Captain D. C. Hawkins, W. O. Sylvester Kearns, Merritt Noel, Edward Spahr, Ewing Ross, Richard Altekruse, George Smith, Robert Ladson, Robert Underwood, Victor Peterson, Franklin Doenges, Richard Weldele, John Yaw, Edward Coons, William Reddie, Randall Wise, Roy Warren, Robert Burger, and Robert Averitt.

After the banquet Mr. Kearns told of many entertaining events which occurred during his stay at Rose.

Hydrogen Cooling

(Continued from Page 7)

3. In passing over the heated surface, hydrogen will pick up 30 per cent more heat than air for a given temperature drop. Similarly, in passing over the coolers, hydrogen will give up more heat for the same temperature drop. A graph of typical temperature rises of the generators with air and hydrogen cooling is given in Figure 3.

4. A hydrogen-cooled machine is installed in a gas-tight shell. This makes it inherently suitable for outdoor installation. It is, therefore, sometimes possible to credit a hydrogen-cooled machine with an appreciable saving in building cost.

5. Decreased windage loss reduces windage noise, and the enclosure prevents gas-borne noises. Hydrogen-cooled machines are, therefore, much quieter than air-cooled units. This allows locating these machines in neighborhoods where air-cooled units would be prohibited. Locating a machine more advantageously with respect to load may mean a saving in cost of line.

6. Operating costs are also reduced by decreased inspection and maintenance expense. The gas-tight enclosure keeps out all foreign matter so that windings and ventilation ducts remain clean.

7. Hydrogen prevents damage that might occur in the air if corona were present in the machine, and the gas will not support combustion. For these reasons danger of short-circuits is greatly reduced and all danger of fire is eliminated.

Although many years of operation will be required to prove the superiority of hydrogen-cooled machines over air-cooled units, it seems safe to predict that this new cooling medium is destined to play an important part in the future designs of electrical machines.

Cracked Gas

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

I guess they call a sailboat "she" because it makes a better showing in a breeze——.

—Exchange

"That girl's a virtuoso!"

"Don't be silly. She's been married twice!"

Kodiak, the Eskimo, was sitting on a cake of ice telling a story. He finished and got up.

"My tale is told," he said.

Jan: "How come you happened to quit teaching school to join the chorus?"

Sal: "Because there is more money in showing figures to the big boys."

Driver of car (unfamiliar with road): "I take the next turn, don't I?"

Muffled male voice in the back seat, "Like hell you do!"

—Battalion

GIVE HER A HAND

"Help your wife," says Good Housekeeping. "When she mops up the floor, mop up the floor with her."

The saddest of all insects is the silk worm; he labors all his life to clothe the beautiful woman and dies with his work only half done.

He: "I just heard of a girl who takes a shower and dresses in three minutes."

She: "Why that isn't so wonderful!"

He: "I'd like to see you do it."

She: "Where did you learn to kiss like that?"

He: "I eat spaghetti."

Any cat can be the cat's whiskers, but it takes a Tom cat to be a cat's paw. Meow!

Orchestra Leader: "I was kissing our girl soloist last night to beat the band."

Friend: "You didn't beat the band. They've been kissing her for weeks."

Mary had a little swing,
It isn't hard to find,
And every where that Mary goes,
The swing is just behind.

He gazed upon her figure
So round
So curved and slim
And marveled
At the delight
"She" had aroused
In him
For "She" wasn't the kind
Of a person
That he could take
On a date
Not for a Math instructor
"She" was the
Figure 8. . .

He: "You don't smoke?"
She: "No."
He: "And you don't drink?"
She: "No."
He: "By George, I'm coming around sometime and see you—you must do something."

Some gals use a pill to get rid of a headache, but others use a headache to get rid of a pill.

We don't vouch for the authenticity of the source of these excerpts from letters actually received at several County Relief Headquarters, but if they are faked by some imaginative wag, he surely must have had some similar experiences for inspiration.

1. I am writing to say that my baby was born two years old, when do I get my money?
2. Sirs: I am forwarding my marriage certificate and 6 children. I had seven but one died, which was baptized on half a sheet of paper by Rev. Thomas.
3. I am glad to say that my husband reported missing is now dead.
4. This is my eighth child, what are you going to do about it?
5. In answer to your letter, I have given birth to a boy weighing 10 lbs. I hope this is satisfactory.
6. I am very much annoyed to find you have branded my boy as illiterite, this is a dirty lie, as I was married to his father a week before he was born.
7. I am forwarding my two children and my marriage certificate one of which was a mistake, as you can see.
8. I cannot get sick pay. Can you tell me why? In accordance with your instructions I have given birth to twins in the enclosed envelope.

—Cornell Engineer

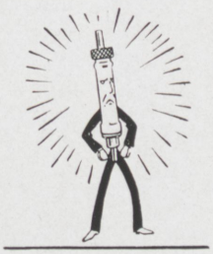
Overheard at a fraternity banquet —Here's to the land we love and vice-versa.

CONFESSION

Half of these jokes I've seen before, and the other half I don't see yet—.

—The Editor

G-E Campus News

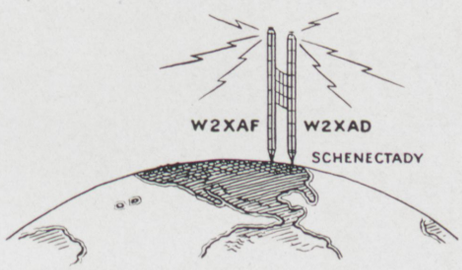


"MIDGET SUN"

FOR years Old Sol has had things pretty much his own way—causing sunburn, having sunspots, and wandering periodically north and south of the equator.

Now a young upstart about the size of a cigarette has been announced by General Electric. It is the new 1000-watt mercury lamp, which, even though many million times smaller than the sun, has one fifth the brilliancy of Old Sol's surface.

Source of the brilliant light is the lamp's highly concentrated arc—12 times more brilliant than the incandescent filament of a 1000-watt standard projection lamp. Laboratory tests show that the "upstart" will be of great value in searchlights, photoengraving, blueprinting, photoenlarging, and as an aid to medical science.



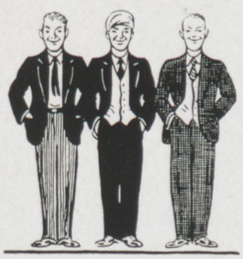
"AMERICA CALLING . . . ."

NEWS reports broadcast via short-wave radio from America told of troop movements in Spain; picked up in Barcelona, they aided forty refugees in escaping a war-torn area. An appeal for emergency contributions to a Red Cross flood-relief fund was heard in South America; Venezuelan oil-field workers answered with a donation.

Behind these events and others of front-page news were the two powerful short-wave stations of General Electric—W2XAD, and W2XAF, in Schenectady, New York. Since they first took the air, 12 years ago, the stations have figured in events of all kinds, have broadcast their programs to all parts of the earth. One of their weekly variety programs is an institution in South America. World Series baseball games have been heard in India and Arabia. The news reports of these stations are heard everywhere.

The steady stream of cards and letters from all over the world asking for information on the programs and congratulating the stations on their service is indicative of the good will that the stations are helping to promote.

The 150-hour-a-week operating schedule, headed by Eugene Darlington, Oregon State '28, ex-Test man, now features broadcasts of all types, on four different frequencies, in six languages—English, Spanish, Portuguese, French, Italian, German.



"FROM AMERICA, FROM INDIA, FROM ENGLAND . . ."

SCANNING the recent rolls of young men on Test with General Electric gives the impression of reading membership lists in an "International House" at some large university. For, intermingled with graduates of engineering schools all over the United States are, for example, Cariapa from Kashmir, in India; Bambery, from " 'way down under" in New Zealand; Gurewitsch, of Roumania; and Chia-Hsu Hou, of China.

But predominating in the picture are picked men from American colleges and universities. Selecting names at random from the various Tests inevitably shows student engineers from widely separated parts of the country working side by side. Miller of Arizona U. and Olsen of Brooklyn Tech. worked together on motor and generator tests. Schmid of Wisconsin ran turbine tests with Norris of Texas Tech. Testing induction motors were Loew of Washington and Owens of Union College.

General Electric's executives look upon this Test training as more than a graduate course in engineering—it is a carefully formulated plan of training young engineers for leadership in industry.

GENERAL ELECTRIC

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