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For this he was sent to prison

Roger Bacon may not have invented gunpowder, as has been claimed by some biographers of the famous Franciscan friar, but he exploded some of the outstanding errors of thirteenth century thought. Because of his advanced teachings, Bacon spent many years of his life in prison.

In an age of abstract speculation he boldly asserted the mathematical basis of all the sciences. But even mathematical calculation, he showed, must be verified by experiment, which discovers truths that speculation could never reach.

In the Research Laboratories of the General Electric Company, Bacon's principles are followed in every experimental investigation. The gas-filled electric lamp and the electron tube were worked out on paper, but it was experimental verification of the underlying mathematical theory that made electric illumination, radio broadcasting and X-rays what they are today.

GENERAL ELECTRIC
MODERN FLAST FURNACE PRACTICE

D. P. Cromwell, '19

In order to visualize to the average student at Rose what a blast furnace really is, a few words of explanation might make the following article more understandable to the person who never has seen one. The furnace proper is a steel jacketed cylinder of brick-work usually about ninety feet high. There are usually four pre-heating stoves that are about the same height as the furnace and are twenty feet in diameter. They are built of brick with passages throughout known as checkers through which gas is burned to heat the stove and then cold air is blown through to the furnace at an average temperature of one thousand degrees Fahrenheit. The furnace proper is of brick, cooled by a system of copper plates and iron coolers so that the liquid iron is kept safely within. The furnace is filled within fifteen feet of the top and kept full of coke, ore and limestone in continuous 24 hour operation the year round. The brick work on one furnace is usually good for one million tons of pig iron which is about four years of service.

The operation is as follows. The furnace is filled with coke, ore and limestone. Cold air, at fifteen pounds pressure and a velocity of about forty thousand cubic feet per minute is blown through the stoves which raise its temperature to one thousand degrees Fahrenheit. This hot air is blown into the furnace through twelve tuyeres. The air goes through the solid mass in the furnace helping to burn the coke and to reduce the iron ore to pure pig iron. This air causes the formation of carbon dioxide and carbon monoxide, which is an inflammable and dangerous gas. This gas is taken from the top of the furnace through twelve tuyeres. The air goes through the solid mass in the furnace helping to burn the coke and to reduce the iron ore to pure pig iron. This air causes the formation of carbon dioxide and carbon monoxide, which is an inflammable and dangerous gas. This gas is taken from the top of the furnace through twelve tuyeres.

The furnace is filled within fifteen feet of the top and kept full of coke, ore and limestone in continuous 24 hour operation the year round. The brick work on one furnace is usually good for one million tons of pig iron which is about four years of service.

The lines of a modern blast furnace are largely a matter of experience, as the blast furnace is a derivation of the cupola. The older furnaces were built with a large flat bosh and they gradually have become steeper and larger in all dimensions. The modern equipment needed for the larger furnace must, of course, be designed for different conditions such as faster filling and regular distribution in the furnace of the coke, ore and limestone. There are several patented furnace tops that give good results but one of the best is a modified Newland top with a single large revolving skip bucket. The stoves and the gas system of the modern furnace are built larger in proportion, but the object in their design now is to permit a maximum heat to the blast with a minimum amount of gas used in the stove. Every bit of the top bases from the furnace is utilized to make steam for the blowing engines and for the mill, so that several types of gas burners are being used extensively. Some plants use a pressure of air mixed with the furnace gas to a good advantage. This gas must be cleaned better when finer ores are used so that several new types of gas cleaners are being used efficiently. One of the most efficient washers, at present, is the tower washer. Some furnace plants use the gas blowing engine, so that a clean gas is necessary. The idea in modern furnace practice is to utilize all the improvements and companies favor mechanical propositions that reduce labor, save lives, save money, and produce maximum efficiency from the laborer with minimum effort. The education of the foreigner is more rapid than expected, so that with restricted immigration laws, the increase is not nearly as much as the decrease in the type of foreign labor that is needed by the steel trades. This condition is being met by engineering ideas and the average man with average muscles can now be expected to do efficient furnace work.

Several other problems call for different methods of handling a blast furnace. First, the ores that are now available for smelting are much finer in structure than the older ones. The old ore mines are gradually being used up and, for the most part, the new ores are approaching the fine dust size. This problem is practically solved by sintering or briquetting the fine ores before charging into the furnace. Most of the modern furnaces use by-product coke instead of the old Bee Hive coke. This necessitates a different kind of equipment, namely the By Product Coke Plant, crushing plants and screens. The limestone available now must also be crushed and screened. Probably the greatest change encountered in raw materials is the decreasing of the Gogebic Range Ores and the increasing of the Mesaba Range Ores. (Gogebic is old range and Mesaba the new range ores.) This condition alone makes the design of furnaces a problem that is still in the experimental stage, as the larger furnaces seem to handle the Mesaba ores much more efficiently than do the smaller ones.

The modern blast furnace requirements have been revolutionized to such an extent that the present day furnaceman finds himself compelled to use all the engineering ingenuity that is available. Ideas of mechanical interest to all have been developed in the blast furnace world and the theories of chemistry and mechanics put to a thorough test. Some of these theories exemplify themselves; others fail; but for the most part, theories are something to compare with practice and start improvements toward maximum production with minimum cost. Of course, experiments and past practice have had much to do with the changes in blast furnace work, but usually the theory has been made to follow throughout, providing that an experience factor is used. The changes in the personnel available for the labor in furnace work, both in number and kind has made steel cor-
products of the furnace whether at the top or at the bottom so that every B. T. U. of gas is used if possible.

With larger furnaces, the problem of efficient blowing apparatus becomes more apparent as the reciprocating tub blower, while it delivers the air needed, does not do it as efficiently as the new turbo blower. Several years of experiment were finally rewarded with an efficient blast furnace blowing machine. Several mechanical problems confronted the builder of these high speed engines. First was the problem of critical speeds, second the excessive steam usage and third the governor that would not vary under constant pressure. All of these problems were solved by theory and practice. The latest turbine built has been proven very efficient as to the cost of upkeep, the amount of steam required and results. This is quite a saving, as this steam saved is in reality an exchange of gas for coal to the boilers.

The furnace operator of today is striving to operate his plant smoothly and economically so that his ore cargoes move on time for the winter months, as all the ores must be handled during the open season and the lake boats can only operate eight months. For a plant of four furnaces, approximately one and one half million tons of ore are needed for a year's operation. This means a sure mechanical means of ore handling such as lake boat unloaders, efficient railroad service where necessary, car dumpers, and ore bridges. Ore larry cars and scale cars that weigh each charge to the furnace must stand the wear and tear and give constant 24 hour service. The handling of the coke from the batteries to the screens, crushers and furnace bins is accomplished usually by a larry car or through the railroads. The manufacture of the coke is a problem in itself that presents many engineering features. Some plants obtain coke that was formerly known as a by-product from a gas plant, so that it is evident that there are many economical ideas regarding coke plant operation. The furnace proper is handled by keeping it full to the stock line with ore, coke and lime, and casting every five or six hours. The iron is either made directly into steel while still liquid, through the open hearth or Bessemer converter, or it is cast into pigs on an automatic pig casting machine. The slag is taken from the furnace and granulated by pouring into pits of water, or it is poured into empty pits, then allowed to harden and loaded out by a steam shovel for crushing and commercializing. This hard slag business is another side issue of the blast furnace as well as another source of revenue for the company. The average blast furnace plant now produces 600 tons of iron per day while the latest records for a month's run is 753 tons per day on straight ore and 797 tons per day using steel scrap along with the ore. This record was made by one of the furnaces in the Youngstown district, using a turbo blower with a picked grade of ore.

Modern blast furnace practice is changing from day to day, due to modern ideas and developments. The most important recent change was the abolition of the 12 hour day. This plan seems to work out well and was a welcome change in blast furnace practice, as a workman well pleased means more efficient results. The future demands for furnace practice seem to be to build furnaces that will produce large tonnages using the ores and materials available. Along with this demand is a necessity for operating these large furnaces economically and safely. Several furnace experts claim that the blast furnace is in its elementary form yet, and that "she" will continue to surprise the theorists occasionally. The art of determining the proper lines for a furnace rests in the ability to wait four or five years to see whether or not the true lines are the best lines to follow on the next furnace to be built. Because of the fact that we only know what goes into the furnace and what comes out, the whole mystery is only solved by saying that the theory of a crucible holds true and that there is nothing new that we know about the theory in modern blast furnace practice.

Flywheel Breaks in Vernon, B. C. Steam Generating Plant

A curious accident happened at Vernon, B. C., recently, when the 20-ton flywheel of a steam engine of Swedish manufacture, at the city's electric generating plant, burst, doing considerable damage to the power house, but, fortunately, injuring no one. Two men were in the act of stopping the engine for the night when the accident occurred, one man being on either side of the wheel. The fragments of metal, some of which weighed several tons, flew off in a direct line to that in which the wheel was running, some going through the roof, some through the concrete walls.

Vernon has had considerable difficulty in keeping its streets and houses lighted since the accident. Among other devices, the city steam roller has been harnessed to one of the dynamos and has rendered valiant aid to the two 200 h. p. engines, which were uninjured. —Power.

A new type of self-contained steam driven railway coach has been developed for use on British Railways. The coach, which is known as the Sentinel Steam Railway coach, is capable of developing a speed of fifty miles per hour. It is remarkable in that while the average weight of the present steam railway coach is over 40 tons, or about 1,650 pounds per passenger carried, the new coach as designed for standard gauge railway weighs less than 500 pounds per passenger carried. Similarly, the fuel consumption of the heavy type of coaches is approximately 25 pounds of coal per mile, as against four pounds per mile for the new Sentinel car, and the water consumption is 15 gallons per mile as against 2 1/2 gallons per mile. The boiler of the Sentinel coach is designed to operate with either coal, coke, charcoal, wood, or waste vegetable products, and therefore is capable of being operated in almost any locality. The light weight of the car makes it possible to operate it over railways which, on account of light track or bridges, are incapable of carrying the heavy railway coaches. —Engineering News-Record.
N buying new stoking equipment one must give sufficient proof that the cost of the equipment is justifiable before asking for stoker bids. After receiving the bids the next thing, of course, is to pick the equipment that will best suit your requirements at the least cost.

**Efficiency of Vital Importance**
The function of a stoker is to burn coal and since coal costs money, the efficiency of the apparatus is of vital importance. In view of this fact, you must make a comparison of efficiencies. How, by the comparison of efficiencies, do you figure the saving in coal that can be realized by installing new equipment in the place of your old equipment, also, how do you figure the saving in coal bill obtained with one type of stoker over that of another type? Many of you merely take the difference between your present operating efficiency and that which you expect to obtain with new equipment; or, in comparing new stoking equipment, you take the difference between the efficiencies as guaranteed by the respective manufacturers. This, however, is not the net saving in your coal bill.

**Coal Saving Formulae**
The coal saving in per cent is equal to:—

\[
\text{Saving in per cent} = \left(\frac{E_1 - E_2}{E_1}\right) \times 100
\]

Where \(E_1\) = Efficiency of new equipment
\(E_2\) = Efficiency of old equipment

**Derivation of Formula**
The following derivation of the above formula has been tabulated below.

Let \(H\) = heat in B.T.U. required per hour to evaporate the water at the rating at which the efficiency is made.
\(H_e\) = heat content of coal in B.t.u.
\(E_s\) = efficiency of new installation.
\(E_i\) = efficiency of old installation.
\(C_s\) = lbs. of coal burned per hour, new installation.
\(C_i\) = lbs. of coal burned per hour, old installation.

Then,

\[
H = C_s \times \frac{E_i}{E_s}
\]

Substituting Values of \(C\).

Saving in per cent = \[
\left(\frac{C_i}{C_s}\right) \times 100
\]

**A Typical Example**
In order to show more clearly the relation that exists between efficiencies when speaking of economy or saving in coal, I have plotted the curve below. As an example of its use, let us say you have a battery of old boilers set in combination with hand fired furnaces with an operating efficiency of 65 per cent. You want to improve this efficiency by replacing your old and inefficient equipment with that which is much more efficient. You investigate and find that by the installation of new stoking boiler equipment you can raise the efficiency of your boiler room up to 75 per cent. Starting at 65 per cent on the ordinate as your present efficiency, cross over to the 75 per cent line as your new efficiency then down to the abscissae, which gives you the per cent saving in your coal bill. In this particular example it is 13.3 per cent and not 10 per cent as some are prone to believe.

**Another Method**
Another way of looking at this is to start with the proportion that coal burning rates for a given rating are inversely proportional to the efficiencies, or

\[
E_s = \frac{C_i}{E_i}
\]

\(E_s\) = Original Efficiency
\(E_i\) = Improved Efficiency
\(C_i\) = Represents Original coal burning rate, or 100%

If the efficiency is improved by a certain amount then the coal consumption is likewise reduced. Taking the example above:

\[
75\% = \frac{C_s}{C_i} \quad \text{or the}
\]

\[
65\% = \frac{C_i}{C_s}
\]

Coal saved = 13.3%

**The Inverse Proportion**
It follows from this inverse proportion that if the efficiency is increased from 65% to 75% then the coal burned is reduced to 75-65 or 13.3%.

The Illinois Central R. R. recently set a new record in moving large buildings when it moved a seven-story brick structure a distance of 84 ft. The building, which weighs about 8,000 tons, was jacked with 1400 jack screws and placed upon two timbers 20 in. x 20 in. x 90 ft. and thirty-six other timbers 16 in. x 16 in. and from 60 ft. to 90 ft. long. Eleven carloads of 90-lb. rails supported the rollers as the building was moved. Five two-horse teams operating five capstans furnished the power to move the building. Five days were consumed in the actual moving.

—American Builder.
THE ROSE TECHNIC

THE DESIGNER OF ELECTRICAL APPARATUS

By J. M. Hipple, M. E., '98. (Ohio State University)

THERE are today in our American colleges many embryo engineers who have, through inherited instincts, early training, or otherwise, a bent toward design work. This is by no means true of all engineering students, therefore it is important that each man analyze himself to determine if he has these characteristics, for the man who is so endowed will achieve his greatest success by making design work his life's vocation.

There does not seem to be so clear an understanding of the real possibilities lying before the designer of electrical apparatus as exists in some other fields. For example, a young man undertaking the study of architecture clearly understands that his future lies in his ability to design, to create, to supervise the construction of the reality from his designs. In just the same measure the electrical apparatus designer is a creator, crystallizing his ideas into designs and supervising the construction of apparatus that is to be a part of the reality of this electrical age. It is the purpose of this article to give a true picture of the opportunities of the designer in order that those who have the inherent ability will not allow themselves to be deflected into other fields where they cannot command the necessary interest and enthusiasm for successful work.

It is a broad statement to say that all electrical achievements, and the growth of the electrical industry are based on the work of the designer but this is nevertheless true. Consider what the electrical industry would be today if the only electrical apparatus available were based on the designs of thirty years ago. The designer has continuously led the way since the early days, creating new apparatus, larger generating, transforming, and switching units, larger and more economical utilization apparatus. The work of the designer has made it possible to equip a railroad twice the speed of steam trains. Compare this with the trolley car was just coming into use. The comparison reveals the fact that there are at least three important design factors:

1. Adequate electrical performance.
3. Adequate insulation.

All of these requirements must be met if the motor is to be a success. This indicates at once that this design field is not limited purely to electrical designers. There is, in fact, a very broad field here for mechanical designers of electrical apparatus. In many cases the difficulty involved in the mechanical design exceeds that of the electrical. The mechanical engineering student with inherent design ability will find in this field an opportunity to capitalize his training and will grow rapidly with the solution of the multitude of problems that are presented.

Another field for specialization is in connection with insulation and processes. The quality and workmanship of the winding and insulation of a piece of electrical apparatus is of vital importance throughout the life of the apparatus. Were unrestricted space available, the problem might not be so great, but insulation space must be paid for in reduced performance or increased cost, or both. Furthermore, the workman, the human element in manufacture, is a large factor in the results obtained with windings, processes and insulation. Exact work, such as may be expected from a machine tool, may not be expected here, and the engineer must reckon the possibilities of the slip of the workman's hand and mind. There is a need, then, for designers who visualize the possibilities of better work in this particular field, and whose tastes and training will carry enthusiasm to this work. The possibilities are very great for the development of new processes, new methods and new materials. The man with a taste for research in physics, and chemistry, and who is trained in the regular electrical engineering course, is usually well fitted for success in this work. Also, the electro-chemical courses given in some colleges afford excellent training. The opportunity is large, and the work is fascinating, for the men who belong in this field.

The Problem of Electrical Apparatus Design

To get a viewpoint on this problem, let us consider a motor which is a typical piece of electrical apparatus. It requires only casual consideration to indicate that there are at least three important design factors:

1. Adequate electrical performance.
3. Adequate insulation.

How many a young man recognizes his talent in design? One of the most easily recognized indications of inherent aptitude for design work is a liking for construction. This is often exhibited at an early age when a child will show considerable ingenuity and spend noticeable time in building a toy only to discard it immediately and start work on something else. Two other characteristics commonly noted in successful designers are curiosity or inquisitiveness, the desire to know the reason why; and persistence, the desire to carry through to a finish, to overcome all obstacles. Another indicative trait is the possession of a mathematical sense, not meaning great facility in the use of involved mathematics, but a working knowledge of the practical application of mathematics. Other desirable characteristics in common with other phases of engineering work are common sense, imagination, and ability to observe and to analyze.

(Continued on page 16)
HE Alumni Editor takes this opportunity to thank Miss Mary Gilbert, Registrar, for her very effective help in securing news of Rose graduates. To her is due most of the credit for the success of this department. Miss Gilbert's interest is never limited to any particular activity of Rose, and we might well profit by following her example of giving time, advice, and encouragement to all organizations, whenever it is needed.

1887
William H. Palmer, graduate in Mechanical Engineering, in 1887, died at his home in Indianapolis, in February, 1923. He left a wife and three children.

1894
Austin V. H. Moré is now with the Bakelite Corporation in New York. His address is 52 East 41st Street, care of the Chemist's Club.

1904
Robert D. Landrum is now Vice-President, in charge of Development of Sales, of the Vitreous Enameling Company and the Vitreous Steel Products Company, at 6800 Grant Ave., Cleveland.
James C. C. Holding has left the Midvale Steel and Ordnance Company, and is in the Steel Car Department of the Bethlehem Steel Company, at Bethlehem, Pennsylvania.

1907
Morris Meyers is President of the West Star Iron Works, Inc., manufacturers of ornamental iron and structural steel. His address is 11 East 137th Street, New York City.

1908
J. J. Gibbons, ex-'08, who is an Accounting Engineer for the Big Four Railroad, has been transferred from Cincinnati to Indianapolis.

1910
Paul F. Stokes, who has been Vice-President and General Manager of the Shelby Metal Products Company, at Shelby, Ohio, has joined the General Electric Company at Schenectady, as Efficiency Engineer in the Vacuum Tube Department.

1913
L. Wallace Lewis is Assistant Engineer on the Panama Canal, stationed at Balboa Heights. Homer A. Howe has located in Terre Haute, as Superintendent for the Shouers-Stoner Company.

1915
Charles N. Stevens is Manager of the Kenosha Boiler and Structural Company, at Kenosha, Wisconsin. Mr. Stevens was formerly Superintendent of the Tuttle Press Company, at Appleton, Wisconsin.

1917
Risser, ex-'17, is with the Westinghouse Company at East Pittsburgh, in the Works Equipment Department. His address is 566 Rosedale Street, Pittsburgh, Pa.
E. C. Mills, ex-'17, who received his degree of Bachelor of Laws at the University of Illinois, in 1920, is a lawyer at Virginia, Illinois, and a member of the Illinois State Senate.

1918
Frederick G. Klatte has moved from Racine to Kalamazoo, where he is Chief Draftsman for the Checker Cab Manufacturing Company.
Ralph E. Price is employed by the Truscon Steel Company, at Youngstown, Ohio. Address: 238 West Rayen Avenue.
Julian A. Vrydagh is with the American Bridge Company, at Ambridge, Pennsylvania.

1920
Norman A. Ruston, who has been with the Sears-Roebuck Company, in their wallpaper mills, is now Chief Chemist for the Dyes Distributing Corporation, in Chicago.

1921
Bolt, ex-'21, received his Bachelor of Science Degree in Electrical Engineering, at Purdue, in 1922. He is now employed by the Indiana Bell Telephone Company. Address: 212 West Colfax Street, South Bend.

1922
Alonzo R. Watson is in the Motor Sales Department of the Lynn Works, of the General Electric Company, at Lynn, Massachusetts.
William C. Turner is in the Construction Department of the Chicago Office of the General Electric Company.
Hubert E. Reed is in Springfield, Illinois, with the Illinois State Highway Commission.

1923
Harry McComb is with the Terra Cotta Service Bureau, in Chicago. Address: 128 North Wells Street.
Bledsoe is a student engineer at the Hawthorne Plant of the Western Electric Company, in Chicago. Address: 3836 Gladys Avenue.
Edwin Wolff will soon complete the Graduate Student Course of the Westinghouse Electric and Manufacturing Company, at East Pittsburgh.
Mr. Albert J. Bedard, instructor in Mathematics and Civil Engineering, in 1921-23, has written from 2 Park View Place, Ann Arbor, Michigan, that he is learning a great deal about highways.

It no doubt will be of interest to readers of the "Technic" that a permanent alumni chapter has just been formed at Schenectady. The chapter has twenty-six charter members and with such a number of Rose men in one place it is expected that several meetings will be held during the year.

(Continued on page 15)
In the first game of the city title play, on January 8, as was expected, the Teachers were victorious over the Engineers.

The teachers took an early lead and were never headed, although things looked bad for them at times. Schoonover was a tower of strength for Rose, while Skeeters and Fox were other Clarkmen to star. Burris was the offensive star for Normal though every teacher played good basketball.

To start the second half, Skeeters hit the net three times from afield, and things for looked up for a time, but the rally was short lived.

**LINEUP AND SUMMARY**

**Rose—**
Skeeters F
Dowen F
Anderson C
Watson G
Schoonover G

**State Normal—**

Skeeters F
Dowen F
Anderson C
Watson G
Schoonover G


---

In a return game with the Teachers on January 16, Rose was again victorious, although the game was at all times close and the result in doubt. The Engineers displayed their best game of the year, with Skeeters and Schoonover bearing the brunt of the attack. Janell and Cox were the outstanding members of the Normal Court team.

**LINEUP AND SUMMARY**

**Rose—**
Skeeters F
Dowen F
Anderson C
Watson G
Schoonover G

**Central Normal—**

Skeeters F
Dowen F
Anderson C
Watson G
Schoonover G


---

In a fast, hard-fought game, January 19, Coach Clark’s “Fighting Engineers” defeated the Oakland City College by a four point margin. Blunt, Coleman and Sanders proved to be real basketball players for the down-staters and, as a result, only the hardest kind of play netted the final victory for the Engineers. Captain Skeeters, with six pretty casts, led the Rose scoring, while Watson added four from the field.

**LINEUP AND SUMMARY**

**Rose—**
Skeeters F
Dowen F
Anderson C
Watson G
Schoonover G

**Oakland City—**

Skeeters F
Dowen F
Anderson C
Watson G
Schoonover G


(Continued on page 12)
THE ROSE TECHNIC

Y. M. C. A.

THE Y. M. C. A. has recently undertaken a task which will be, on completion, an asset to the student body, and, we hope, a source of pleasure to every Rose man who has ever identified himself as a member of an athletic team. At a meeting of the Cabinet on January 24th, it was decided to buy a few pictures for the Y. Room. The very next day, Coach Clark showed us a picture of the 1923 Football Team and said that we should have a photograph of every team that has represented Rose. Now, we hadn't thought much about starting an art gallery, but the suggestion of the Coach was not only gladly accepted, but has been developed into a definite program for securing, framing, and hanging all available athletic pictures.

Details of the plan, in charge of W. R. McIntosh, of the Y. M. C. A. Cabinet, have not been formulated, but the very first step will be to gather together all photographs in the school and Terre Haute. Then, knowing those teams which are not represented in the collection, Alumni will be asked for the loan of any pictures they may have, until new ones may be printed.

WHAT OTHER SCHOOLS ARE DOING

Carnegie Tech co-eds have a new way of attending social functions to which they have not been invited by their male companions. The theory that the college girl without a bid to a football dance sits in a corner sulking and weeping has been upset. It finally leaked out that the girls, in many cases, have been masquerading at dances as men, taking their roommates with them, dancing with them and escorting them home. The girls use vaseline to make their hair stay flat and the “Sheik” haircuts of college youths, resembling the bobbed hair of the girls aided deception. Young men’s suits, hats and overcoats were borrowed from various frat houses.

Harvard has organized a “Blue Shirt” Club which thus far seems to be very successful. The members of this noble organization are required to wear only one shirt a week, and that one must be a blue one. The purpose of the club is twofold. The purpose is to boycott the laundries, to make them lower their prices, but we are inclined to think that it would be just as effective and perhaps even more bizarre to have the men form a Shirt Washing Club.

The second purpose is to combat the Ku Klux Klan and similar organizations. It is rather puzzling to determine just what blue shirts have to do with the Ku Klux Klan, but perhaps the blue shirts are set up in opposition to the white one of the Ku Klux.

Thus far this club has been confined to Harvard, but they do not expect to be able to keep up the monopoly much longer. They fear that the idea will spread to other colleges, and that soon the club will become an intercollegiate affair.

A co-ed at the University of Chicago held a meeting recently at which they discussed men, dances and parties, and they decided that “all men are talkers; some of them serious and dull, some frothy and dull, and others trivial and dull.” A movie with the right man is better than an opera with a “yap” is their opinion. They are in favor of three dates a week, preferably theatre dates. Two shows are regarded as better than one theatre and supper date.

A co-ed at the University of Kansas has started a date-making agency as an aid to paying her expenses through college. For twenty-five cents she will arrange a date for any girl, satisfaction guaranteed or money refunded.

Oberlin is conducting a drive for the purpose of collecting $4,500,000 in the short period of one month. The money is needed for a hospital, a woman’s gym, a library addition and a men’s dormitory.

A new system of electing captains of teams is to be practiced at Franklin College, Indiana. The captain will be elected before every game and will rule for that game only.
Bill Goes Through Finals and Then Rush Season

Dere Pete:—

Well, old sock, I suppose you are commencing to wonder as to what has became of me, but believe you Bill, I sure have been busy. The last week of January was "final-week" and it sure did look as if it was going to be my final week at R. P. I.

We had an exam every day for six days, and even yet my hair has an unnatural hue due to it's almost turning gray under the terrific mental strain and brainstorm that threatened to overwhelm me. Day after day I sat, vainly trying to give my exam papers a worthy appearance, but the only thing that rose clear in my mind was "Why did I ever decide to try to be an engineer?"

We did have an opportunity to air our personal views, however, as in the English exam we were told to write a letter giving our suggestions for the betterment of the school management and curriculum. Although mine was sorta brief I enumerated 'em under the following ten headings:

1. All eight o'clock classes will be abolished.
2. All classes will cease at two o'clock daily—except Fridays. "Home-go" at noon on that day.
3. Professors will distribute exam questions three (3) days before the date when the students are expected to answer them.
4. Students will refrain from removing their hats during recitation periods.
5. Assembly will be compulsory on the third Tuesday of each week.
6. Football or basketball will be a five-credit course. Mr. Fogarty will be the head of this department.
7. Discontented Professors may ask for the chair of Applied Electricity at Sing Sing Institute. The request will always be cheerfully granted.
8. Students will refrain from shooting craps for more than two bits a crack during lecture periods. The excitement of a stronger game often leads to noise which disturbs those who, having had dates the night before, need their rest.
9. All students living in Clinton, Louisville and Havana will be members of the St. Pat's "refreshment" committee. Funds will be furnished by an appropriation from the General Fund.
10. No one shall molest Mr. Day's "Coles Phillips —John Held" Art gallery in the wood shop. Destruction or removal of any of these works of art will be punishable by expulsion from the Institute.

Now honest, Pete, if those rules wouldn't change conditions at Rose, why I'm a sport model jackass!

Of course, we must realize that Rose Poly, like conditions at Rose, why I'm a sport model jackass!

Of course, we must realize that Rose Poly, like everything else worth while and modern, must be uplifted. Fortunately, the world has enough up-lifters and shock-absorbers to do the job. The other night one of 'em "held sway" at a downtown hall, and he deposed the conduct of the college youth of today. In the course of his lecture he gorgies thusly:—"My friends, the floors of hell are paved with champagne, automobiles and chorus girls." At this crack a well known Rose senior stands up, gleefully waves his arms aloft and chortles, "O death, where is thy sting? Hot rocks! Let's go!" He broke up the show.

Finals were over on Saturday morning, and at noon the lid flew off and "Rush Season" started commencing on all six. "Rush Season" is the correct name. The fraternity men rush hither and yon riding herd on the Freshmen, while the Freshmen rush from all directions in the hopes of nailing a bid from the gang they like. It's sorta nice, though. After you have been razzed, paddled and frowned upon all term, it sure is great noise to have the upper classmen act courteous and tickled pink to see you. And, to continue, Saturday afternoon Lefty Clark picks my roommate and ME and takes us to the Hipp, where we exercises our eyes on some zippy chorus acts (censor's hand falls heavy here). After the show, Lefty harks as how it's almost time for chow so we climb into his "Superlative Six" and rides out to the IK MIK OIK house. There I shove my dogs under the swellst looking dinner table that I've seen for quite an eon, so yours hungrily starts nutrifying himself while the opportunity is excellent.

After supper I spent the evening playing everything from billiards to Ma Jonk, with bridge and the piano included. Pete, me boy, I enjoyed that evening more than a moonlight petting party. The "IK MIKs" (they call 'em that for short) are a flock of real live wire entertainers.

In the next few days I has dates with the "KO SINE ALPHAS" and the "HOO SLUNGS MOOs". The ALPHAS are a plenty good outfit but I've got a cousin in their frat. Pete, cruel experience has brang home to me that it's unprofitable to live near a relative if you've got anything worth borrowing. The "HOO SLUNGS MOOS" are well worth a man's while but when I was introduced to their Senior House-man, I recognized him as the same guy to whom I owed a twenty-dollar poker-debt. Pete, you'd have done just what I done. I left early and banished the MOOs from my troubled mind.

Rush season was over yesterday, so I'm obligated to the IK MIK OIKs for my being their pledge.

The cost of living at the house is moderate compared to my grasping landlady (she got darn little outa me!) and the IK MIKs say they will board me free during initiation week. They all laughed hard when they said it, but I believe they really mean it.

Your's as a friend and an IK MIK,

BILL.
Although Professor Snopfarthy has spent some time and effort on an attempt to translate the subject matter of the book, he has, as yet, been unsuccessful. The nature of the characters used suggests the English language of the early ages, but the words are absolutely unrecognizable. The only theory that has thus far been advanced is based upon the fact that the subject matter is headed "ENGINEERING ENGLISH." It is conceived that the ruins are those of a prehistoric school of some sort and that the volume may have been an old copy book—the first attempts of some adolescent student to master the chirography of the language. A few excerpts are published:

A.B.—n.—any one addicted to excess study.
Ax.—n.—weapon used by Profs on YOUR grade.
Bearing—buster—n.—an undergraduate. mechanical.
Dynamite—n.—hip tea, cough syrup, blonde-donkey.
Eskimo—n., (fem)—a cold potato, a "nice" date.
Ditch-digger—n.—any civil engineer.
Fritz—v.—to put the skids under, to flivver or flunk.
Gas-chariot—n.—A flivver coupe.
Hay—v.—to snooze, to rest with Morpheus.
Ice-breaker—n.—the one in the party who starts the necking.
Irish race track—n.—jazz emporium, struggle palace.
Kitty—n.—any money-raising attempt.
Mean-mamma—n.—a hot rock, an affectionate flapper.
Shekel—n.—one buck, eight bits.
Struggle—v.—to dance, to strut one's stuff.
Sheik—v.—to act sentimental, masculine of "to vamp."
Slumber party—n.—the Student Assembly.

Whatever your "Choice of a Career," college training has increased your economic value, and whatever business or profession you enter, adequate life insurance is a proper self-appraisal of your powers in that direction.

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LIFE INSURANCE COMPANY
of Boston, Massachusetts
ATHLETICS
(Continued from page 8)

13—ROSE, EARLHAM—17

On January 25, the Quakers defeated Rose in a hard struggle, the score, all the way through, showing the excellent defensive game demonstrated by both teams. Rose led at half time, being on the long end of a 5-4 score. Wallace starred for Earlham, while the widely touted Huntsman was held to one goal. Captain Skeeters, Watson, Schoonover and Dowen all played well for the Engineers.

LINEUP AND SUMMARY

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14—ROSE, LOYOLA—24

After holding Loyola to an 8-8 score at the half, Rose lost to the “Yellow Jackets” by a ten point margin on February 2. Rose was off on goal shooting, but played an excellent defensive game. Captain Skeeters starred for the Engineers, while Schoonover was also a bright light. Shelock was the outstanding player for the lake-side team.

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BETTER LIGHTING NEEDED IN INDUSTRIAL PLANTS.

In a paper read before the Illuminating Engineering Society, February, 1920, entitled, "A Survey of Industrial Lighting in Fifteen States," R. O. Eastman submitted some very interesting data regarding the lighting conditions in industrial institutions. The survey comprises some 446 institutions, in which lighting was considered by 55.4% as being vitally important, and by 31.6% as being moderately important, and by 13% as being of little importance. Practically 58% considered that lighting was as important as power in the operation of the plant, and a small proportion would give more attention to lighting than to anything else.

In considering the present condition of lighting as found in the various plants, only 9% ranked as excellent, about ½ as good, 29% fair, 3.5% very poor, and 7.8% partly good and partly poor. It was found that the lighting in the offices was far superior to that in the shops; 19% being excellent, 36% good, 31% fair, and only 13% poor and none very poor.

On consulting the executives regarding what factors were most important in considering lighting, the following facts were revealed: Increase of production 79.4%, decrease of spoilage 71.1%, prevention of accidents 59.5%, improvement of good discipline 51.2%, and improvement of hygienic conditions 41.4%. Manufacturers who have good lighting appreciated its value largely from the standpoint of its stimulating effect upon output.

There is no question that any intelligent man who carefully considers the necessity for good lighting in an industrial plant, will agree that it is impossible for a person to do as good work, either in quality or quantity, in poor light as in good light, but yet the result of a careful analysis discloses the fact that only about 40% of industrial plants are furnishing good light to their workers and 60% are operating under poor lighting. It is hard to understand why such a proportion of concerns can be satisfied with a condition which is universally admitted to be a curtailer of efficiency and a prolific causer of accidents. The principal cause of this condition is that those in charge of such establishments have not given the attention to lighting that it demands. They do not know what constitutes good lighting, and in their absorbing interest of other factors of production have overlooked a vital one.

Every safety official should deeply interest himself in the lighting of his plant and insist upon good lighting as much as good goggles, good guards and other necessary accident prevention equipment. Every production manager should insist upon good lighting because the efficiency of the working force is increased by the condition of the lighting furnished. The plant physician should examine the lighting, for eye strain and eye fatigue are directly affected by poor lighting, as is the hygienic condition. Well lighted plants are invariably cleaner than poor lighted places. Plants equipped with Factrolite Glass in all windows are well lighted.

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Mechanical, Electrical, Civil, Architectural and Chemical Engineering
ALUMNI NOTES
(Continued from page 7)

Special occasion was offered on Friday evening, January 11th, for the dedication of our new chapter, namely the visit of President Wagner to Schenectady. This was the first time that a member of the Faculty ever made us a visit and it is hoped that other members of the Faculty can arrange to visit us from time to time. President Wagner had many interesting things to tell us about school.

The by-laws were drawn up by Mr. H. J. Madison '10, and following the talk by President Wagner, they were presented to the chapter. Mr. H. C. Uhl '12, was elected president.

The complete list of members follows:

E. G. Waters, '88  G. W. Evans, '16
A. H. Moore, '88  C. W. Falls, '18
E. E. Gilbert, '89  J. A. Wildermuth, '18
W. J. Davis, '92  A. Yatsko, '18
H. E. McDermott, '93  G. Henry, '18
S. E. Johannesen, '93  C. W. Schroeder, '21
G. H. Pfeif, '05  O. E. Conever, '22
W. O. Hensgen, '06  C. B. Wilson, '22
R. S. Page, '07  R. Bennet, '23
O. G. Whitecotton, '07  E. Brown, '23
H. J. Madison, '10  R. Hager, '23
H. C. Uhl, '12  R. D. Wright, '23

Mr. S. E. Johannesen, '93, is located at Pittsfield, Mass., and Mr. I. R. Weir, '21, is temporarily engaged in radio construction work in Central America.

C. W. SCHROEDER, Secretary.

Frank J. Frisz, '10, and Samuel Finkelstein, '15, have bought, and are operating, the Alemite Company of Pittsburgh.

Harry M. Leathers, '14, of Dingle Clark Company, Cleveland, has recently been made manager of the Pittsburgh office of that concern.

Rose men can well be proud of the new Sixteenth street bridge over the Allegheny river in Pittsburgh when they learn that a Rose man, Edward J. Ducey, '11, was the chief designer of the structure and was in charge of its construction.

For the above notes, we are indebted to Jay H. Overpeck, '16. We take this opportunity to thank him for the interest he has shown in the TECHNIC. Come again, Jay. We appreciate it.
THE DESIGNER OF ELECTRICAL APPARATUS

(Continued from page 6)

The Electrical Designer—His Work

Such a man is essentially a creator. In the order named, he conceives, plans, constructs, exploits. The newly graduated engineer, potentially endowed though he may be with all the desirable qualifications herein enumerated, is not yet a designer. He has yet to become acquainted with the state of the art by a study of fundamental reasons governing present designs, he must acquire skill in calculation to be able to evaluate results and to develop his judgment, he must study manufacturing methods and limits; in short, he must as quickly as possible catch up with the procession and equip himself to contrive his share to the progress of the art. Nothing will do more to develop the designer than experience and this experience must carry its share of responsibility. Almost anyone would make a fair sailor in calm seas, but when the storms come with their varying conditions the resourcefulness of the navigator is then truly tested. So it is with the designer, passing through one storm qualifies him to deal better with the next one, even though it is likely to be a gale from a different quarter.

The Designer of the Future

Some of the men in school today will be the designers of tomorrow. After viewing the progress of recent years in design, somebody may be tempted to ask if we are going to need designers tomorrow; if the larger problems have not all been solved. The answer, based on a knowledge coming from an intimate contact with design work for many years past, is that there are new and greater design problems presented each year. Some of the reasons back of the design problems now facing us are the following:

(a) The growth of centers of the population, with the consequent need for concentration of power in the cities. This required the construction of gigantic generating units and distributing stations, with new problems in switching, control and protection of circuits.

(b) The inevitable growth in transportation requirements for the country which requirements double about every twenty years. Electrification of the railroads—already started—is eminent, and will involve unprecedented construction and equipment.

(c) The growing demand for greater production of the worker in industry: This takes the form of shorter working hours which can be successfully put into operation only by the introduction of labor saving machinery.

Also, progress must involve legislation or regulation requiring safety from physical harm to the worker in the operation of all forms of electrical equipment. This requires that motors be designed to protect workers from accidental injury and that automatic control be installed to protect against accidents due to acts of carelessness or ignorance.
(d) The growing percentage of power load in central stations is emphasizing the low power factor on such systems and is calling for the design of higher power factor utilization apparatus and of power factor correction apparatus.

(e) The aftermath of the world war has brought many nations to the verge of bankruptcy and foreshadows an era of keen competition for world markets. This emphasizes the necessity for designs that can be economically built.

(f) In all of the foregoing cases and many others, including the main generating, transforming, and utilization units, there must be supplied switching, control, protective and metering equipment, the requirements for which are constantly changing, thereby keeping the designer always alert.

An attempt has been made to give some conception of design as a vocation. Although it may appear to many from the outside that this conception of design as a vocation presents a rather prosaic picture, yet from the inside—to the true design engineer—the reality is intensely interesting and genuinely fascinating. To see the products of one's thought and work take shape and then go into useful productive service, resulting in economic gains to the work, gives a sense of satisfaction and achievement that goes far toward realizing one's ambitions.
To all forwards who are playing center

"The little fellow hasn’t got the reach. Why don’t they put him at forward where he belongs?” You have heard comment like that about some mis-positioned player.

Just look out they don’t talk that way about you—not in athletics but in your field of work after college.

The world is full of doctors who should have been lawyers, and lawyers who should have been writers—men who can’t do their best work because they haven’t got the reach.

You still can avoid their haphazard choice of a career. Some earnest thinking on the subject, “What do I really want to do in life?” will help you decide right.

That’s a real problem. Get all the advice you can—from the faculty, from alumni, from men in business. If you find you have made a false start, change now and save yourself a lot of grief—for once you graduate into a profession, the chances are you’ll stay in it.

Western Electric Company

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few Shirts and Ties

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Something Happened in 1891

What Engineering Owes To Sound Principles

Perhaps no phase of electrical development is more fascinating than the events leading up to the practical use of electricity as the motive power for street railway transportation.

It is a story of “midnight oil”, hard thinking, extreme perseverance. No better example of the value of sound principles to present day engineering could be cited than the Westinghouse No. 3 Motor, as introduced in 1891.

Its design was so fundamentally correct and the details were so soundly worked out that subsequent developments of railway motors all followed the principles embodied in it. Now let’s see what bearing this has had on modern transportation.

In 1700 the first permanently fixed rails made their appearance. In 1831, in New York, horse cars began operation. In 1834, after fruitless attempts to apply steam, compressed air, gas, etc., to these cars, a Vermont blacksmith, one Thomas Davenport, suggested that electricity be used as the motive power. The very first practical commercial dynamo, built by Gramme, in 1862, made this suggestion a possibility.

It was natural that George Westinghouse, with his intense interest in transportation, should take up this problem. From 1889 to 1891, he, with his organization, worked continuously to perfect a commercially practicable railway motor, and the famous No. 3, daddy of all street railway motors, was the result.

As mentioned before, the principles embodied in the No. 3, thirty-two years ago, are still in use, and at least ten prominent features of this remarkable motor are to be found in present-day types. A number of these early motors are still in operation—a tribute to sound engineering principles.
"In Terms of the Colossal"

The co-ordination of commercial strength, architectural vision and engineering skill which created this titanic quadruple office building represents the motive and creative force which has turned the eyes of the world toward this type of American architecture.

This, the largest office building in the world, possesses fundamentally magnificent largeness in its conception, and a clean-cut directness in its execution which place it among the most significant of American buildings.

With such existing structural achievements no architectural future is impossible, no project too vast or too complex to come readily to our imagination.

Certainly modern invention—modern engineering skill and organization, will prove more than equal to the demands of the architecture of the future.

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