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Rose-Hulman Institute of Technology

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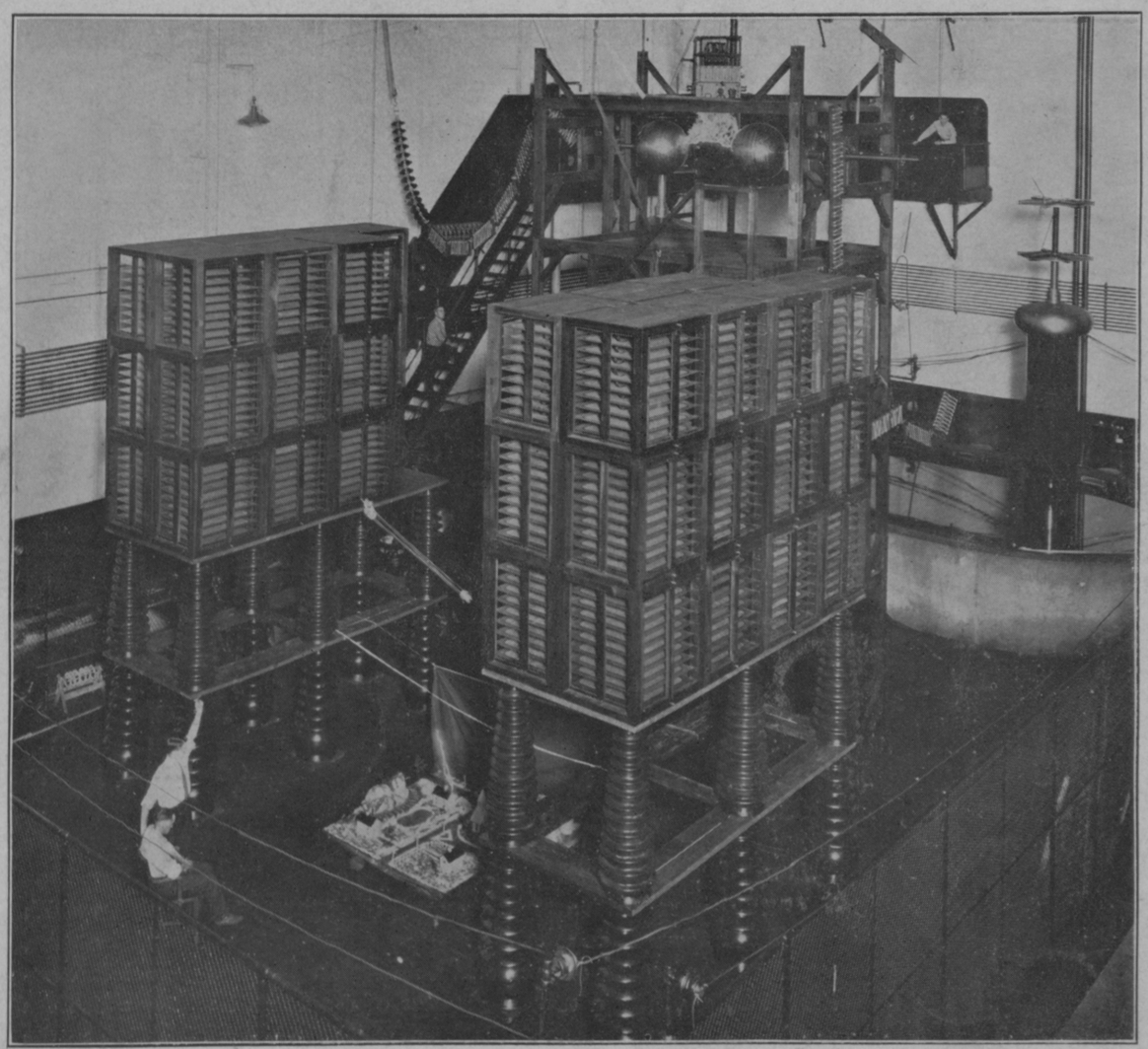

The Two-Million Volt Lightning Generator
(See Page 4)

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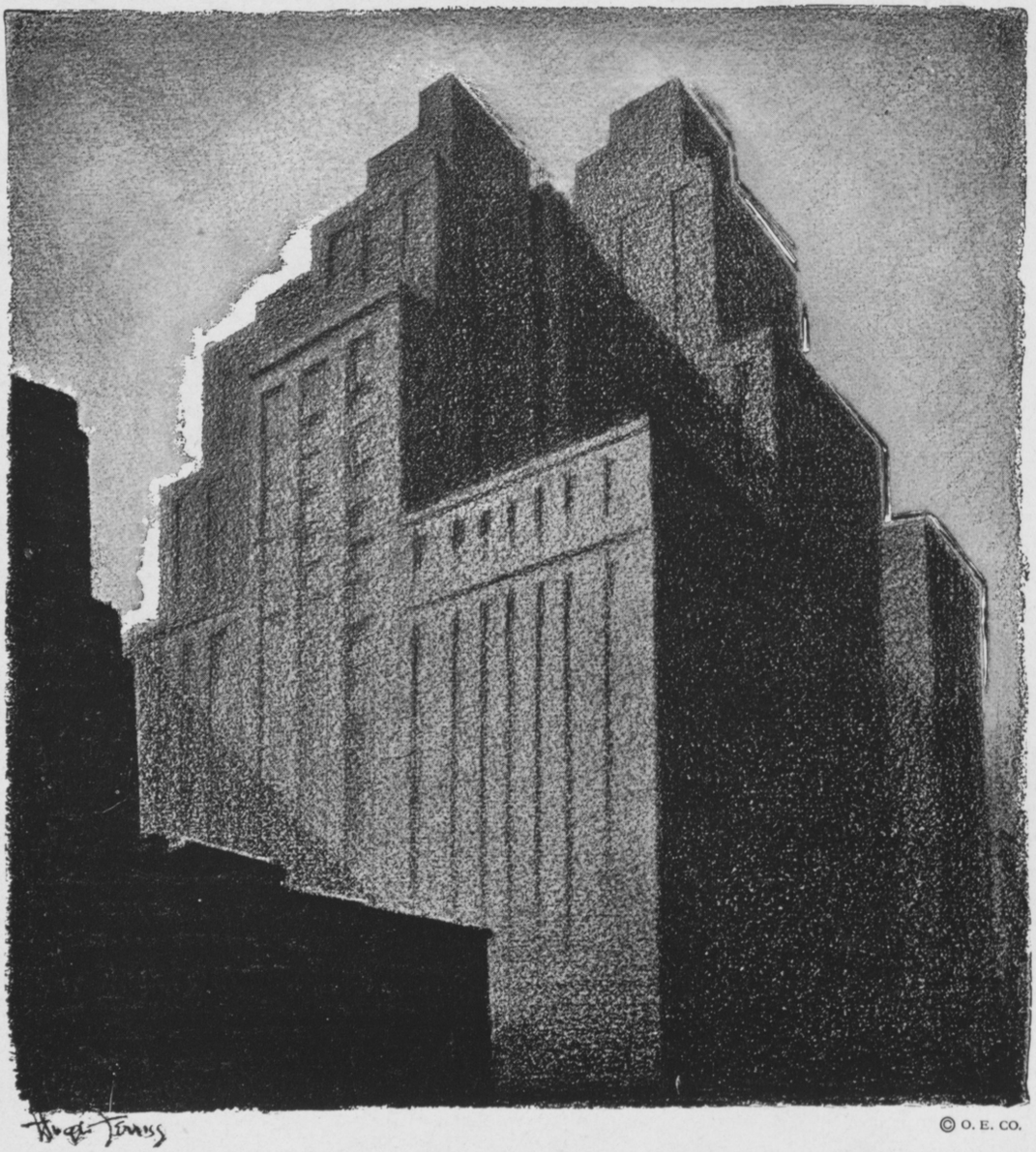

The Garment Center Buildings
New York City
WALTER M. MASON, Architect
Drawn by Hugh Ferriss

"Towering Masses"

HERE the new architecture expresses itself in great vigorous masses which climb upward into the sky with a pyramidal profile—gigantic, irregular, arresting. An earlier, conventional building on the near corner is overshadowed, engulfed in towering masses of the newer building which are prophetic of an architecture of the future which is vividly stimulating to the imagination.

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

O T I S E L E V A T O R C O M P A N Y

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THE TECHNIC

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PROF. LESLIE F. VAN HAGAN, Chairman.....University of Wisconsin, Madison

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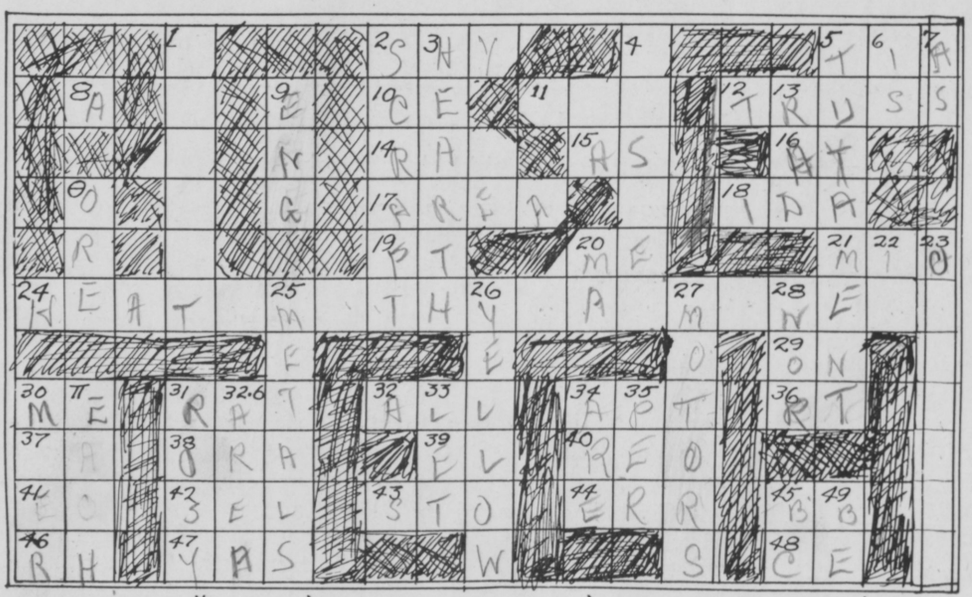
Summary of Contents

Try and Crack this One



HILLIS '27 + ITEHDE '28. + SISSON '26

VERTICAL

1. Column.
2. To have been junked.
3. Part of a fire-place.
4. Method.
5. Defence (Military).
6. Part of verb "to be."
7. Like.
9. Snap (?) Course (Abr.).
13. V (Abr.)
20. Parent.
23. Base.
25. Used in foundry.
26. Green minus blue.
27. Electrical machines.
28. Neither
30. Soldier of Fortune.

Pi Third Degree

Theta Studied in Minerology

31. Our swimming mascot.
32.6 What Civils try to find.
33. Permit.
34. Form of to be.
35. By (Latin).
45. Previous to Christian era.
49. Exist.

HORIZONTAL

2. Engineer's weakness.
5. Aunt (Spanish).
8. A rarity in calculus.
10. A course (Abr.).
11. A layer.
12. Support.
14. 57.3° (Abr.).
15. Like.
16. Near.
17. Part of a circle.
18. Girl's name.
19. Measure (Abr.).
20. Ego.
21. My (Span.).
24. Strongest Base (see "Holmes").
29. Atop.
30. Pronoun.
31. Pernicious animal.
32. Everybody.
34. Likely.
36. Hindu diety.
37. Synonomous to 'Aitken'.
38. Boy's name.
39. Definite article (Span.).
40. "The Gold Standard of Values."
41. College degree (reversed).
42. Salt (French).
43. Pres. Ind. of "To Stand" (Latin).
44. "Doc." Sousley Doesn't.
45. A size of shot.
46. Radio ham (Abr.)
47. Ethiopian for Uh-huh.
48. Same as No. 10.

The Reserve Officers Training Corps

Wm. W. Bessel, Jr.

Second Lieut., C. E. (D. O. L.)

THE UNIT of the Reserve Officers Training Corps at Rose Polytechnic Institute is enjoying the sixth year of its establishment. The Reserve Officers Training Corps idea is an outcome of the lessons learned from the unpreparedness which was manifest during the recent war. Switzerland, surrounded as she was by foreign countries, learned this lesson years ago and has had military training in its schools. Modern inventions, such as the aeroplane, dirigible, radio, and long range guns have indicated that the United States is in little better situation than Switzerland despite the width and breadth of the seas. As a consequence, Congress, in the National Defense Act of 1916 as further amended on June 4, 1920, provided for the establishment of units of the Reserve Officers Training Corps in certain selected institutions throughout the country. Rose Polytechnic Institute was one of the first to have such a unit established.

The purpose of the R. O. T. C. are, first, the inculcation of basic military principles in **all** the students of the institution in which the unit is established, giving them a knowledge of tactics, military law, and discipline, and the handling of large bodies of men; second, training and developing certain **selected** students for commission in the Officers Reserve Corps. The first is accomplished by what is known as the Basic Course in Military Science and Tactics, of three hours a week for the first two years for **all** physically fit students. This Basic Course is usually compulsory for all such students. The students are examined physically to determine their physical fitness. Students completing the Basic Course are thus sufficiently versed in military fundamentals to be of service in case of emergency.

The National Defense Act as passed by Congress provides for three components for the defense of the Nation. The first, the Regular Army is small, but continually in training for immediate action and ready to aid in training the other components. The second, the National Guard, also in training at least one evening a week, is provided as the second line of defense and has the secondary function of being subject to the call of the governor of the state in which established in case it is deemed necessary to maintain martial law or to quell riots, etc. The third and largest component for the defense of the Nation is the Organized Reserves, consisting of the Officers Reserve Corps and the Enlisted Reserve Corps. The Officers Reserve Corps is maintained at an adequate number through graduates of the R. O. T. C., units such as the local unit at Rose, and through the graduates of the Citizens Military Training Camps. The Citizens Military Training Corps camps are held for one month each summer all over the Nation. In order to attain a commission as a Second Lieutenant in the Officers Reserve Corps through the C. M. T. C. it is necessary for the student to pursue these courses for four summers. Each summer's course is a continuation of the subjects covered the preceding summer. The first year course is known as the Basic C. M. T. C. Course; the second year's course is known as the Red Course; the third, the White Course; the fourth, the Blue Course. Before entering on the fourth or Blue Course the prospective lieutenant must have served for nine months as a warrant officer or enlisted man in any one of the three components of the National Defense System. If the students successfully completes the four months of summer courses plus the enlisted service as outlined above he is available for commission as Second Lieutenant in the O. R. C. upon examination in the subjects pursued.

However, it is the Reserve Officers Training Corps that furnishes the majority of officers for the big Officers Reserve Corps. It will be noted that the second purpose of the R. O. T. C. as given above was the training of certain **selected** men in special military subjects to fit them for a proper place in this excellent system for the defense of the Nation. This is accomplished by what is known as the Advanced Course in Military Science and Tactics of five hours a week for the last two years of the student at the Institution. This course is elective at Rose Polytechnic Institute, but if elected, one credit of certain other subjects, as determined annually by the President, may be omitted, and Military Science and Tactics substituted therefor. The course is limited to those students who have indicated a required amount of proficiency in the Basic Course, who are interested in the defense of the Nation, who desire to take their proper part in such defense, and who are satisfactorily proficient in all their other subjects at the Institution.

The Advanced Course deals with special military subjects and completes the training of the student so that upon graduation he is sufficiently well versed in the principles of Military Science and Tactics to merit a commission as Second Lieutenant in the Officers Reserve Corps. Such a commission entitles the holder to the rank of a Second Lieutenant in the armed forces of the United States in case of an emergency, and does not in any way obligate the services of the holder during time of peace. It means an opportunity to the young man of today to be a "leader of men" in event of war instead of a "follow the leader." The students are quick to realize this opportunity as is shown by the remarkable growth of the R. O. T. C. since its inception. This commission as a Second Lieutenant in the O. R. C. is valid for only five years, but may be renewed by the holder on written application to the War Department. Once having been commissioned in the O. R. C. it is possible to gain promotion to higher grades by examination. This examination is held by a board consisting of other members of the Officers Reserve Corps and of the Regular Army. Under the present regulations for the Officers Reserve Corps an officer thereof may apply for promotion according to the following table of time limits, providing there is a vacancy in that grade for him at the time of examination:

PROMOTION	MUST HAVE SERVED
2nd Lt. to 1st Lt	2 years as 2nd Lt.
1st Lt. to Captain	2 years as 1st Lt.
Capt. to Major	4 years as Captain
Major to Lt. Col.	5 years as Major
Lt. Col. to Co.	5 years as Lt. Col.

Promotions to higher grades are by selection.

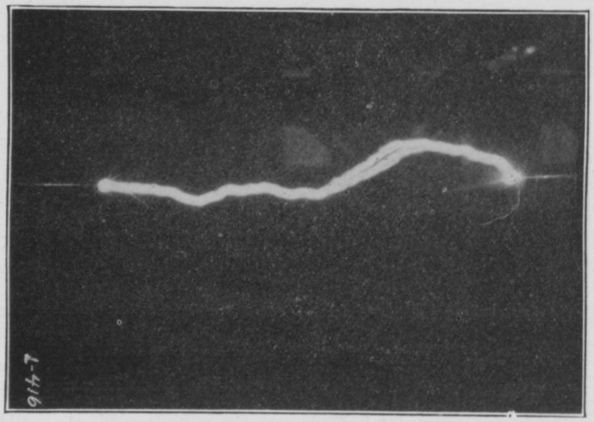
Mainly, then, the purpose of the Reserve Officers Training Corps idea is to furnish through its graduates a great supply of trained officers, men in whom military fundamentals have been ingrained, and who are capable of serving as officers in their grade, in the event of war. Thus the Nation will do away with the costly necessity of training officers and men while war is actually in process, with the consequent need for more speed than thoroughness as evidenced in the late war.

The Unit of the R. O. T. C. at Rose Polytechnic Institute is an Engineer Unit. In other schools there are Infantry, Cavalry, Artillery, Air Service, Chemical Warfare Service, Medical and Dental Units. Graduates of the schools are commissioned in the branch for which trained. The Advanced Course at Rose, therefore, deals chiefly with engineering subjects, all of which are extremely valuable to the civilian engineer. Although the problems are given from a Military viewpoint the principles involved are those of present day engineering practice. The military subjects are linked, if possible, with the subjects being studied in other departments of the Institution. The course in Bridges as given in the Military Department in the Junior year links in very well with the course in Applied Mechanics held currently. This course covers wooden beams, stringer bridges, I-beams, wooden trusses, steel trusses, and floating bridges. The course in fortifications is a corollary to the earthwork in railroad problems in civil practice. Similarly military railroads hinges upon civil practice. Military explosives and demolitions deals with mining, the care and use of explosives, calculation of charges, etc.—all valuable to the civilian engineer. Military roads gives the student an insight as to the importance of this work in modern warfare and at the same time impresses the need of thoroughfares for present day traffic and commerce.

Last and most important of all, it may be said that the self confidence and ability to handle bodies of men which the Advanced Course gives the student in drilling the companies, platoons and sections of the local Battalion on the drill field, with its consequent impression of the necessity of discipline and organization in any operation, is of inestimable value to the future engineer. The handling of men successfully is one of the most important of the many things which an engineer is called upon to do..

The Unit at Rose Polytechnic Institute was established as such March 8, 1919 and has enjoyed a remarkable growth since that date. Due to the reaction which followed the War its growth at first was slow but since 1922 has taken a big jump. In 1922 only two student were enrolled in the Advanced Course, whereas there are now 35 enrolled. The Class of '24 with twenty-four graduates furnished the greatest number of Second Lieutenants in the O. R. C. since the establishment of the Unit, and the Battalion is still growing.

And this growth is not only local but national. In 1923-24 there were 336 units at different Institutions throughout the country of which 21 were Engineer units. The total enrollment was 115, 357 with 11,056 in the Advanced Course. Of these, the seniors, 2,883 were commissioned. The approtionment for 1924-25 is 5,659 or nearly double that number and indications are that it will be easily reached. In this Corps Area alone the enrollment has increased over a thousand and the total enrollment for the Nation has increased 10,147 with a 2,404 increase in the Advanced Course. The latest institution to add the Engineer Reserve Officers Training Corps to its curriculum was Pennsylvania State College.



Lightning is electrical "dynamite". This shows an arificial stroke from the 2,000,000-volt lightning generator on front cover.

Lightning

Summary and conclusion of the lecture deldelivered at the Franklin Institute Centenary by F. W. Peek, Jr., A. B., M. E. E., who is in charge of the high voltage experiment laboratory at the Pittsfield works of the General Electric Co.

Lightning Research

A study of lightning is of scientific importance because there is manifest in the flash the dynamic effect of the electrons and ions, the elemental bricks of which, it is believed, all matter is made; it is of engineering importance because an exact knowledge of the characteristics of lightning will make it possible to protect life, buildings, powder magazines, oil tanks and transmission lines against it. The ideal method of making such a study is by observations of natural

lightning in the field and researches with artificial lightning in the laboratory. This lecture is a report on such a combined study.

The artificial lightning was obtained by means of the author's lightning generator which supplies 2,000,000 volts at an energy of 2,000 watt seconds. The power may be several million kilowatts or horse power. The character of the discharge is similar to that of natural lightning. The destructive effects are also similar; fires may be set, metal conductors made to disappear, wood may be blown apart, discharges in water or oil may produce explosive results, etc.

The experiments with natural lightning were made in the mountains o fColorado and elsewhere. The conclusion from this study are as follows:—

The Voltage, Energy and Character of Lightning

A thunder cloud discharges to earth when the voltage along the discharge path is about 100,000 volts per foot. The effect of the thunder cloud is not local, but the atmosphere becomes electrified for a considerable distance. 32,000 volts for each foot above ground may occur at a quarter of a mile from the flash; 12,000 volts at a half mile and 3,000 volts at a mile.

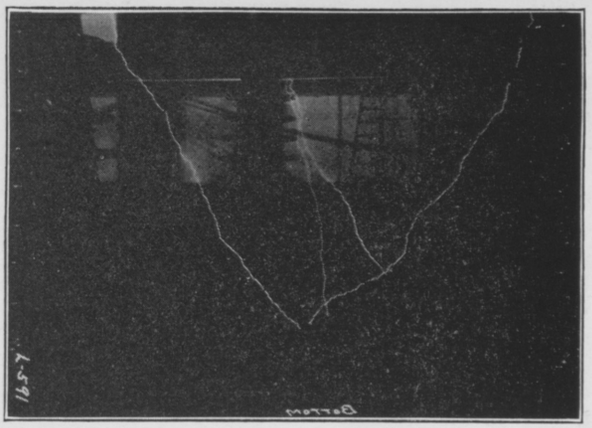
When the flash occurs, current flows from the cloud to ground and the potential of the cloud becomes zero in a few micro-seconds.* The cloud may become charged in the opposite direction at a lesser voltage a few micro-seconds later and so on. This is called an oscillatory discharge. Most discharges seem to be non-oscillatory or impulsive. The electrical energy is changed into heat, light, sound and chemical energy. The chemical changes take place in the path of the discharge. The oxygen molecule is split up and partly recombines as ozone. Nitrous oxides are also formed as well as nitric acid in the presence of moisture. Along the discharge path are untold numbers of electrons and ions moving at enormous velocities. It is a matter of speculation whether this intensive ionic bonbardment of the oxygen and nitrogen atoms transmutes some of them into helium or hydrogen.

The voltage of lightning is of the order of 100,000,000. This is about one million times the voltage of the ordinary lighting circuit or one thousand times the voltage of very high voltage transmission line. The current may be 80,000 amperes and the energy 13,500 Kw/seconds or 3.8 Kw/hours. The energy is sufficient to operate an automobile about five miles or an electric toaster for a day. Since this energy is dissipated in a very short time the power may be several thousand million kilowatts or horse power. The effect is thus explosive and destructive.

The voltage was arrived at by researches with artificial lightning on models of clouds, etc., built to scale. This voltage measurement was described in a lecture before the Institute last year and caused considerable interest. It has since been further confirmed. It may be of interest to point out that the voltage of the lightning generator is about 2 per cent and the power about 2 hundredths per cent of natural lightning. This practically corresponds to the lightning energy that appears on transmission lines.

Voltage Disturbances on Transmission Lines

A lightning flash in the vicinity of a transmission line may cause dangerous voltage on the line. The line is very seldom directly struck, but the effect is generally by induction. The line, as well as the atmosphere around it, becomes electrified by the cloud. The charge on the line is released when the cloud discharges to ground. The voltage on the line reaches its maximum at about the time the cloud voltage reaches zero. The line voltage becomes equal to the voltage of the atmosphere above ground at that position in space just previous to the discharge but of opposite sign.



Artificial lightning striking a model transmission line during a study of direct strokes.

The maximum voltage induced on the line is one or two percent of the cloud voltage. The energy is of the order of 1350 watt/seconds. The character of the discharge is generally impulsive and reaches its maximum in a few micro-seconds. In fact, it corresponds closely with the discharge from the lightning generator in voltage, energy and duration. The maximum possible voltage on any line can be found by multiplying the height of the line in feet by 100,000. Thus by "wireless" action 1 to 2 percent of the voltage and 2 hundredths percent of the energy is of a lightning flash can appear on transmission lines several thousand feet from the clouds. These maximum conditions rarely occur on transmission lines.

A lightning disturbance travels over the line at the velocity of light and is dissipated to a considerable extent by losses; it may double in value when it strikes the end of the line where it starts back. If the voltage is high enough it may break down insulators or discharge over an arrester. If no break occurs, it is eventually dissipated by losses.

A grounded wire placed near the line conductors reduces lightning voltages on transmission lines to less than half. Several ground wires reduce the lightning voltage still more. The ground wire is also a good protector against direct strokes.

The strength of the insulation of lines operating at various voltages was determined by measurements with artificial lightning. By comparing the insulation strength with the maximum lightning voltage the ability to withstand lightning was determined.

The insulation of transmission lines is increased with the operating voltage. The higher the operating voltage the better able the insulation is to withstand lightning voltage. The exact voltage where danger from lightning disappears varies with conditions but in general there will probably be little trouble on 220 KV lines. Special precautions must be taken, however, to cause the lightning voltages to divide evenly over the apparatus.

*micro-second equals a millionth of a second.

Where Lightning Strikes and Chance of Being Struck

Researches in the laboratory show that lightning from a cloud over head does not always strike the highest object or rod unless the height of that object is over 2.5% of the cloud height. The division of hits is about equal between cloud and ground when the rod is 1.1% of the cloud height. The chance of being hit is less when the cloud is not directly over head. Lightning either strikes the rod or some distance away. There is a protected area around the rod with a radius equal to four times the height of the rod where no ground hits occur.

These researches show that a man standing directly under the storm center would be hit fifteen times out of a hundred strokes, while a man flat on the ground would be struck about once in one hundred strokes. A 25-foot building would be struck every time. The chance of a thunder cloud of sufficient voltage to cause a discharge being over any particular object is small. The chance of any particular object being struck is thus generally very small indeed.

The lightning rod seems to be of real value for the protection of buildings. Except for buildings in exposed positions or in special cases, as magazines, the cost of a rod unless it is quite low, is not warranted from the standpoint of the cost of insurance.

Under certain conditions lightning may cause sparks within metal tanks.

Higher Education Becomes Higher

Higher education is becoming still higher. Tuition at Princeton, Harvard, and the University of Nevada has made a skyward leap, to take effect next fall.

PRINCETON: The yearly tuition has been raised to $400.00 for the year.

HARVARD: In the College, Engineering School, Graduate School of Arts and Sciences, and Law School a $50.00 increase in the tuition fee will be levied beginning in the year 1925-1926. The fee in these schools will be $300.00, excepting the Law School, where it will be $250.00.

UNIVERSITY OF NEVADA: Because of the great number of outside students that flock to the university, the tuition for non-resident students is to be raised from $50.00 to $75.00. This was done to keep non-resident students from crowding out residents, also to provide for new instructors and equipment.—The New Student.

"Ku Kluxing" the Freshmen

The sophomore diversion of Ku Kluxing the freshman has been abolished forever from the campus of the University of Utah. Students and faculty united in formulating the resolution, "That tubbing, kidnapping, and raiding and similar hazing activities, dangerous to property, health, and person be abolished."

The Dean's council and faculty commended the student body and committee for their action and recommended a rewriting of the constitution of the student government giving freshmen equal rights with others on the campus.—The New Student.

Loyalty

Dr. Frank C. Wagoner

A SENTIMENT that good scholarship is not essential to success in later life is always more or less prevalent in the student body. It is not difficult to point to alumni who were not conspicuous for good scholarship when in school, who have been highly successful in later life.

There is an element of truth in this sentiment, and one that is recognized by men who are charged with the selection and promotion of men in business organizations. It is that other qualities in addition to mere brain power are large factors in determining the value of men to an organization.

One of these qualities is loyalty. Men are being rated on loyalty as well as on scholarship, honesty, initiative and other qualities when applying for a job.

A spirit of loyalty is natural for most people. It may be cultivated or it may be weakened by the attitude we take toward our fellows. It shows itself in early life. A boy may talk back to his parents in a very disrespectful manner. But let anyone else speak disparagingly of the boy's father and he is likely to have a fight on his hands.

Loyalty to a group is a sentiment that appeals strongly to most boys. The gang is the center of interest at a certain stage in the normal boy's life. Later it is the school, and the boys shout themselves hoarse in support of their football or basketball team.

The opposite spirit, not necessarily active disloyalty, but indifference or simply lack of loyalty, exhibits itself in the habit of continually finding fault. There is no sense of responsibility for the success of the organization as a whole. It is always somebody else's fault that the athletic team fails to win. If our particular friend had been chosen for the team instead of some other man who had a pull, things would have been different. We do not care to go to the games if our friends are not in it. Our loyalty, such as we have, is confined to a very small group. Sometimes the group consists only of oneself.

In business life, after school days are over, the same habit of mind prompts us to imagine that we are being discriminated against. We are not appreciated. We are not paid as much as we should be. If we do not accomplish as much as is expected of us, it is always because we were not supplied with the latest and best equipment. In other words, our principal concern is about ourselves and not about the success of the work in hand or the organization for which we are working.

Loyalty to the institution for which we are working has a distince value and in the long run it will be appreciated. If we stay after hours to attend to an urgent matter,—if we take pride in holding up our particular part of the work,—if we rejoice in the success of the entire organization,—then, not only are we worth more to our employer, but we have joy and satisfaction in our life's work.

It is probable that most of the graduates of ROSE will work for large corporations. Either life will be merely a treadmill of work to obtain the wherewithall to support ourselves and our family, or the company for which we work will be **our company** in a real and vital sense, and we will work loyally for **its** success. Which shall it be?

Die-Casting—A New Era in Production

Milton E. Feldstein, '25

A simple description of a new casting process due to revolutionize modern production records.

DIE-CASTING is a relatively new process in industry. With the advent of big production methods and the necessity of quantity with a maximum of quality, especially in the production of small castings, came a demand for a process such as the modern die-casting process. Sand casting is a slow and tedious process at best, and production is slow. Again, if there is any machine work to be done on the cast piece, it has to be sent through the machine shop after it passes from the foundry. Often the finished castings have "blow holes" in them due to imprisoned air. Many small parts used in automobiles, electrical and household appliances, adding machines, and other production-process articles use small castings made of aluminum, zinc-base, and lead, and tin-base alloys. These are low fusion-point metals. Then came a method for die-casting these in huge quantities. This process gives a smooth, uni- from casting, and eliminates completely the necessity for a lot of intricate machine work. Casting orders in lots of 100,000 are a necessity in order to make the process a commercial success, due to the initial heavy expense in making the dies and special machinery.

The modern method of die-casting dates back to the Mergenthaler linotype machine. With this machine, metal was passed through apertures as small as .0003-in., and a clear sharp casting was made in a steel die. This was beyond the wildest dreams of the sand caster. Die-cast aluminum, by for the most used metal in this process, is a denser, more ductile, and stronger metal than that cast in sand, and is but 30 per cent less in strength than cast iron. The following test data illustrates this:

	Die Cast	Sand Cast
Uutimate tensile strength.....	25,000	20,000
Per cent elongation in 2-in.....	3.1	1.7
Specific gravity	2.87	2.84

The right metal mixture must be obtained to make a successful die-casting, and for this purpose expert metalurgists are employed. An alloy of zinc has been developed by a world famous casting company that is far better than the cast bronzes on the market, being stronger, firmer, and having a better bearing surface when die-cast.

A die-casting is a casting produced by forcing molten metal into a metallic die by a force greater than atmospheric pressure.

There are two distinctive types of die-casting machines—the plunger type, and the compressed air type. Compressed air is instrumental in the operation of both types, but is only secondary in the operation of the former. This is simply a general classification and the following description of the two types is also general.

In the plunger type, we have a cast iron container for the metal which is kept fluid by gas burners under the vat. In this container is submerged a secondary or cylinder chamber fitted with a plunger. There are two openings in this cylinder, one located at the side or bottom just at the end of the plunger when it is drawn back. The metal flows into the chamber by gravity, and the plunger completes its stroke forcing the molten metal into a steel die through a second hole, closing the first one in its travel. This force may be applied by steam, hand, or air. This process is best adapted for metals having a melting point of 800° to 900° F.

In the second type of machine, there is an air tight chamber which contains the molten metal and which is connected to the die by one opening and to the air line by another. There is a valve in the air line in order that the air supply may be cut off a sufficient amount has been admitted. Air pressure of 150-500 pounds per square inch is used, the air forcing the metal into the die.

The dies are made of low carbon steel for zinc-, tin- and lead-base alloys, and of chrome-vanadium steel for aluminum. These dies are very expensive, as they must be made by very highly skilled men and must be accurate to the highest degree. Some dies cost as much as $3000.00. Only men who have been trained in the art of die-making for a long period of time are entrusted with the machine work involved in making a die. Very intricate patterns are made in sections so that a mistake in one part of the die need not mean the discard of an expensive job.

As in sand casting, the dies are in two parts. The ejector die is the movable member, and the cover die the stationary one. Also, as in sand casting, cores are used, only in this case the cores are of steel, the same kind of steel as the die itself is made of. For castings of large mass, the dies and cores are water-cooled. These cores are operated by levers, or a pinion and rack, and are carried in the ejector die. The metal enters the die through the cover die. In back of the ejector die is an ejector plate that carries the pins to remove the casting. These pass through the die block to the ejector die in which the casting remains.

The design of dies requires a great deal of skill, as each job is a different problem in itself. Clearances, cores, drafts, and shrinkages must be figured in, and no mistakes are tolerated. All drawings are carefully checked before being sent to the die room.

Die-casting is getting to be more and more an automatic machine job, and the larger companies are always building and testing new machines. For casting parts that require little or no machine work, in quantity lots, this process has no equal and is the process that is due to revolutionize production. When a satisfactory way of die-casting cast iron and steel is found, it will certainly open the eyes of industry.

A New Meaning of School Spirit

John M. Barr, '25

THE ROSE Y. M. C. A. ls nearing the completion of a second year of aroused interest and activity, after a long period of war-engendered idleness. Through various types of social and campus work, every student has at some time or another come in contact with the Association and has been a recipient of at least some of its benefits.

Notwithstanding the facts of its general influence, the frequent reminders of its purpose, and the examples of student members bending their efforts toward a thoroughly constructive Christian program, comparatively few have availed themselves of the privilege of active membership, and consequently only too few are intimately acquainted with the basic principles underlying the work.

"Y Room" has become a byword with every student, and various services rendered by the active members of the Association are daily contributing to student welfare. The average student, however, takes these outward manifestations of an effective program not only as natural advantages created for his enjoyment, but considers it quite unnecessary for him to contribute any personal effort toward their success. Most unfortunately, he is generally oblivious to the fact that the Y, midst the sort of disinterest demonstrated by those like himself, is consantly endeavoring to carry out its purpose and program of direct application of the teaching of Jesus Christ to the solution of the many problems confronting campus life.

That the above statement may be made at this time is not only a serious indictment of members of the student body themselves but of the officers of the Association. On the part of the student body, it indicates a lack of understanding of fundamental principles of life or an unwarranted antagonism toward anything of a religious nature. With the officers, it shows that their efforts toward making the Y what it should be have been carried on with too little zeal or have been improperly directed.

Those students who have learned the Y. M. C. A. in the true sense are not, for a moment, inclined to feel that the last two years' work has been without spiritual as well as material good results. They believe that, although little has yet been done in the line of evangelism or active religious work, a foundation has been laid for these necessary parts of a proper program. The unselfish efforts of a score of students who have devoted time and effort to the success of what has been accomplished form a basis of service, reverence, and love for the greatest of all causes, that of Christianity, and upon this basis depends the future success of the Association.

It is now time that the Association take an unequivocable stand against those campus customs or student attitudes which it does not believe to conform with the spirit of Christ's teachings. It is only by doing this that the Association may distinguish itself from other campus agencies supposedly created to better student life. This stand will make itself evident through the consecrated and concerted efforts of members in their natural groupings.

From its inception in the minds of men who are now among the world's greatest leaders to the present day, when the work is going on in every field of work and covering the entire United States and many other nations of the world, that part of the movement as the College Young Men's Christian Association has been recognized by most Faculties and school administrators as the one organization that must take the initiative in student reform and maintaining an active religious program upon the campus. In this respect, the Rose Y has lost its power and influence to a degree, the regaining of which, while having been the purpose directing the officers in the last two years, must now be taken into more earnest consideration by the active members themselves.

Attempts have been made to begin general discussion and solution of such problems as that of the social fraternity, dishonesty, loyalty, religious duty and activity, international and inter-racial relations, new student work and other no less important problems. The announcement of some problems has sometimes resulted in nothing more than the overwhelming of members with its scope and difficulty of solution, indicating a dearth of students who are willing to work out for themselves the problems which are most effecting them, as well as a shortage of leaders who are willing to stand out against the crowd as supporters of the truth.

It is hoped by the present officers that even in the few months remaining in their stay in office, the stand of the "Y" on the most serious problems may be made known. The field of endeavor is a great one and honest effort on the part of members is not only necessary for making the "Y" what it should be but for saving the school from consequences due to arise from a number of demoralizing conditions.

In taking a new determination to bring about these accomplishments, no greater help can be had than through prayer to Jesus Christ, to Whom all Association work is dedicated.

Dr. Johonnott's Position filled by Dr. B. A. Howlett

An able successor to Dr. Johonnott was found in B. A. Howlett, Ph. D. from Indiana University. Other degrees which he holds are: Bachelor of Arts in education, Bachelor of Science in physics and mathematics, Master of Science in physics from the University of Chicago.

He taught in Valparaiso University from 1914 until 1922. When he left there to go to Indiana University, he was Dean of Arts and Sciences. At the time of being called to Rose he was Waterman Research Assistant.

His society membership include the American Physical Society, the Optical Society of America, the A. A. A. S., the Indiana Academy of Science, the Indiana State Physics Club, Sigma Xi, and Phi Betta Kappa.

Dr. Howlett comes to Rose with a record of sixteen years of successful teaching.

Benjamin Garver Lamme

A tribute to a Great Engineer, singularly distinguished

By Charles F. Scott, Ohio State '85

Professor of Electrical Engineering, Yale University

BENJAMIN GARVER LAMME (1864-1924) was Chief Engineer of the Westinghouse Electric and Manufacturing Company, which which he was connected for thirty-five years.

Mr. Lamme received the Edison Medal, awarded annually by the American Institute of Electrical Engineers for electrical achievement. He was one of its two representatives on the Naval Consulting Board during the war, serving as Chairman of the Inventions Committee which directed investigations and passed upon hundreds of schemes for the detection and destruction of submarines. These testify to his standing in his own profession as an engineer and inventor.

He received a unique distinction from his alma mater, Ohio State University. The first award of a recently established medal, eligible to all of its fifteen thousand alumni—engaged in every field of activity—was made to him in recognition of the value of his work to the world. Such an award to an engineer, and to Lamme, is of peculiar significance. What sort of a student, what sort of a man was Lamme? What qualities does his career indicate contribute to the making of a great engineer?

It would be interesting to consult the Class Day prophecy of 1888 to note the career predicted for a member who held first rank in his classes but was little known outside the engineering group, who figured in no major or minor sports, who belonged to no fraternity or literary society, who took no part in social affairs, who was quiet and retiring, of few words and with nothing in appearance or manner indicating intrinsic capability. But the man ranking low in many qualities often counted essential to success, won in life achievement. Why?

Many may imagine that an electrical engineer and inventor of pre-eminence must be a wizard of some sort; but he had no occult powers, he was no visionary. He was simple and unassuming in manner and mind and method. His magic wand for transforming new ideas into realities was a trained mind. He could think clearly, analyse a problem into its fundamental elements, proceed directly from cause to effect or vice versa. He had vision, persistence, purpose. He was a productive thinker because he worked many hours and with high efficiency.

My own recollection of student days gives a clew to his success. In the fall of '85 (I had received my A. B. in June) I took analytic mechanics with the engineering juniors. I can name only one student and recall but one outstanding incident. Professor Robinson said a page or so of the four or five pages of problems at the end of the chapter would be a reasonable task. The next morning Lamme asked me how many I had done; I gave an apologetic answer and reversed the question. He quietly replied, "Well, I didn't have anything else to do so I worked them all."

Nearly four years later, shortly after Lamme had begun work with the Westinghouse company on May 1, 1889, I remembered that sentence when Mr. Schmid asked me, "Do you know that man Lamme? Can he figure?" And nearly forty years later, considerably more than half of which we worked in the same building—many years at adjacent desks, that sentence seems to reveal certain life characteristics—an interest in mathematical-mechanical problems, diligent effort at a self-imposed task far exceeding the normal expectation, a super-preparedness, a joy in accomplishment. His work as a student and as an engineer was not something apart from him, but it was a part of him.

As Chief Engineer of his Company, Lamme interviewed many young men. To determine present aptitudes he ascertained what they liked to do as boys, believing no one would make a real engineer who had not shown certain early traits and likings.

Notes Tell of Early Life

He left some notes in which he traces his own career in a sort of self-analysis. His earliest recollections concern the hunting of curious stones in a plowed field. He continued to gather Indian relics, such as tone axes and hammers, and arrow heads. In his will he leaves to the University his treasured and rich collection. He enjoyed building blocks and mechanical toys. He liked to work with tools and made little water wheels which he placed in the stream. He tinkered around machinery whenever opportunity afforded. The real pleasure was in finding out how things worked and why they were made in certain ways. These interests in childhood matured into interest in design in later years. An early aptitude later proving of highest importance was a liking for elementary mathematic. The wise teacher in an old-fashioned country school let the scholars work out things in their own way.

Benjamin Garver Lamme

Lamme enjoyed mental arithmetic, particularly the relations of numbers. (In later life he patented some magic square puzzles.) The multiplication table which we learned to 12, he learned to 25, then to 36. He developed curious and quick methods and a sense of proportion. While classmates in college thought mathematics "came easy" to him, he was studying more hours than they did. He endeavored to get a physical conception of mathematical ideas and relationships. Later in life he had an uncanny way of working out a result in his head before another man could get it on a slide rule. He used a slide rule for a short time but discarded it as the mechanical operation caused him to lose his quantitative sense and his facility for mental computation; furthermore, results were not retained mentally as they had been. Visualization and physical conception of principles and problems he employed constantly in his engineering work. Mathematical computation and analytical ability were closely associated. As a boy he directed his analytical ability to the characteristics of his schoolmates as well as to mathematical problems. A critical sense and persistency were other traits of youth which continued through life.

He determined, when a boy, to be an engineer; he set about to make an engineer of himself and he did.

Following his junior year, owing to the illness and death of his father, Lamme spent a year at home on the farm near Springfield. After graduation from the mechanical engineering course he spent a half year at home, reading in spare hours Sylvanus Thompson's "Dynamo Electric Machinery," a compendium of historical and descriptive information. He sought the underlying principles and got a grasp on the idea of the magnetic circuit, then little understood. When he came to the Electric Company in Pittsburgh, he had a preparedness which was unsuspected. His evenings for many years he spent largely in study. He has said that often his quick and confident answer to some new question has been attributed to some intuitive insight which others do not possess instead of the hours of painstaking analytical study which had already given him the answer.

Opportunity is futile unless one is prepared; Lamme was prepared when opportunity came. He graduated at the opportune moment when the electric current was establishing its usefulness for light and power, and when the greatest problem was how to make bigger and better electrical machines; he was fortunate in the progressive leadership of George Westinghouse, who gave not only opportunity to design and construct, but incentive and impetus and inspiration; he was peculiarly fortunate in the early guidance and cooperation of Albert Schmid, a master in mechanical design.

Proved Equal to Opportunity

Mr. Westinghouse had, for two or three years, been exploiting a new system, the alternating-current system. There were engineering critisicm and commercial opposition from without and technical difficulties from within. The largest generators were less than two hundred horsepower; there were no commercial motors; there was no way to convert from alternating to direct current. The need and the opportunity were great. The design of new types of generators, of polyphase motors of various types, of synchronous converters, of an alternating-current railway system; all these presented gigantic problems which Lamme met and solved. Present and proposed super-power systems and the utilization of power in industries and in railway employ the system on which he worked and most of the apparatus follows the designs which he inaugurated. He had many good assistants and much was done elsewhere, but Lamme was pioneer and leader, he originated new types and they have persisted. To him is due a far larger proportion of the prominent types of apparatus now in use than to any other designer. And his judgment was so good that he spent little effort on types which soon disappeared.

Lamme never gave up. To him a defeat was a challenge. If trouble occurred, he at once sought a remedy—often he had already determined what to do if difficulties did arise. On one occasion there were serious troubles in an important installation. An official of the Company said, "Lamme, this will be your monument or your tombstone." This did not perturb him. Now it is his monument.

Although he might well rest his reputation on the design of the single reduction railway motor, the machines exhibited at the World's Fair in Chicago, the generators which inaugurated power production at Niagara, those which supply power to the Elevated and Subway Systems in New York and the equipment which operates the New York, New Haven & Hartford Railroad, Lamme was far more than a designer of particular machines. He says that his work was mostly analysis rather than design. He developed a system and method of simple rational design. He directed and taught others and during recent years his principal interest and activity and enthusiasm were in the selection and training of men. He conducted a design class each year, he took active interest in "The Electrical Journal" as chairman of its publication committee, suggesting topics and writers, critically reviewing manuscripts, and often summoning writers for conference, being particularly concerned in developing young engineers in clear thinking and expression. He wrote and spoke on engineering education. Years ago the electrical engineer was an isolated individual. Now invention and development and design are conducted by groups of men who work together. Lamme started as an individual, but he developed an organization and left in his department a hundred men with the advantage of his knowledge, his experience, his methods and his inspiration.

His Genius Was Contagious

Modest and retiring, he was a genial and inspiring companion to those who knew him. In later years, his reticence was somewhat overcome and he wrote papers and made some addresses. His clear and simple presentation, free from mathematical formula, made his writings highly appreciated. He regarded mathematics as a tool and did not exhibit his tools when the work was done.

He never married, but made a home with his sisters. One of them, Miss Bertha, graduated from Ohio State in engineering and became a competent designer under her brother's direction, but ceased engineering to become Mrs. Feicht. He was a broad reader, he liked travel, he was fond of the best music and was interested in archaeology, he became an ardent and expert photographer, and when he finally got an automobile, he drove it nearly ten thousand miles in six months and knew all the roads within a hundred miles.

(Continued on page 18)

Simplifying the Selection of a Career

C. H. Murray

Supervisor of Employment, The American Rolling Mill Company, Middletown, Ohio

Here are several good qualities to look for in the Company you choose to become associated with. They are vital and should be understood by every potential engineer.

POSITIVE results are being accomplished in helping the college graduate find the work he is best fitted to do. A following out of certain specific considerations will materially aid the young man who, after four or more years of intensive training such as is now offered in the major schools of the country, faces life's work. The terms "career" and "life's work" are used advisedly because in most cases the college graduate has fairly well decided what he wishes to do. After this his major problem is the selection of the particular organization in which he is to give his energies play. On the other hand, there are a large number of young men who have little ideas of the line of work in which they can be most effective, and here again the choosing of a company in which they may properly "find" themselves is most important.

A few years ago, except in isolated cases, there was apparently no scientific method in any young man's mind as to how such a problem could be approached. As a result, the man, as well as industry, lost a great deal of time in getting to the place where a proper contribution could be made and rewarded. With the recent growth of an increasingly close relationship between educational institutions and industry, however, the program begins to take definite shape; and it is our belief that in later years the average student will attack this problem of choosing the company with which he wishes to become affiliated in much the same manner as he attacks any laroratory test; first setting up his problem, then getting together all facts necessary to its solution, and finally tying them together and arriving at a logical conclusion.

Technical skill of every class must be employed in successfully carrying out the varied programs of the larger industries as they function today. In these industries are found positions fo major responsibility which should be attractive to the college man. It is thus that men trained in any of the engineering fields, as well as in other lines, find full play for their efforts and ideas in a single organization. It is not uncommon to see the mechanical, civil, electrical, chemical, mining ,and metallurgical engineer; the trained salesman, accountant, publicity man, and social service worker carrying out under the same roof important phases of a large company's undertakings.

Let us assume that by specialization in his college work and supplementing this technical training by practical experience during the vacation periods, a man has prepared himself for a specific line of work. We can see that is is led to the place where the problem of what particular company is best adapted to the effective outlet of his capabilities in paramount to him. He wants to know which firm he should go to work for. There are hundreds of well-managed industrial organizations established in this country today so the man is puzzled. The "measuring stick" which we are presenting is sufficiently elastic to apply to any.

First, there are certain obvious considerations such as realizing that the problem cannot be worked out overnight and that often a few years of actual observation on a job or various jobs may be necessary before a decision can be arrived at; that of dodging the soft spots which may prove to be "dead ends," a disregard for initial monetary return when balanced against experience and future possibilities; and a number of other factors which are important, but with which we are not concerned here. It is the specific considerations in which we are now most interested. Experience has shown that those set forth below should be more carefully regarded:

1. What is the character of the personnel and management of the company? The personnel and management of an organization must be studied together, as the two are so closely related that one cannot be effective without the other. A far-visioned and understanding management is sure to build up a contented and "producing" personnel, and if any of these factors is lacking, the company is not one in which the ambitious, technically-trained man can effectively cash in on his ability.

2. Is it a basic industry; i. e., one of the fundamental industries on which other lines of work depend? This is important to insure the steadiest growth of a man's career. There are many non-basic industries which are successful and operate with little interruption, yet there is surety that a basic industry will carry out these factors to a greater degree.

3. How big is it? Although a rise to the top is usually easier in a small organization than it is in a large one, because of the fact that competition is less keen, the ultimate gain will not nearly approach that which is in reach of men in the larger organization.

4. What has been its history in expansion and labor relations—has it been a follower or a leader? It is comparatively easy to study the history of our larger organizations, and to do so is important, because as an organization has functioned in the past, so will it function in the future, provided, of course, that its management and personnel remain practically the same.

5. What is the breadth of its market? A company whose market is wide in scope is naturally wide in the opportunities which it can give the individual members of its organization and offers an outlet for the functioning of many different forms of effort.

6. Is the product diversified? A business whose distribution depends upon the economic situation of one particular group is likely to offer unstable and interrupted employment to the members of its group.

7. How is the company generally regarded—by its own personnel, competitors, and persons in other lines of work? The method of getting the answer in this question and the conclusions to be drawn from the answers are obvious.

8. What is its financial standing? Anyone has access to the balance sheets of the larger industrial concerns. It is well to study these closely in order to be sure of identifying oneself with a growing concern.

9. Study the general appearance and layout of plants and offices. Just as the dress and carriage of an individual show something of his personal habits, so does the outward appearance of an industrial organization reflect its methods of management.

10. Have other men made progress? Where other men with similar qualifications have made progress, it is natural to assume that the new man will move upward in a like manner. An organization loaded with potential leaders who have stood still for a number of years is one to avoid.

11. Are there many young men in executive positions? This consideration is directly in comparison to that mentioned above. An organization which gives full play to the ambitions and ideas of the younger members of its personnel should attract those young men who are seeking places of responsibility.

12. What is the policy of promotion? A company which fills its important positions from within its own organization may be counted upon to offer regular progress; that which hires its executives from outside its own doors has usually a discontented and constantly shifting personnel.

13. Are there many organization changs made? Regular changes in organization due to expansion in a company's size and scope are healthy. Those which are caused by a constant shift in supervisory positions would indicate that there is a lack of team work and that even when gained, a responsible place in that organization is insecure and, therefore, not to be especially sought after.

14. What are the facilities for training? Every right-minded technically trained man, realizes that additional and constant study is necessary to his future advancement. A company which offers under its own supervision, a variety of courses with which a young man may supplement his college training gives him the advantage of those necessary studies which is acquired on the man's own initiative might be expensive as well as misdirected.

15. What outside activities does the company sponsor? Interest in civic affairs, the furnishing of recreation places where the members of its organization may meet together, the support of athletic teams; in short, the promotion of a general plan for an outlet of the "play" energies of its employes and for the moulding of good citizenship are a very close indication of what may be expected from that company along other lines.

16. What are the opportunities for investment in the company? When a man has confidence in the future of the organization with which he is affiliated, he is often moved to divert all his available financial as well as his physical efforts into that company for his own well being. A company which offers an easy method of purchase for its securities is setting up the opportunity for an investment against the future in the same measure as it does in offering advancement on the job.

As mentioned previously, the above considerations have purposely been made elastic so that they will fit any number of companies in various lines of endeavor. There are, undoubtedly, other individual considerations which a man must consider before allying himself with one particular organization, but these will depend very largely on local conditions and must be met and handled as they occur.

The important thing is the recognition of the fact that these factors represent a very vital part of a young man's entry into the business world and that a closer study of the problem along scientific lines is becoming a greater necessity from day to day. We feel that it is well for the college graduate to know that personnel departments of companies throughout the country are as anxious to see proper placement made as are the men themselves and that in most cases wholehearted cooperation can be gained from this source in working out such a plan as has been set forth here.

The above mentioned factors seem to make up a very complicated program for the college men to carry out, and it is true that considerable effort will have to be expended in order to arrive at a successful conclusion. Yet the plan is far from being unworkable, especially if the man begins its study early in his college career. We believe, further, that the time is not far distant when the necessity of such a program will be so universally recognized that courses in vocational guidance will be a regular part of our college curricula.

This discussion of the college graduate's relation to industry is an important, but nevertheless only one single phase of the whole subject. There are certain preparatory steps necessary as well as a great many things to be done after he has been placed on the job, but these factors could not be discussed in detail except in a very complete volume.

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The numerals that appear on your envelope in which The TECHNIC is mailed are the numbers corresponding to the expiration date of your subscription.

Thank You.

ALUMNI NOTES

(All Alumni are invited to send in personals of themselves or fellow Alumni)

1893

M. B. Fitch is now President and Manager of the Corona Silica Co. of Corona, California.

1894

F. F. Hildreth, who has been with the Penn. R. R. at Columbus, has been transferred to Indianapolis.

1895

G. W. Phillips has left the Truscon Steel Co. and is a dealer in fireproof building materials in Denver, Colo.

1896

W. E. Burk has been transferred to Denver where he is Secretary for the Highway Oil Refining Co.

1897

Capt. H. J. Hancy, of the Ordnance Dept. U. S. Army is now stationed at Aberdeen Proving Ground, Md.

1898

N. S. Kidder, who has been with the Minnesota Electric Distributing Co. has taken to farming and is now at De Laniere, N. D.

1899

C. B. Keyes is now Asst. District Manager, Railway Dept. of the General Electric Co., and is located in New York.

1902

A. J. Paige is now with the General Motors Corp. in Detroit.

R. C. Warren is Purchasing Agent and Statistician for the Arkansas Central Power Co., at Little Rock, Arkansas.

J .A. Nicholson who is with the Union Pacific R. R. has been transferred from Omaha to Chicago.

1903

E. C. Metzger is now with the American Steel Foundries, Granitte City, Illinois.

1905

C. B. Speaker is with the Crown Willamette Paper Co. of Portland, Oregon.

1906

J. W. Cannon has moved from Boston to Providence, R. I., where he is Gen. Mgr. for the Aetna Automatic Oil Burner Co.

F. A. Delle is now District Manager for Westerlin and Campbell Co. of Cincinnati.

1908

B. L. Kelso, formerly with the I. C. R. R. at Chicago has gone int othe real estate business at Tampa, Florida.

G. H. Freers is now Asst. Chief Engineer with the Nordyke and Marmon Co. of Indianapolis.

H. W. Heidenger has gone to Indianapolis as Manager of the Haronia Mfg. Co.

1909

H. Isenbery who has been Manager of the Saminoli Mills, in New York, is now President of the William Co., Inc.

1910

H. M. Shaw has left the Army and is in Cleveland, as Special Factory Representative of the Haroma Chemical and Mfg. Co. of Newark, N. J.

1911

J. N. Stevenson, who took his Masters degree in Ch. E. at Rose in 1911, and has for some years been editor of "Pulp and Paper" of Canada, has been appointed Principal of the Institute of Industrial Arts at Tardenvale, Canada. He will continue to carry on his work as editor.

D. W. Jones has been made Electrical Engineer for the Valier Coal Co., Valier, Illinois.

1912

C. P. Rommel is chemist with Bradley and Vrooman Co., Chicago, Ill.

J. H. Service is now a Junior Lieutenant with the Coast and Geodetic Survey. At present he is aboard the N. S. C. and G. S. S. Guide, San Francisco.

L. D. Gilbert has left Cedar Rapids, and is with the Byllesby Engineering and Management Corp. of Chicago.

W. S. Mace is now with the Tower Lee Co., Commercial Printers of Los Angeles.

1914

J. A. Coltrin is a consulting engineer in Los Angeles.

K. E. Lancet has become a member of the firm of James H. Carnine, Indianapolis, dealers in building materials.

C. E. Moore is with the Gould Contracting Co. of Nashville, Tennessee.

1915

S. Kinkelstein is now President of the Alemite Lubricator Co. of Indianapolis.

R. M. Smith is Metallurgist for the Rockford Tool Co. of Rockford, Ill.

1917

E. O. Austermiller is now Asst. Electrical Engineer with the Wisconsin Steel Co. at South Chicago.

E. N. Goldstine has taken a position as Manager of Construction Dept. for the Universal Construction Co. of Milwaukee.

1918

C. R. Decker is Master Mechanic for the Greenwood District of the Lehigh Coal and Navigation Co. at Langsford, Pa.

L. J. Heedwohl has left Los Angeles and expects to go to Miami to engage in real estate business.

D. M. Howard is with the Penn R. R. as Engineer in Charge at Mingo Junction, Ohio.

1919

E. L. Miller is Sales Engineer for Pitsbury-Becker Engineering and Supply Co. of Memphis, Tenn.

C. E. Wessel is Mechanical Engineer for the Pure Oil Co. at Columbus, Ohio.

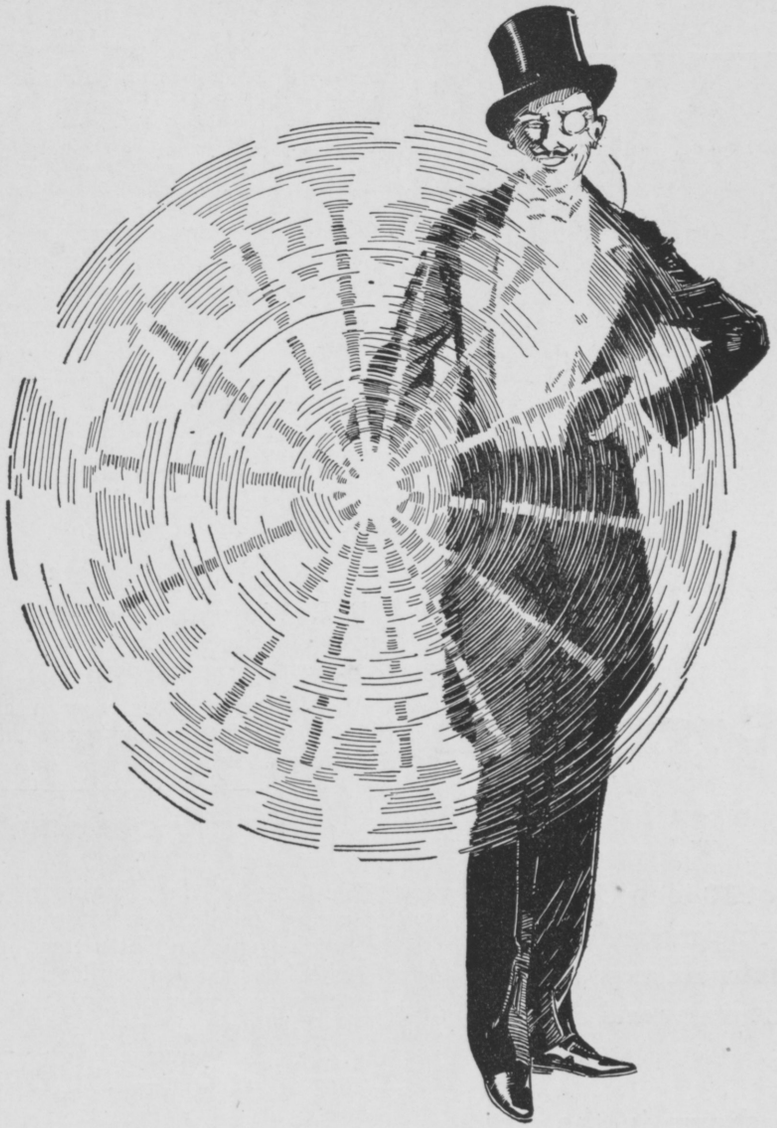
1920

George Justice, ex-20 is now with the Engineering Department of the Pennsylvania Railroad, Louisville, Ky.

H. Bierbaum is in the office of Stimson, Stimson and Davis of Terre Haute.

1921

E. R. Ronald is now a Junior Member of the firm of Lewis, Warren, Consulting Engineers, Louisville, Ky.



What Is Timken Dual Duty?

YOU know how it is; trying to make your finger keep up with a twirling cane. The cane may twirl all right, but it keeps trying to run out ahead of your finger—and off.

That is, the cane has at least two motions. It spins *around*, and also moves *along* your finger.

This same tendency toward motion in more than one direction exists in connection with nearly everything that revolves. The hubs of your automobile, for example, not only have the familiar spinning force applied, but there is also the sidewise push of turning corners or running on a crowned road. The transmission gears, too, not only turn 'round and 'round, but the mountings are pushed upon from the end by the same pressure felt in the clutch pedal.

In automobiles, and in most other machinery, the 'round and 'round whirling forces with which you are familiar, nearly always are combined with the endwise pushing forces known to engineers as *Thrust*.

The presence of Thrust is another factor contributing to the dominance of Timken Tapered Roller bearings. Timken bearings are able to care for *both* of the forces at work in almost every bearing mounting. Timken bearings are more capable in carrying the whirling motion (radial loads) and *in addition* Timken bearings carry all the thrust loads at the same time!

That's Timken Dual Duty, made possible only by the Timken Taper principle. When Timkens are engineered into automobiles, farm machinery and industrial appliances, it is accepted that the bearings are equal to the whole job of caring for *both* radial and thrust loads without compromise or complication.

THE TIMKEN ROLLER BEARING CO., Canton, Ohio

TIMKEN *Tapered Roller* **BEARINGS**

1923

Buford Tyler has taken a position in the Engineering Division of the Penn R. R. with headquarters at Terre Haute, Ind.

L. Quinlan is with the Ky. Actuarial Bureau at Lexington, Kentucky.

C. F. Leisey, who is with the American Telephone and Telegraph Co. has been transferred from Cincinnati to Detroit.

E. Wolff is Railway Equipment Engineer with the Westinghouse Co., at East Pittsburgh. He is working on the design and application of equipment for heavy traction locomotive.

S. St. Clair was a visitor in January. He has just recently been transferred from Denver to Port Clinton, Ohio, where he is Asst. Distribution Engineer for the Ohio Public Service Co.

1924

F. E. Watson, who is with the Northern Indiana Gas and Electric Co., has been transferred from Hammond to South Bend.

A. L. Sherwood is now a chemist in the Coke Plant Lab. of the Youngstown Sheet and Tube Co., at Chicago.

EXCHANGES

The Co-operative Engineer (Cincinnati U.) for December, publishes a most interesting book review on the "Plastic Age" written by Percy Marks. To all who have read or will read this book on college life, this review will give the reader a new slant upon all things under the name "Collegiate" By the way, the "Co-operative Engineer" is in the E. C. M. A. magazine holder—Y. M. C. A. room.

More this year than ever before the engineering school magazines are publishing technical and "general interest" articles written by the students, which to our mind is a worthy step forward.

A paper that purports to be "of, by, and for the students and alumni" can hardly hope to maintain its position with most of its news being acquired from sources exterior to the school.

Hence it is most commendable that so many school magazines are beginning to realize that the students and interested alumni are the ones who "make" or "break" the official organ of the institution.

Come on gang, get your ink-sticks going and write a few paragraphs. Slip 'em to "Milton," "Louie" or Prof. Settles; the TECHNIC will appreciate your interest and help.

This issue contains—at last—a cross word puzzle, as is fitting and proper with well-kept publications. So drag forth not only dictionaries but all your old text-books and delve into this noble exponent of cross-wording.

Hillis and Kehoe are the worthy perpetrators of ye puzzle, so if errors are discovered go easy on the razzberries. The boys expended four hours of perfectly good time in the composition thereof.

ATHLETICS

OAKLAND CITY 18—ROSE 10

The jinx followed us right along to Oakland City and we again tasted defeat. As yet the coach hasn't found a combination which can get the points. He hasn't had good material to work with and it is a big job to find the combination which works the best. He's doing his best though, and before long we ought to get going. What we need is a bunch of goal getters as the floor work is pretty good.

The Oakland City crew had a nice team, in fact every team around this part of the country is pretty good, nowadays, and we've run into some pretty stiff opposition this year. The boys are doing their best and we must stick behind them to the last whistle.

NORMAL 38—ROSE 8

Our ancient enemy again downed us in basketball. It seems that they've done that little trick for a number of years in this branch of athletic sport but some day we'll surprise 'em. They have the advantages as their alumni are teachers out in the various high schools of the state and they send all the basketball players to Normal. We get the small percentage who want to be engineers. There are some good players developed, too, in these country high schools where everybody is basketball wild.

The shooting of Van Horn and the all round good playing of the Normal was responsible for our downfall. Our boys fought like the mischief but it was for naught and we were overpowered.

The freshmen were also beaten in a curtain raiser by the Normal freshmen. The trouble with the freshmen was that they didn't get started until too late and the game was gone. They didn't play up to their usual form at all and consequently lost the game. They could have won easily if they had been in form. However, the two freshmen teams will meet again at the same time the varsities clash and we'll see some fireworks this next time. Get going, Freshmen.

FRANKLIN 50—ROSE 3

This time we went up against the state champions, a team which has been playing together ever since they were in high school and are so used to each other by this time that everything goes just like clockwork. They exhibited a brand of basketball that a person does not often get a chance to see. They passed with deadly accuracy and their goal shooting was superb. This team has only been defeated once in a number of years and it is no wonder that we lost to them. The "Engineers" must be given credit for a plucky fight but in the face of such overwhelming odds defeat was inevitable. We are not ashamed of it, though, and we'll take 'em on again any time.

CENTRAL NORMAL 34—ROSE 20

At last we found a combination that works better. We came close to winning this game but it got away in the last few minutes of play. It is a significant fact, however, that the scoring power has increased for we made twice as many points in this game as we made in any other this season. If we keep on with the good work, things will look good for the "Engineers." There's no getting around the fact that Central Normal had a good team for they came within one point of beating Normal and it was only in the last few minutes on account of a few lucky breaks that Normal beat them. With just as much improvement between this game and the next we'll break into the winning column and surprise everybody.

UNIVERSITY OF LOUISVILLE 23—ROSE 22

This was a heatrbreaker, losing by one point. It seems that the jinx that Louisville used to hold over us is on us again and we can't get rid of him. And then two of the players of the good combination of Central Normal game, left us after the final examinations. One of our old standbys, Harry Willson, returned, however, and that will make up for part of the loss. This game was hard fought all of the way through, first one side and then the other taking the lead. Everything was going good until the Louisville drew two points ahead of us in the last part of the game. As the gun went off, one of the Louisville men fouled Reinking and gave us a chance to tie the score. As the scoreboard was incorrect and didn't check with the official score, Art thought we only needed one point to tie the score and missed one of his shots. Afterwards when we prepared to play an overtime period, the mistake was discovered and we lost by one point. That was worse than being defeated more decisively.

Benjamin Garver Lamme

(Continued from page 10)

Habitual optimism and indominitable courage waged a long struggle against an incurable disease. With hopeful cheer he concealed his early fears and to the last his knowledge from his immediate family. Again he had prepared for emergency by deciding on plans for continuing his wrok and on the provision in his will. He died July 8th, 1924.

"An Extraordinary Ordinary Man"

Summing it all up, after an acquaintance of many years and after talking with many who have worked with him and known him best, he was an extroordinary ordinary man. He had developed ordinary qualities to an extraordinary degree.

Lamme was one of those whose greatness lay in the perfection and practice of common traits and homely virtues. The qualities which made him great would contribute to success in many fields, but are especially important to the engineer.

ROSE LEAVES

Rush Season Here and Gone

Rush season with its flurries of excitement, dates, hopes, fears, joys, and disappointments opened Friday, Jan. 27 with all of the Greeks on the campus making frantic efforts to obtain first dates with promising rushees. At a meeting of the Inter-fraternity board held prior to the Rush, it was decided to curtail the activities a few days this year so that the season proper only required ten days—an invaluable change to all concerned as rush overlapped only two days of the new semester thus eliminating the customary interference with both rushers' and rushees' scholarly pursuits. While the efforts to pledge the more outstanding members of the class developed a spirited rivalry, no open breaches of the friendly relationship resulted. It is pleasing to note the rise of this new spirit in the Greek circles so that even in a hard rush such as the last proved itself to be, the members of the fraternities showed themselves as gentlemen and sportsmen at all times. Display of this attitude does much to strengthen the position of the Hellenes, and its cultivation is highly desirable by all who have their own as well as others' fraternity at heart.

New Plan started for Term Opening

With the opening of the new term, some important changes took place in the schedule of the classes. Registration was conducted upon Feb. 4 and a rule made that each student program must be O.K.'ed by the proper committee before he would be admitted to classes—in this way overloaded schedules and conflicts were avoided. The holding of classes upon Saturday morning was also resumed; this practice, dropped when the institute was moved to its present site, was made necessary to accommodate all of the practice periods on some of the courses. However, no theoretical classes will be held this semester upon Saturday forenoon.

Memorial Services held for Dr. Johonott

Memorial services for the late Dr. Johonott were at the institute at the first assembly following the opening of school after his tragic death. Dr. Wagner in an introductory talk, stressed the loss the school had sustained—Prof. Peddle presented a brief history of the life and achievements of the deceased. Mr. Omar Mewhinney who was a classmate of Dr. Johonnott when both attended Rose in 1877 touched upon the side practically unknown to the students, his activities as an undergraduate. Resolutions of regret from the various Tech clubs were then read by Professor Faurot, following which a similar expression from the students as drawn up by the Student Council was read and approved, closing the services.

The Wanderer has Returned

"The return of the native" or Sergeant Kearns stages a come-back—" Sergeant Kearns, the genial raconteur of the Military department, has returned to one again regale the uninitiated with his stirring tales of adventure and conquest. With a new flock of customers, (the 28's,) "Sarge" is once more in his glory of chilling brave blood with his graphic accounts of the horrors of war known only to those on the inside. But seriously, we are all glad to have him back—the drill field and classroom seemed just a little vacant and lonesome while he was away. Even his favorite uptown corner at 7th and Main looks more natural since "Sarge" is once more "walking" his post there.

N. Y. C. R. R. furnishes pleasing Safety Movies

The assembly period a few weeks ago was considerably and pleasantly 'hopped-up" with an undeniably interesting movie released by the safety department of the New York Central railroad.

For once the students were aroused from their chronic lethargy and applauded with vigor when the villian drove ker-blam into a freight that had absorbed the right of way,—and loud and long were the gleeful cheers as some future Valentino did a rotten job of driving a "Chevee" touring car with one hand and did a worse job of necking some hot looking frail who was riding with him.

Yessir! We're much in favor of celebrating "Safety Week" anytime when such nifty cinema attractions the presented for our personal instruction and ultimate entertainment.

INDUSTRIAL BUILDINGS SHOULD BE WELL LIGHTED.

From the employer's viewpoint, the big difference between men who work out of doors and those who perform tasks inside the building, is the factor of light. Daylight furnishes sufficient illumination outside during the daytime working hours for men to pursue their tasks efficiently and safely. But the proposition of getting enough daylight into the interior of industrial buildings, requires some thought.

It is not a difficult problem by any means, and any employer can take advantage of daylight and utilize it for lighting his building during the daytime, if he desires. It is an excellent light, especially suitable for the eyes, reducing eye strain and eye weariness to a minimum, and has the great economic advantage of costing nothing.

To utilize daylight to the utmost, we must first provide means for allowing daylight rays to enter the interior of buildings in sufficient quantity—namely, proper and adequate windows and skylights. Many excellent instances of buildings designed with a due regard to the importance of daylight lighting can now be seen in many of our industrial cities. Such buildings present the appearance of being practically all windows—"window walled," as they are termed—and this type of daylight construction is coming rapidly into favor, because it constitutes a more healthy building for large numbers of employes, both from the lighting and ventilation standpoints.

Among those who have constructed this type of modern industrial building may be mentioned: The Shredded Wheat Co., Gillette Safety Razor Co., Lyon & Healy Piano Co., H. J. Heinz Co., Corona Typewriter Co., Skinners Macaroni Co., Grape Juice Co., Dodge Bros., Nelson Valve Co., Piston Ring Co., Remington Arms Co., and a great many others.

The Larkin Co., Philadelphia, has erected a building almost entirely glass, 85% being windows, and the Loomis Breaker, operated by the D. L. & W. R. R. Co., Nanticoke, Pa., is literally a glass house, being 93.5% of glass. The new buildings of the Winchester Repeating Arms Co. have an average glass area of 58%.

An investigation covering 18 buildings constructed by the Aberthaw Const. Co., Boston, shows that the average window area is 57.5%.

These figures indicate how important the subject of lighting is now considered by employers of industrial labor, and how well the idea has been carried out by the architects and engineers, in order that all parts of a building may receive sufficient daylight. But, in addition to providing ample window space, there is another factor which is equally important, and that is, equipping the windows with the proper glass.

The bright direct rays of the sun should not be permitted to strike the eye, and we must provide a means for reducing the glare to rays which will not be too bright. This is accomplished by glass especially manufactured for industrial windows, known as Factrolite. This glass possesses the property of breaking up the intense rays of the sun and diffusing the light into the interior of the building in proper portions, solving the problem of sun glare.

If you are interested in the distribution of light through Factrolite, we will send you a copy of Laboratory Report—"Factrolited."

FRATERNITY NOTES

A. T. O.

Gamma Gamma of Alpha Tan Omega announces the pledging of the following men as the result of a successful rush season: R. F. Alexander, T. M. Reed, G. H. Macnair, A. F. Drompp, G. H. Barton, H. S. Carmack, M. Wesley, A. C. Keiser, A. L. Kasameyer, H. L. Crawford, and W. L. King.

On the afternoon and evening of February 8, Mr. and Mrs. E. O. White of Dana, Indiana, entertained the chapter and friends at their beautiful country home. Ample refreshments were served and the guests enjoyed themselves thoroughly, dancing until a late hour.

Brother Jake Machling of Gamma Xi chapter at Chicago University treated the chapter to a Hippodrome party on Ground Hog Day.

Brothers Hall and Shepherd are now attending Indiana University where they are pursuing a course in commerce.

We are pleased to have brothers Harry Wilson and John Jakle in school again this semester. Wilson has already taken his place on the varsity basketball squad.

P. I. E. S.

The pledging of the following men of the class of '28 is announced: J. T. Harvey, W. A. Doden, W. T. Davidson, P. A. Iahn, H. A. York, W. A. Watkins, J. D. Robinson, H. M. McKee, W. R. Schauweeker, and W. Kehoe.

A dance in honor of these men is to be given on Saturday, February 28, at the log cabin in Edgewood. Several of the alumni from Chicago will return as usual and several others will probably come back also.

The fraternity and pledges went in a body to the First Baptist Church on Sunday morning, February 15. It has been a practice for the fraternity to occasionally attend in a body at one of the various churches in the city.

P. I. E. S. takes pleasure in announcing the granting of their petition to Theta Kappa Nu.

The move for nationalizing has been actively under consideration for more than two years. After a careful study of the national fraternities, Theta Kappa Nu was chosen as the one most fitting for P. I. E. S. The fraternity was immediately petitioned and the official acceptance was delivered this month.

Theta Kappa Nu is one of the newer national fraternities. It was formed as an immediate result of the Interlocal Fraternity Conference and has the full backing of the National Interfraternity Conference. Its constitution and aims have been chosen carefully and have taken advantage of the experience of all the other fraternities in these matters.

It is expected that the installation will take place in about six weeks. Rose will have the Indiana Gamma Chapter. Indiana Alpha is located at Hanover; Beta at De Pauw will be installed at the same time as the local chapter.

P. I. E. S. gives up its local constitution and its traditions of a quarter of a century to the new national brotherhood. This has been done only after the most careful consideration and study and although new to most of the student body has been in the minds of the members for a long time.

THETA XI

Kappa is pleased to announce the pledging of the following men:

H. S. Dorsey, Louisville, Ky.
B. F. Fox, Louisville, Ky.
R. J. Pearce, Louisville, Ky.
J. B. Smith, Brazil, Ind.
J. E. Goddard, Farmersburg, Ind.
E. S. Johonnott, Terre Haute, Ind.
C. A. Newton, Terre Haute, Ind.
A. Nehf, Terre Haute, Ind.
R. D. Reese, Terre Haute, Ind.
R. F. Taggart, Terre Haute, Ind.
W. Leake, Louisville, Ky.

Kappa held their pledge dinner Friday, February 13, 1925, at the Chapter House.

Recent visitors were Brothers W. Boyd, A. Weinhardt, W. H. Junker, C. Raeber, F. R. Rippetoe and J. Hutchinson of Alpha Beta. Brother Green has returned to school after this term.

SIGMA NU

Monday, February 9, marked the completion of of one of the most successful rush seasons ever enjoyed by Beta Upsilon of Sigma Nu. The men pledged were Fred Carroll, John Crawford, Harry Grafmiller, Bill Houk, Bill Houston, Bill Jones, Al Kepler, Val Mitch, John Mendenhall, Paul McMullen, Ed Sager, Wallace Todd, Bob Thomson, Harry Wilkens, and Bob Wade.

On Tuesday following the close of rush season the annual Pledge Dinner was given in honor of the pledges at the chapter house. The house was attractively decorated with the fraternity colors, black, white, and gold. Black, white, and gold tapers, and the electrically lighted fraternity badge furnished the illumination. Following the service of a three course dinner the informal pledging ceremony was held with John Moorehead as chairman. An excelent musical program was then executed by Maurice Nichoson, pianist, and Bed Fischer, violinist.

The final event of the post rush season festivities will be Thursday evening, February 19, when the chapter will entertain the pledges with the annual Pledge Dance at the Edgewood Grove Community House. This is always an elaborate affair and this year's dance is expected to be better than ever before.

ALPHA CHI SIGMA

Iota chapter initiated J. Preston Lentz, Harry P. Shewmaker, Lowell E. Muehler, and Marshall T. Landrum on the evening of Jan. 30.

Iota takes great pleasure in announcing the pledging of the following men of the class of '28. Harold Hayworth; Julius R. Adams, Centralia, Ill.; Kenneth Metcalfe, Terre Haute; Melbourne Heinig, Terre Haute; James S. Ross, Terre Haute; and Louis R. Yansky, Terre Haute.

Finals and the Aftermath

"Louie" Sisson

In the last issue of the Technic there appeared a timely article entitled: "What is wrong with Rose Athletics?" and the writer made some very sound statements, but there arises another question that overshadows even the omniportance of athletics.

The question may be worded thus: "What is wrong with Rose scholastics?" At the end of the semester, just past, our student enrollment has been depleted about twelve percent due to students "flunking out"—in other words automatically suspended for one year—and why? A careful survey would reveal that almost fifty percent of those suspended "flunked out," eihter directly or indirectly, because of failures in Freshman and Sophomore mathematics and foreign language. Two seniors, seven juniors, twelve sophomores, and eighteen freshmen fell by the wayside.

A failure in any subject may generally be traced to one or all of three causes.

1. Insufficient or mis-directed application upon the part of the student.
2. Lack of basic or general training in the elementary or secondary school's part of the man's previous education.
3. Lack of co-operation between the student and the instructor.

Under the first cause we will all agree that the student who makes no conscientious attempt at study, has no place in the student body of Rose because information and worthwhile knowledge are acquired only thru the efforts of the student himself; but what of the student who conscientiously thinks he has studied? Too often the student doesn't clearly understand what he is to study and hence he has a haphazard idea of what he has gone over; so perhaps the time spent upon "How to Study" will not be wasted.

Under the second cause we have the students who lack the fundamentals of mathematics, or whatnot, primarily because the average secondary school does not or cannot offer courses that will be of permanent value to the student entering an engineering school. If we need a course in elementary Algebra or English gramma, let's have it!

Under the third cause of "flunking"—that due to lack of student-faculty cooperation—we should bear in mind that most of us proud Americans excell all comers as regards "passing the buck."

When a student drops below standard, he immediately shifts the blame on to the instructor; believeing him as incompetent or unfair. And in turn the instructor naturally shifts his burden by laying the it should occur to him that he is approaching things in blame upon the student's lack of interest, application, or initiative. If a student consistently does poor work, the wrong way and that he should get to the root of his difficulty; likewise, when an instructor finds that he is getting little response and must give low marks, shouldn't it occur to him that for some reason he isn't "getting his stuff across" to the men who need it?

Can it be that a lack of understanding and frankness between the faculty and the student body can be responsible for some of the all too many failures?

Both faculty and students are at Rose for one purpose—that of producing trained men—so instead of anyone jumping at unfair conclusions let's thresh out just what IS the matter with all of us at ROSE!

Do We Need a Dorm at Rose?

"When are you going to build that freshman dormitory out at Rose?" a middle aged friend of mine asked me the other day.

"I didn't know there was one being planned," I answered. "What do you mean?"

"Well, Mr. Deming left $100,000 to the school with stipulation that it be put into a building on the campus. I've heard it said that it's to be a dormitory."

"News to me!" I exclaimed. "Why in the name of St. Pat's cross-eyed daughter don't they put it into a decent place for a library and a gymnasium with some seating capacity?"

Now this friend of mine has a queer little sarcastic twinkle in his eye when he hears me blurtin' out like a bellerin' calf that never takes time to think what it's goin' to say. "Well," he began real soft and easy, "what, in your estimation, are the situations at Rose that are most in need of remedial measures?"

"What are you changin' the sub ject for?" I asks, stallin' for time. I knew he was tryin' to lead me off my guard and prove something to me.

"I asked you a simple enough question, I think," he opines very softly, smiling.

"Well," I began slowly, doing my level best to think straight as the profs are always having to urge me to do, "I expect the first thing is a better school spirit so that we can have better athletics, but of course that means that we must give some kind of soothing syrup to the fraternities to keep them from vomiting up their spasmodic animosities, if you know what those look like. Then next, "and I happened to think how many bosom friends I lost at the mid-year examinations, "I guess there comes the need for a little instruction in an elective course (made compulsory for everyone) called 'Efficiency Methods in Mental Gymnastics.' In other words, we need something that will teach men when, where, why, what, and HOW to study at times other than the one week before and during finals."

"You think that is all the school needs to make it first class?" he asked.

I pondered just a moment. "Y-y-yes, I think all our frigid little faults would melt and run away if we could just melt the two big ice cakes on the bottom of the pile."

"Then what do you think of a plan whereby all of the freshmen and as many of the upper classmen as are so inclined could be gathered together for the school year and live under the same roof. That would be compulsory for all out of town freshmen, just as it is at Harvard and at a number of other eastern schools. Don't you think that one of the professors or instructors acting as proctor of the hall could teach the boys how to regulate their hours and how to study

when they first come out of high school? Couldn't he help to establish companionship within the class, and between the classes as far as that is concerned if there are upperclassmen in the building? Would that companionship not help to establish the school spirit that you are asking for? I believe it would. It would result in as closely a knit student body as you could find anywhere. Men would find more time to participate in athletics, for their home would be right here on the campus away from the thousands of diversions in town."

"Yah!" I says, my thoughts seeming to stray to one of those aforesaid diversions. But he doesn't know her, so I said nothing else.

"Do you know," he resumed, waxing eloquent like a socialist, "—do you know if I were a member of your Board of Managers—"

"Haw! Haw! Haw!" I broke in with a horse-laugh, for this friend of mine has as much chance of getting on that oBard of Managers as a grasshopper has of promenading in a chicken coop. But that laugh peeved him. He leaned and pushed me in the face with the flat side of a bunch of metacarpals and walked off disgusted.

But on the level now, after he was gone, I got to thinkin' over what he said. Maybe we do need a dormitory here at Rose. And the more I think about it, the more I think about it, or of it, or for it, or—oh gosh! somebody stop me. My mind's all right, but it's this blowed-up pen. It hasn't worked just right since the finals.

With Cap and Pipe

LEAN and tanned from work in the open, pipe in mouth, cap pulled well down—that's the erecting engineer, as pictured in the magazines, and generally as found on the job. In an organization like Westinghouse he occupies a pivotal place, being responsible for the erection of equipment in the field.

Take him in the electrification of the Chilean State Railway, for example—one of the outstanding electrical projects of recent years. It included not merely the electrification of 134 miles of steam lines, but also power and substation equipment to convert water power from the Andes Mountains into electric current.

In 1922 the first shipment of substation equipment departed—but ahead of it had already departed a force of Westinghouse erection engineers. They went to a country that was a stranger to railroad electrical operation, and to the installation of large electrical equipment. In the 134 miles of steam railway to be electrified they encountered every kind of topographical and engineering condition—curves, grades as steep as 2¼ per cent and as long as 12 miles, bridges extending to 440 feet, six tunnels, the longest 1,600 feet.

Today, two years later, these same erection engineers are returning—returning from a Chile, much of whose railway traffic is moved by its water falls; they are returning and promptly *departing* again on still other missions of electrical improvement, at home and abroad.

This advertisement is sixth in a vocational series, outlining the fields for engineering achievement in the Westinghouse organization. A copy of the entire series will be sent to anyone requesting it.

Westinghouse

ACHIEVEMENT & OPPORTUNITY

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Irrigation by electrically driven pumps has made hundreds of thousands of acres of desert land in the Intermountain West blossom like the rose.

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What electricity is doing for the farmer is only a counterpart of what it is doing for Industry, Transportation, City and Country life or any of the professions. It is a tool ready for your use and which, wisely used, will make the impossible of today an accomplished fact tomorrow.

How electricity does these things is important to the student in a technical school—but *what* electricity can do is important to every college mar or woman, no matter what their life's work may be.

The General Electric Company provides for agriculture little motors that do the farm chores and great ones that operate mammoth pumps to irrigate vast stretches of arid valleys.

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