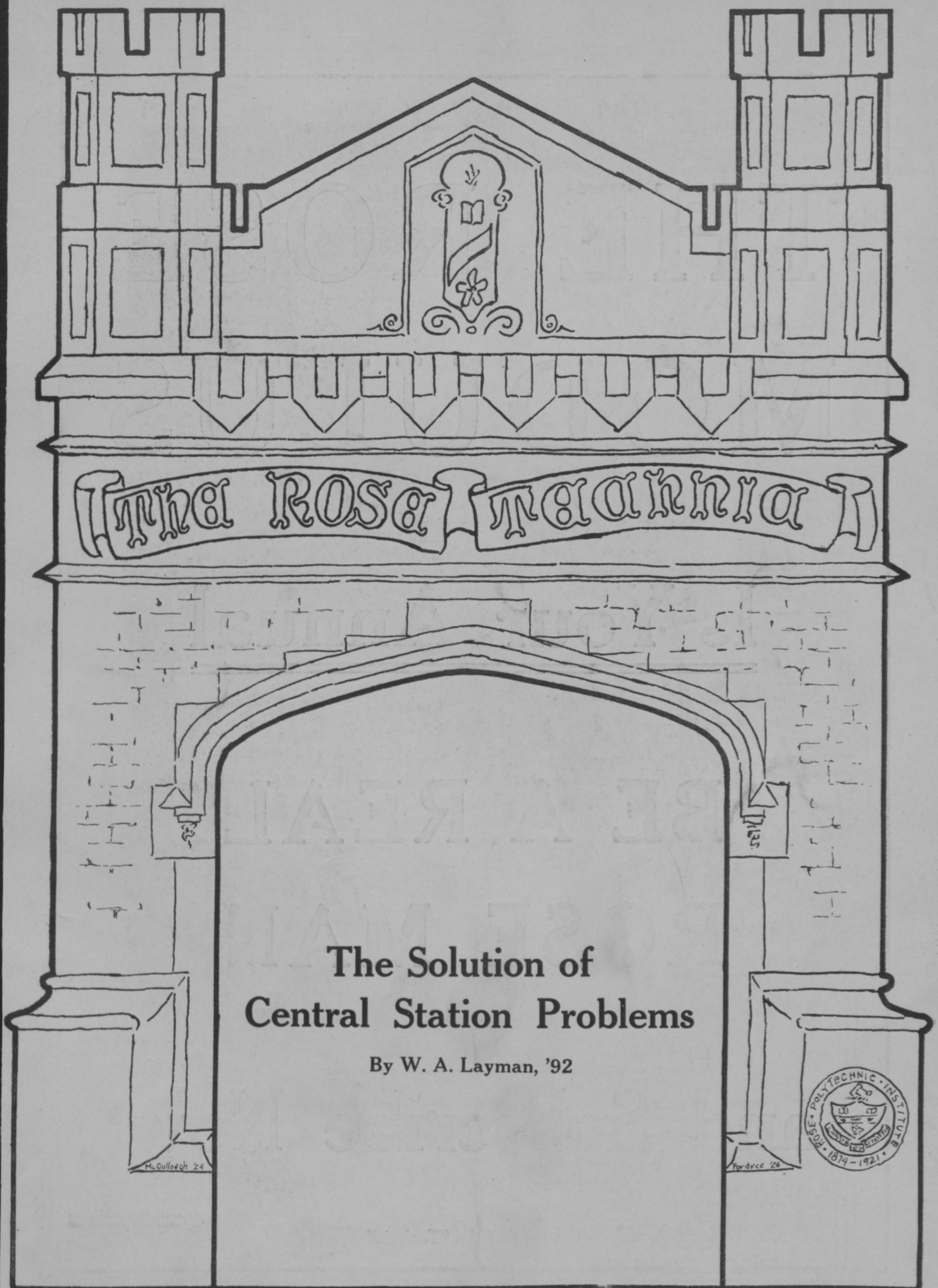
Winter 1-1924

Volume 33 - Issue 4 - January, 1924

Rose Technic Staff
Rose-Hulman Institute of Technology



The Solution of Central Station Problems

By W. A. Layman, '92

VOL.. XXXIII Member of Engineering College Magazines Associated No. 4

THE ROSE MODULUS

Is Your Annual

BE A REAL ROSE MAN

and Subscribe Now

Courtesy of the "Technic"

Vol. XXXIII TERRE HAUTE, INDIANA, JANUARY, 1924 No. 4

THE TECHNIC

MEMBER OF ENGINEERING COLLEGE MAGAZINES ASSOCIATED

PROF. A. E. KURTZ, Chairman.....Iowa State College, Ames, Iowa.

A monthly magazine published nine times from October to June, inclusive, by the student body and Alumni of Rose Polytechnic Institute.

Other Members Are

The Transit.....Towne Scientific School Journal
Colorado Engineer.....Tech Engineering News
Sibley Journal.....Cornell Civil Engineer
Iowa Engineer.....Kansas State Engineer
Nebraska Blue-Print.....Minnesota Techno-Log
Wisconsin Engineer.....Illinois Technograph
Penn State Engineer.....Ohio State Engineer
Princeton E. A. News-Letter.....Michigan Technic
University of Virginia Journal of Engineering

EDITORIAL STAFF

Harold B. Hood, '24.....Editor-in-Chief
Milton E. Feldstein, '25.....Managing Editor
John M. Barr, '25.....Alumni
Orville M. Dunning, '25 ..... Technical Exchange
Lewis J. Sisson, '26.....Jokes
Sam Forsythe, '24.....Athletics
John Shaw, '25.....Campus Notes

BUSINESS STAFF

Carson W. Simms, '24.....Business Manager
Roger Bolin, '25.....Advertising Manager
Wayne E. Watkins, '26.....Asst. Advertising Manager
Ed. Dunning, '27 .....Asst. Advertising Manager
Clay P. Watson, '24 .....Circulation Manager

Address all communications to
THE ROSE TECHNIC,
Terre Haute, Indiana.

Terms of Subscription

One Year $2.00
Single Copy ..... .30

Recognized by the Terre Haute Retail Merchants' Association as an Advertising Medium.

Acceptance for mailing at special rate of postage provided for in Section 1103, Act of October 3, 1917, authorized December 13, 1918.

Summary of Contents

A SOLUTION OF THREE SERIOUS CENTRAL STATION PROBLEMS

1. Idle Investment 2. Excess System Losses 3. Poor Regulation

By W. A. Layman, '92

IN a retrospective survey of the development and progress of electrical science, there is no more interesting chapter than that telling the story of the advent and evolution of the electric power motor. Today motor applications are proceeding at the probable rate of several million horsepower annually. Only a comparatively short time ago, the electric motor as an instrumentality for delivering power had not come into existence.

In 1878, Count Du Moncel published what he termed a very complete "Expose des applications de l'electricite". With reference to the electric power motor, he said:

Attempts have been made for the past thirty years to employ the attractive effects of electro-magnets or the dynamic effects of currents as a motive force. This question today still occupies many heads, and considering the ardor displayed to solve this problem, one would say that it is no less a question than the discovery of the philosopher's stone in mechanics. Without doubt the creation of a non-explosive motor which would need no one to attend to it, which could be situated wherever it would be most convenient without needing a special building, which could be made to act with more or less force according to the work required from it, finally, whose size would not be cumbersome, would be very important, especially for the minor industries, **but we should not have too many illusions on this point.** * * *

"A great number of persons—as many in France as in Germany, England, and America—have spent much money for the construction of these motors, and have arrived at this conclusion: **that the electromotive force is only suceptible of application in very narrow limits, which cannot exceed those of clockwork.** * * *

"The conclusion of this is that one should for a long time, if not forever, be on guard against the pompous announcements of certain constructors and of certain periodicals, which affirm that electromotors can be established having the force of several horses. What is certain is that **up to the present time no motor has equalled one horsepower,** and those who treat the problem as solved recall to us the fable of the hunter who sold the bear's skin before he had killed the bear."

In 1881 there was held in Paris, France, an "International Exhibition of Electricity", pronounced by the representative of the United States government who attended to cover "the whole ground of electric science." "One of the most interesting applications of electricity at the exhibition," said Major David Heap, "was that of its use as a motive power."

The most important individual exhibit was that of a new type of machine "for the transport of power to a distance". The machine exhibited weighed about 1,150 pounds, and it was claimed that it would transport from six to eight horsepower for a distance of three miles, the useful work given out by the motor at the far end of the line being about fifty per cent of that required to drive the generator.

Think of it! Forty-two years ago only—five horsepower being transmitted three miles, at a loss of fifty per cent of the driving energy, and no living scientist or engineer so bold as to predict the commercial distribution of electrical power on a larger scale over considerable distances!

In 1893, at the great Chicago World's Fair there assembled an International Electrical Congress. When the program of this Congress had been practically completed, it was found that not a single engineer had suggested, nor had the managing committee pre-arranged a single paper on the electrical transmission of power; so, a general discussion was improvised and in the light of the present day state of the art that discussion was extraordinary in its meagerness and poverty of imaginative anticipation of the subsequent rapid expansion of power transmission. A distinguished British engineer present quoted the daily press as suggesting that the American engineers had conspired to draw out the visiting foreign engineers on the subject. A prominent Pacific Coast engineer did not mince words in picturing the status of power transmission at that time. He said:

"As a consulting engineer I represent a variety of companies in California who desire to transmit power electrically. The aggregate will amount to some 40,000 h.p.—the distance running from ten to forty miles. Notwithstanding the fact that Mr. Scott has referred to the successful transmission of power for lighting purposes at San Antonio for twenty-eight miles, the electric transmission of power for long distances in California is a failure." * * *

The Editor wishes to call the special attention of all readers of the Technic to this article by Mr. W. A. Layman, '92. Mr. Layman, as President of the company which has produced the Fynn-Weichsel motor, the greatest stride in electrical engineering in many years, has a very interesting message, which we are sure will be well worth the time required to read it.

The Editor also wishes to take this opportunity publicly to express his thanks to Mr. Layman for his fine co-operation with us in our effort to put this invention before our readers. We on the Staff can only wish that all of our Alumni could be depended on to "come through" in so admirable a manner as has Mr. Layman.

"I wish to say definitely that to the inventor in California today, the successful machine for long distance transmission of power electrically exists only in the minds of the inventors and promoters, or in some beautiful advertisement."

There was a great variety of discussion of the relative merits of direct and alternating current for power transmission purposes, and no less an authority than the great electrical genius of recent years—the late C. P. Steinmetz—said:

"If I may be permitted to take a look into the future, although we do not know what tomorrow will bring, I think the power transmission system of the future will be the single-phase system. Where the power is transmitted over a long distance by an overhead wire, the ground can be used as the return conductor."

Late in the '80's a project for the development of power at Niagara Falls began to take definite shape. An International Commission of engineers was created to consider how the power of the Falls could be practically developed. Leading engineers of the world appeared before this commission with recommendations. The well-known authority, George Westinghouse, in his early discussions before the commission recommended the adoption of compressed air as a means of power transmission to the City of Buffalo. The chief engineer of the commission is authority for the statement that for a long time there was a great preponderance of opinion in favor of compressed air, and when, in the spring of 1891, the commission awarded its premium for projects worthy of further consideration, four projects were for compressed air transmission.

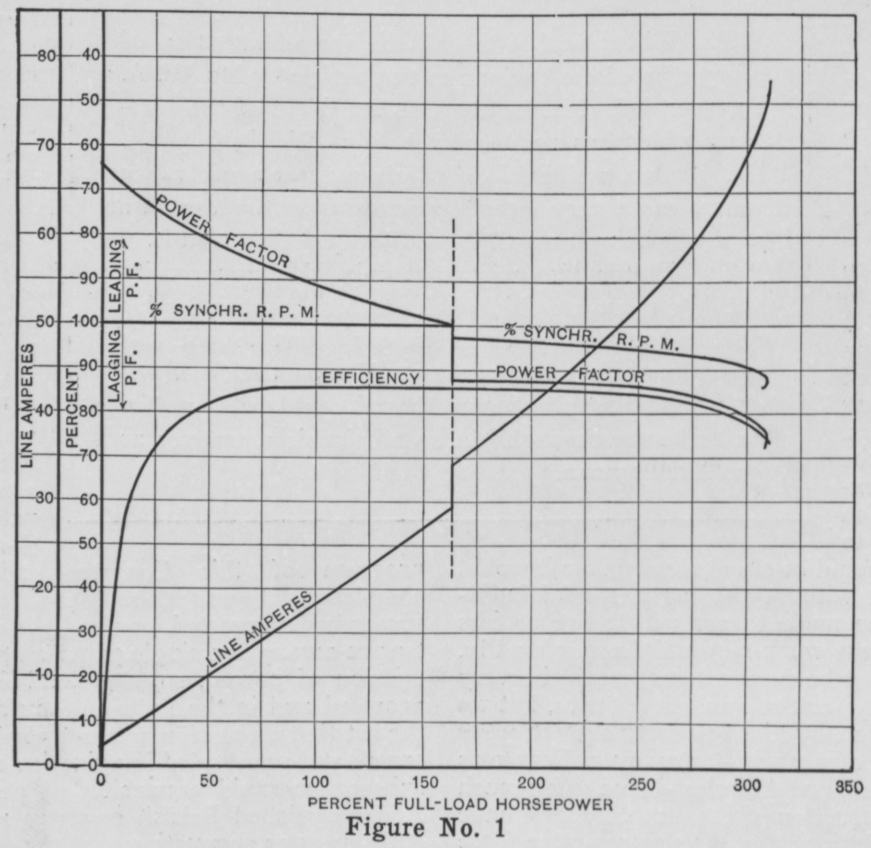


Figure No. 1

Does not this retrospective survey all seem strange in the light of the discussion today of super-power with inter-connection of all American generating stations from the Atlantic to the Pacific; and with practically no commercial limitation to the application of electric motors to power drive?

Indeed, so complete is the present day acceptance of the proposition that electrical transmission has no reasonable scientific or commercial limitations that it is somewhat startling to the general public to be informed that there has remained all these years one tremendous transmission problem crying out for solution. I refer to the problem of low power factor, with its three phases of idle plant investment, excess losses of transmission arising from the idle current flowing in alternating current generating and transmission systems, and poor regulation. It is in connection with the solution of this problem that I am writing this article.

Four questions present themselves in this connection:

1st. What is this so-called idle current?
2nd. What is this problem of idle investment and what is its magnitude?
3rd. What is the magnitude of the excess of transmission losses due to this idle current?
4th. Why poor regulation?

Idle Current

To the majority of electrical engineers, an answer to this first question is hardly necessary. To some a clear statement may be desirable. At the risk of an explanattion being gratuitous, I make the following reply:

In the early beginning of electrical transmission, there was no idle current problem. Direct current was the agency of power transmission. In the direct current circuit the energy flowing is the product of the whole current and the pressure. Up to the early '90's, the situation was serene with respect to this proposition, but the rapid expansion of demand for electrical power created a crisis in direct current transmission. The limitations of the old two-wire system and its successor, the Edison three-wire system, had been reached. Energy losses in the transmission became so staggeringly great, because of the low voltage of transmission, that the industry cried out for a new invention. Forward came George Westinghouse, William Stanley, and Nicola Tesla with the alternating system. After two or three years of vicissitudes and failures in experimental trials, engineers generally accepted the alternating current system as a solution of the crisis of direct current limitation—

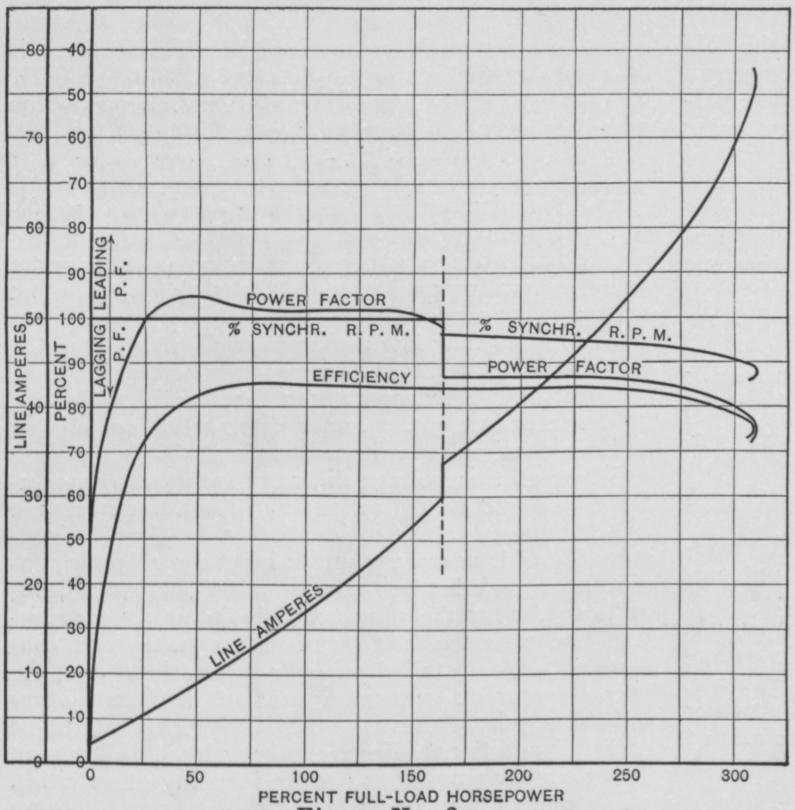


Figure No. 2

but with the alternating current arose a new situation. No longer was the energy flowing in the circuit the product of the total current and the pressure, as in the direct current system, but only a fractional part of this product—namely, somewhere between 40 and 80 per cent of it, depending upon whether the system was partially or fully loaded. This percentage is what is popularly termed the power factor of the system.

It is exceedingly difficult to explain to the non-technical mind just what idle current and power factor are. Because you and I will be called upon much more frequently in the immediate future than in the past to make an explanation to our non-technical friends. I shall here mention two or three popular analogies that have been offered.

First, the illustration of a salesman friend—**a glass of beer.** You all have recollections of such an institution, with about 50 per cent of solid dark amber fluid and about 50 per cent of foam. My friend calls the solid amber fluid the working current and the foam the idle current. He says the ratio of the solid beer to the capacity of the glass is the power factor.

Second, Mr. V. A. Fynn's illustration—**the heavy roller.** In the case of a large and heavy cylinder rolling on the floor, a very considerable effort will be required to set the cylinder in motion, but very little effort will suffice to keep it rolling. An equally considerable effort will be necessary to stop the cylinder. If the cylinder is used to crush corn, then the effort necessary to start it—that is, to overcome the inertia—will certainly do no work on the corn, but will be transferred to whatever stops this cylinder after it has rolled over the corn. So far as corn crushing is concerned, this effort is idle, and the only effort which is useful and does crush corn is that which is necessary to keep the cylinder rolling after it has been started.

In direct current work, the roller keeps going in the same direction all the time, and the current to start it is a small portion of the total current consumed; but in alternating current where the roller keeps reversing itself 120 or more times per second, the current consumed in starting and stoppage is a very large percentage of the total current flowing. This starting and stopping current is the idle current and is necessary because of the presence of inertia in the motor—but it does no useful work in the motor or anywhere else.

Third, my own illustration—**the old town pump.** The old wooden town pump, I am sure you remember, was always dry when you tried to pump water. Cupful after cupful of water had to be poured into it before it would take hold and draw water from the well below. This priming water represents in the alternating current system, the idle current. If you imagine the well to be the generator, the pipe connecting the well with the pump to be the transmission system, and the pump to be the alternating current motor, you have a picture of an entire alternating current system. Most old town pumps not only required a liberal supply of initial priming water to start, but a considerable amount of the water drawn from the well continuously slipped back and

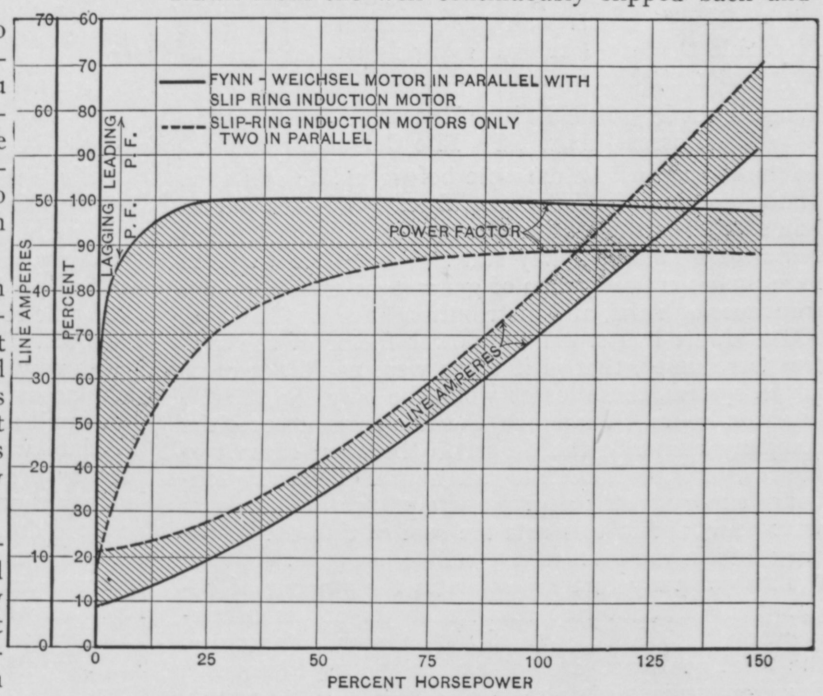


Figure No. 3

never reached the bucket, and was in reality a continuous priming supply.

The alternating current motor is like the old wooden pump. It requires continuous priming, and this priming current is always occupying a large percentage of the capacity of the dynamo at the power house, the transmission system, and the windings of the motor itself.

So much for popular illustration.

Years have gone on and the idle current problem has not only persisted, but its magnitude has become astounding.

What Is This Problem of Idle Investment and What Is Its Magnitude?

There is invested in the central station industry of America today more than five billion dollars. Based upon figures from several large generating and distributing companies, approximately 25 per cent of this investment yields no productive return, because it is loaded down with idle current.

I have before me, as I write this paper, the carefully prepared figures of an important operating company, from which I quote the following data:

The total property investment of this company is $44,000,000, subdivided between $5,000,000 in generating systems; $12,000,000 in transmission systems, and $27,000,000 in distributing systems. The power factor of the transmitted load is 79.3 per cent and of the distributed load sent out from sub-stations is 72.7 per cent.

This operating company has determined that the amount of excess investment due to the low power factor current is $3,500,000 in generating and transmission system, and $7,500,000 in distribution systems; or, a total excess investment of $11,000,000. Almost exactly 25 per cent of the total investment is their calculation of idle investment due to idle current.

A prominent central station executive has stated to me that he believes this illustration quoted is an example of a well-managed company, and one in which the idle investment is probably conservative and more favorable than the corresponding figures of the majority of distributing companies.

What Is the Magnitude of the Excess of Transmission Losses Due to This Idle Current?

The most concrete example before me at this time of the volume of excess central station losses due to idle current is the station above quoted as to idle investment. This company states that the total annual losses in its entire system of generators, transformers, transmission lines, and distribution lines are 269,000,000 kilowatt hours. If the power factor of the system were unity, that is if there were no idle current in the system, these losses would be only 198,000,000 kilowatt hours. Therefore, the idle current costs the company annually the difference between these two figures, or 70,600,000 kilowatt hours. Their switchboard energy cost is approximately 0.6 cents per kilowatt hour, and at this rate the cost of this excess energy loss in the system is $485,000 per year.

This company further estimates the amount of depreciation and interest charges on its excess investment of $11,000,000 as $1,300,000 a year. Therefore, the total combined cost of excess energy losses and fixed investment interest loss is $1,800,000 per year, or 19.12 per cent of the entire operating costs of the system.

Assuming that the idle plant investment of the country due to idle current is 25 per cent of the total central station investment of $5,000,000,000, there is an excess central station investment of $1,250,000,000 of capacity in dynamos, transformers, transmission and distributing lines, motors, etc.

Why Poor Regulation?

In a technical article I need not dwell on the difficulty of poor regulation. A prominent engineer of my acquaintance says poor regulation is a far more serious operating problem to him than idle investment or excess transmission losses. Every operating engineer knows how low power factor load reduces the capacity of generators for maintaining switchboard voltage; how the drop in transformers is tripled by inductive or low power factor load; how transmission and distribution line voltage drop is similarly reduced; and how all this voltage difficulty increases constantly as the induction motor load on the station increases.

Not long ago the Cincinnati Gas & Electric Company found it necessary under low power factor conditions at peak load to operate additional generating units solely for the purpose of maintaining distribution line pressure. At large cost, synchronous condensers were installed in four substations and the power factor at generating stations sufficiently improved to release the voltage boosting generators for carrying additional effective energy load. I have no doubt similar conditions prevail in many other cities, solely due to low power factor.

The effect of low power factor on transmission line drop was very graphically expressed recently by an operating engineer who said his transmission line capacity would be doubled, without the investment of a single dollar, if he could operate at unity power factor.

Every central station executive knows what good service means as contributing to financial success and public good will, and realizes how important good regulation is to good service.

When the facts with respect to idle investment excess losses, and poor regulation are marshalled into plain view, even those of us long identified with the electrical industry are startled by the magnitude of this low power factor problem. How much more astonishing must it be to the general public, accustomed to believe that the great problems of electrical transmission have been solved, to find that such a gigantic problem is not only unsolved, but that it has persisted for thirty years, and that the central station industry has accepted it as an almost inevitable price to pay to be able to transmit energy in large amounts to long distances.

But why has the central station industry been so complacent about this proposition?

A familiar story is a complete explanation:

A late wayfarer, heavily under the influence of a popular pre-Volstead beverage, wending his difficult journey homeward collided with a tree and was knocked down. Getting back on his feet and heading himself again for home, he struck the same tree again and was knocked down again. A third time he essayed the proposition with the same result, whereupon he concluded he was in an impenetrable forest—settled himself comfortably on the ground, and went to sleep.

The central station industry has been conscious of

(Continued on page 24)

STUDENT ACTIVITIES

HAVE you fellows any idea what percent of the Student Body is actively affiliated with any student organization? Probably not; and probably you will be more or less startled to learn that the percentage runs below forty.

Perhaps the reason for that is the fact that the organizations which exist now don't offer a sufficiently wide range of interesst to attract all of us. We hope that there is some such reason, for we feel (as do a great many others) that at least ninety percent of the students in a school should take some active part in the so-called "College Life". The feeling is so strong in some quarters that there are several schools in the country where every Freshman is required to affiliate himself with some student activity within his first two weeks in school.

If a lack of diversity of aims is the reason for the small percentage mentioned above, then a certain amount of the trouble has been eliminated in the presen month. Two new organizations are being offered o the studen—the Rose Round Table and the Rose Chapter of the American Associaion of Enginers.

The Round Table is, as the name indicates, a club organized for the purpose of allowing the members to hear the opinions of others on the principal topics of present-day interest, and to express their own opinions thereon. The charter members of the club have no idea of revolutionizing the world—they don't even intend to make any attempt to influence anyone to change his views on any subject. It is, however, their hope to be able to conduct their organization in such a way as to allow those who attend the meetings to obtain a more comprehensive and broad-minded view of subjects of world-wide interest and importance.

There is, too, another aim. It is a conceded fact that engineers, as a class, lack the ability to talk well on their feet. It is an easy matter to sit down and talk to one or two men, but to stand before an assemblage and express one's views in a forceful and interesting manner is an entirely different matter. It may be that you fellows feel that you can do it, but nine out of ten of you, after making a ten-minute talk, wouldn't be able to repeat even the gist of what you had said. It is planned to make arrangements such that every member will have an opportunity to talk for a few minutes at least once a month—and practice makes perfect.

It may sound like a bunch of bunk, fellows, but drop around to a meeting once in a while and see if it doesn't interest you.

With respect to the Student Chapter of the American Association of Engineers, a short article has been prepared which we will quote here:

"During the past few years there have been several attempts to form student chapters of the large student engineering societies at Rose. Many of these attempts have not been highly successful. Several reasons for their failure have been suggested, but probably the biggest reason is that the students do not have enough interest in societies of a more or less technical nature. The student is crowded every day in the week with technical studies, and he may feel that such societies mean only more work.

"An opportunity is now extended to Rose students to affiliate with a newer associaion which embraces all the different branches of engineering and is better described as a professional society than as a technical one. This association is new and its policy is not fixed by old prejudices or traditions. Still, it is not so new that its worth is doubtful. Its aim is to unite all the professional engineers into one association for promoting their work as a profession. It is called the American Association of Engineers and numbers thousands in its membership.

"Many advantages are given to a student by a student membership in the association. He is not only a party to the activities which the student chapter may carry on, but he will be welcome at many meetings of the active chapters of the association. He receives the magazine, 'The Professional Engineer,' published by the association, which keeps him in touch with practicing engineers all over the country.

"The dues for student membership are one dollar per year, which no more than pays for the magazine. When, after graduation, the student member wishes to raise his grade in the associaion, he is not required to pay the initiation fee of ten dollars which he would have had to pay had he not been a student member. This saving is surely worth while.

"Mr. C .E. Drayer, the secretary of the association, offers a loving cup to any student chapter which makes a hundred percent enrollmen of students above the Freshman class. Freshmen are welcome, but their membership is not necessary to get the cup. The University of Arizona, the University of Southern California and other schools have made their hundred per cent. Can't Rose do the same?"

This quotation gives some idea of the interest one student at Rose is taking in the organization of a Rose chapter of the association. A like enthusiasm on the part of a hundred or so other men would go far toward the winning of the loving cup mentioned above. The winning of the cup, though, is a minor consideration. Membership in student organizations, aside from the good it does to the members, is a valuable aid to the other things which foster a good school spirit. School spirit, though not lacking at Rose, is one of those things of which we can not possibly have too much. Let's get a little more. Join something!

A disinterested observer said, during the Normal game on January 8, that "to all appearances, Whitecotton, Reynolds and Sherwood-sub-two got more kick out of the rendition of 'Indiana's Dear State Normal' by said dear one's alleged band than did anyone else in the gym." Attending the game with Normal girls, the boys had to resort to somewhat strenuous measures to keep their fair ones from standing while the musical (?) aggregation poured forth the revered strains. It was generally noticed that the selection was played much more often than was strictly necessary, and it was thought that the three boys must have gone into cahoots with the inspired Normalites in the west section in order that they (the boys) might have further opportunity to resort to the beforementioned strenuous measures. Of course, the logical thing to say to them is, "Take he home, George!"

Basket-Ball

20—ROSE, CENTRAL NORMAL—19

The Rose maple court performers, under the expert tutelage of Heze Clark, opened the season on December 7 with a fast victory over Indiana Central Normal. Good basketball was displayed by both teams when the early date is considered, and the Rose basketeers gave promise of developing into a formidable outfit before the close of the season.

Schoonover, giant back guard, and Dowen at forward, were the stars of the Rose play, while Hite and Janell were the best of the losers.

LINEUP AND SUMMARY

ROSE		CENTRAL NORMAL
Skeeters (Capt.)	F.	Cox
Dowen	F.	Janell
Anderson	C.	Hite
Watson	G.	Walls
Schoonover	G.	Carpenter

Substitutions—Normal: Hauck for Janell, Janell for Cox, Cox for Hauck.

Field Goals—Normal: Cox, 3; Janell, 2; Hite, 2; Walls, 2. Rose: Dowen, 4; Anderson, 4; Skeeters, 2; Watson.

Foul Goals—Normal: Hite. Rose: Watson, Dowen.

Referee, Hannah.

23—ROSE, E. I. S. N.—17

Our fast stepping Engineers registered their second victory in as many starts on the night of December 8 against the Charleston Teachers. Rose was never headed during the game, though the score was close at all times. All of the Rose players teamed well and played steady basketball. Foreman was the stellar performer for the Normalites.

LINEUP AND SUMMARY

ROSE		E. I. NORMAL
Skeeters (Capt.)	F.	Phipps
Dowen	F.	Muchmore
Anderson	C.	Cowles
Watson	G.	Foreman
Schoonover	G.	Bisson

Substitutions—Normal: Brainard for Phipps, Hall for Muchmore, Brown for Foreman, Gilbert for Brown, Osborne for Bisson.

Field Goals—Normal: Cowles 2, Foreman 2, Phipps, Brainard, Muchmore. Rose: Dowen 4, Skeeters 3, Watson 3.

Referee, Rotz of Milliken.

7—ROSE, PURDUE—45

On the night of December 12, Rose Poly suffered a crushing defeat at the hands of the powerful Purdue team. The offense flashed by the Purdue warriors was undeniably brilliant, and their eye for the net was uncanny at times. Rose boosters who saw the game declare that Purdue boasts a "wonder team" this year—one which will probably reach the end of the season undefeated. Captain Gullion and Robbins were the stars of the Boilermakers' offense, though every man played stellar basketball.

LINEUP AND SUMMARY

ROSE		PURDUE
Skeeters (Capt.)	F.	Spradling
Dowen	F.	Tavis
Anderson	C.	Gullion
Watson	G.	Robbins
Schoonover	G.	Wellman

Substitutions—Purdue: Fauble for Tavis, Newman for Spradling, Rigsby for Robins, Crane for Gullion. Rose: Miller for Dowen, Fox for Anderson.

Field Goals—Purdue: Spradling, 7; Gullion, Robins 5; Jones 2; Tavis, Newman, Rigsby. Rose: Skeeters.

Foul Goals—Purdue: Tavis. Rose: Watson 2; Dowen, Schoonover, Skeeters.

12—ROSE, FRANKLIN—40

In the second home game of the year on December 14, Rose was defeated by the Franklin "Wonder Five" by a score of 40 to 12. The defeat, coming as it did from the holders of last year's State Championship, was not particularly bitter. The team work of the Baptists was perfect, and they rarely shot without connecting. Vandiver and Gant bore the brunt of the visitors' attack, while Captain Skeeters was the strongest member of the Engineers' quintet.

LINEUP AND SUMMARY

ROSE		FRANKLIN
Skeeters	F.	Gant
Dowen	F.	Vandiver
Anderson	C.	C. Friddle
Watson	G.	Deer
Schoonover	G.	Wood

Substitutions—Franklin: B. Friddle for Deer, Peterman for Wood. Rose: Fox for Anderson, Kadel for Skeeters.

Field Goals—Franklin: Gant 8; Vandiver 5; Deer 2; C. Friddle, B. Friddle. Rose: Skeeters 2; Dowen.

Foul Goals—Franklin: Vandiver 4; Deer, Gant. Rose: Watson 3; Skeeters 2; Dowen.

Referee, Bayh; Umpire, Hannah.

15—ROSE, INDIANA UNIVERSITY—51

In the last of three hard games in one week, Rose Poly suffered a 51-15 set back at the hands of I. U. at Bloomington on December 15. The Rose warriors, badly used in the Purdue and Franklin games, were in no condition to offer any real opposition to a team of Indiana's calibre. Captain Mike Nyikos and Logan were the Crimson stars.

LINEUP AND SUMMARY

ROSE		I. U.
Skeeters	F.	Nyikos
Dowen	F.	Logan
Anderson	C.	Sinks
Watson	G.	Sponsor
Schoonover	G.	Alward

Substitutions—I. U.: Bordner for Sinks, Knoy for Sponsor, Coffey for Nyikos, Parker for Bordner. Rose: Miller for Watson, Fox for Anderson.

Field Goals—Nyikos 9; Logan 7; Knoy, Sinks 2. Rose: Skeeters, Dowen 2.

Foul Goals—I. U.: Logan 5. Rose: Skeeters 3; Fox 2; Dowen, Watson.

Referee, Vandiver of Franklin.

Referee, Vandivier of Franklin.

23—ROSE, MEROM—14

As a celebration of the holidays, Rose walked on Merom to the tune of 23-14 on December 22. The game was at all times fast, with the Cliff-dwellers leading at the half way mark, only to give way to the steady rise of the Rose offense in the second half. Rose gave promise of hitting her stride once more, and the season's average, to date, was brought back to 500, with three wins and a like number of defeats.

LINEUP AND SUMMARY

ROSE		MEROM
Skeeters	F.	Ward
Dowen	F.	Williams
Fox	C.	Burroughs
Anderson	G.	Parker
Schoonover	G.	Brown

Field Goals—Merom: Parker, Ward 2; Burroughs. Rose: Anderson 4; Skeeters, Watson 2; Dowen.

Foul Goals—Merom: Brown, Ward 2. Rose: Dowen 2; Skeeters, Schoonover.

Referee, Wibble.

5—ROSE, HOOSIER ATHLETIC CLUB—30

Journeying to Indianapolis on the night of December 29, Rose suffered defeat at the hands of the H. A. C. team, formerly the proteges of Coach Heze Clark. The well drilled Club team was too much for the Engineers, and the final count was 30-5. The Hoosiers worked well as a unit, while the Rose team showed the effect of holiday meals and lack of practice.

LINEUP AND SUMMARY

ROSE		HOOSIERS
Skeeters	F.	Jessup
Dowen	F.	Scott
Fox	C.	Summers
Watson	G.	Teeters
Schoonover	G.	Cox

Substitutions—Hoosiers: Rogers for Jessup, Hanson for Scott, Summers for Cox, King for Summers. Rose: Fisbeck for Dowen, Kadel for Skeeters, Kelly for Kadel, Anderson for Fox.

Field Goals—Hoosiers: Scott 5; Teeters 3; Summers 2; Jessup. Rose: Dowen.

Foul Goals—Hoosier: Scott 2. Rose: Schoonover 2; Skeeters.

53—ROSE, MEROM—12

In the fourth win of the season on January 5, Rose Poly swamped the Merom College quintet by a 53-12 score. The Rose offense was fast at all times, and if the boys continue passing and shooting according to the standard set in this game, the outlook for a good season is bright indeed.

The defense offered by Watson and Schoonover kept the Merom sharpshooters away from the netting at all times, while the passing game and goal shooting of Fox, Skeeters, Anderson and Dowen was of inestimable aid in the winning of the game. Probably the prettiest shot of the game was a backhanded cast by Willie Dowen as he came under the basket a mile a minute. Joe Fox, however, was the scoring ace of the evening, making seven beautiful casts in a little over half the game in which he participated. V. Ward and Burroughs showed to best advantage on the visitors' team.

LINEUP AND SUMMARY

ROSE		MEROM
Skeeters	F.	Williams
Dowen	F.	V. Ward
Anderson	C.	Burroughs
Watson	G.	Parker
Schoonover	G.	Brown

Substitutions—Rose: Fox for Dowen, Fisbeck for Skeeters, Kelly for Schoonover, Kadel for Anderson, Shepherd for Fox.

Field Goals—Merom: V. Ward, 2; Burroughs, Cunning-

Field Goals—Merom: V. Ward 2; Burroughs, Cunningham. Rose: Skeeters, Watson, Fox 7; Dowen 3; Fisbeck, Kadel.

Foul Goals—Merom: V. Ward 4. Rose: Watson.

A clipping from the St. Louis Post-Dispatch of December 5, sent to us by Joseph A. Hepp, '12, tells of an address broadcasted from station K S D in St. Louis by Mr. H. E. Wiedemann, '03. The address was entitled "A Lump of Lime" and dealt with the importance of lime in the daily life of Mr. Average Citizen.

Mr. Wiedemann is, to quote the Post-Dispatch, "a well-known chemist and a member of the St. Louis chapter of the Alpha Chi Sigma Fraternity, an organization of scientists." He is, by the way, State Chemist of Missouri.

Mr. Hepp, our correspondent, is a research engineer with the Union Electric Light and Power Company of St. Louis, and is also the chairman of the committee of the Alpha Chi Sigma chapter which is caring for the programs of popular chemistry which are broadcasted from St. Louis with a large degree of regularity.

We wish to take this occasion to thank Mr. Hepp for this demonstration of his interest in the Technic, and to ask that other Alumni follow his very excellent example. Send in that interesting item, Grads!

Check, Profs

Profs is those which:

Talksodamnedfastthatyoucan'ttakeanote.

Spend three-quarters of an hour and one box of chalk explaining, and then after you've copied four pages of notes, tell you that the stuff is not important.

Wear red neckties and horse collars.

Wait until you're jammed with work and then throw a quiz.

Think that their course is the only important one that you are taking, and hand out problems as if they were giving away German marks.

Tell you not to bone for the exam because it will be general, and then ask you if you agree with statement on page 247.

Give you the Fs and the others the Cs and Bs.

Call the roll the day you cut.

—Mass. Tech. Voo Doo.

FRATERNITY NOTES

AXS

With a theatre party at the Hippodrome on December 10, Iota chapter celebrated the twenty-first anniversary of the founding of Alpha Chi Sigma at the University of Wisconsin. The active members who were present were Russell Corban, Herbert Corban, Garnet Phillips, Gustave Pfeiffer, E. C. Gosnell, L. E. Muehler, C. L. Corban, G. Kittle and E. Pifer. Chaperones were Dr. and Mrs. John White and Mr. and Mrs. Ray Cooke.

Everett Gosnell entertained with a smoker to the Alumni and the active members of the chapter on Friday, December 28. Visiting Alumni present were Mr. Errol L. Fox and Russel Snyder from Indiana University and John M. Sanford. Members present were H. M. Corban, G. Phillips, G. Pfeiffer, E. Pifer, G. Kittle and C. L. Corban.

H. E. Reed and H. R. Kinkle were home Christmas from Springfield, Illinois.

H. A. Clarke, '21, was at home during the holidays.

G. E. Defel was in town from Washington during the holidays.

A. T. O.

At the Deming Hotel, December 20, the active members of Gamma Gamma and Alumni enjoyed one of the most attractive formal Christmas dances ever given by the chapter. Stewart's Society Syncopators furnished music and a perfect evening ensued.

Sunday evening, December 9, found the chapter house in a deluge—a pillow shower. It seems the girls about town had gotten together and made a whole flock of the things which they donated to make the new home comfortable.

The annual informal smoker held Christmas afternoon was thoroughly enjoyed by all. Some of the old heads who were back were, McKee, Ronald, Tyler, Offut, Hendrich, Froeb, J. Burns, Manson, McKeen, Belden and Scott.

"Ron" Manson and Mrs. Manson, formerly "Libby" Pugh, have returned to Terre Haute. They were recently married in California.

Brother "Johnny" Burns who has been in New Mexico for his health returned home Christmas and was given a royal welcome.

Brother "Shakey" Hager is now in charge of a test for General Electric at Schenectady, New York.

Brother Dewitt "Pat" Cromwell was a distinguished visitor at the house during the holidays.

SIGMA NU

On Friday evening, December 21, a Christmas party was given at the house for fifteen orphan boys from Flora Gulick's Home for Boys. The house was attractively decorated and a large Christmas tree stood in the center of the spacious reception room.

The youngsters, all of them between the ages of six and eight, played various games, boxed and had a good time in general. A six o'clock supper was served and following this, presents were distributed. All the children had a good time and it was unanimously decided to make the party an annual affair.

Brothers Simms and Moorhead attended the National Convention at Birmingham, Alabama during December 28, 29, 30, and 31.

Announcement was made of the marriage of Brother Wright, '23, to Miss Virginia Alsop of Vincennes, Indiana.

Many of the Alumni were back to spend the holidays in the city including Brothers Reinking, Wright, Red Wilson, Schroeder, Harmas, Steffen, Biller, Henderson, Quinlan and Dowen.

P. I. E. S.

Alumni brothers who visited the house during the holidays were: Chester Williams, '17, St. Louis; Homer Clark, '21, Detroit, Mich.; Edward Donham, '23, Chicago; Fred Owens, '21, Pittsburgh; Earl Moses, '21, Pittsburgh; Jerome Farmer, '20, Pittsburgh; Hubert Goodman, '21, Sapulpa, Okla.; Floyd Hunt,, '22, Indianapolis; Ernest Hunt, '22, Indianapolis; Robert Failing, '22, East Chicago; Samuel Minar, '21, Chicago; John Bernhart, '08, Chicago; Raymond Liehr, ex-'23, Indianapolis; Max Faucett, '21, Urbana, Ill.; Floyd Benson, '23, Marion, Ohio, and Arthur Griepenstroh, Marion, Ohio.

Brother Homer Clark, '21, was married Saturday, December 29, at Indianapolis to Miss Oneta Barber of Bloomington, Indiana. Brother Clark is teaching Chemistry in a Detroit high school.

Brother Leroy Wilson, '22, who was Traffic Manager for the Indiana Bell Telephone Company in Terre Haute, has been transferred to Kokomo, Indiana.

Friday evening, Dec. 21, the Fraternity entertained with its annual Christmas dance at the Elks' Club. The hall was elaborately decorated with the Fraternity colors, royal purple and white, together with Christmas decorations. Three lighted evergreen trees were also used in decorating. During one dance, each guest receivd a headband made with purple plumes tied with white roses and purple plume fans to match. For another dance, toys were distributed to both the young men and the girls ,and partners were found by matching the toys. At a late hour, Santa Claus entered the room and gave each young lady a handsome engraved silver compact. Cliff Lowe's orchestra of five pieces furnished the music.

Honor guests at the dance were: Brother Orion Stock, '08, and Mrs. Stock and Professor and Mrs. A. Diefendorf. Several Alumni members who were at home for the holidays attended. The dance proved to be one of the most successful ever given by the Fraternity.

On New Year's Eve the Fraternity held a watch party at the Fraternity House. The members and their guests first attended the performance at the Hippodrome and then returned to the house to dance. At 12 o'clock, horns, balloons, and serpentine confetti were distributed and freely used to drive out the old year and to usher in the new. Delicious punch was served throughout the evening.

STUDENT COUNCIL

STUDENT COUNCIL MEETING, P. I. E. S. HOUSE.

November 1, 1923—8 P.M.
Rollcall—McDargh and Watson absent.
Report on Technic—Hood.
Report on Y. M. C. A.—Barr.
Report on rifle club—Schahfer.
Report on Honor point committee.
Moved by Jean that the Student Council act on the report of the Committee.
Sec. by Barr. Carried.
The following schedule approved by the council:

Activity.	Points.
Captain of any team	3
Letter man in football, basketball or baseball	5
Letter man in track or tennis	4
Manager of football, basketball or baseball	2
Manager of track or tennis	3
Assistant manager of football, basketball or baseball	1
Assistant manager of track	1
President of Athletic Association	2
Members of Athletic Association	1
Numeral man	tabled
Freshman manager	tabled
President of the Student Council	6
Vice-President of the Student Council	3
Financial Secretary of the Student Council	3
Recording Secretary of the Student Council	2
Members of the Student Council	1
President of Senior Class	5
President of other classes	3
Other class officers	1
Cheer leader	2
Assistant cheer leaders (not more than three)	1
Editor in chief of the Technic	10
Business Manager	8
Advertising Manager	6
Managing Editor	5
Circulation Manager	5
Assistant Advertising Manager	3
Members of staff	2
President of the Y. M. C. A.	7
Vice President of the Y. M. C. A.	4
Secretary of the Y. M. C. A.	4
Advertising Manager of the Hand Book	2
Cabinet members	3
Other active committeemen	1
Editor of the Modulus	5
Advertising Manager	4
Business Manager	4
Staff members	2
Grand Marshall of St. Pat's parade	2
Each participant in act at Hipp.	1
President of Rifle Club	1
Secretary, Treasurer	1
Expert rifleman, sharpshooter, marksman	1
Major in R. O. T. C.	2
All other commissioned officers	1
Chairman of the Junior Prom. Committee	4
Treasurer	3
Members	1

Hood moves that the above schedule take place immediately together with the old schedule till September 1, 1924.
Sec. by Reinking. Carried.
Moved by Jean that a man receiving twenty-five points in four years be awarded an honorshield.
Sec. by Barr.
Hood amends the motion so that a man receiving ten or more points in one year or twenty-five in four years is awarded an honorshield. Carried.
Hood moves that the last clause of the above motion takes effect Sept. 1, 1924.
Sec. by Jean. Carried.
Hood moves that Dave Campbell be awarded an honorshield.
Sec. by Glenn. Carried.
Hood moves that two shields be awarded to Leroy Wilson.
Sec. by Glenn. Carried.
Jean moves that $1.81 be paid to Martin out of the general fund for supplies for parade.
Sec. by Barr. Carried.
Radio Club applies for recognition by the council and Pres. Werner presents constitution.
Hood moves that Radio Club be recognized and given a seat in the council.
Sec. by Jean. Carried.
Jean moves that Radio Club be allotted 2 percent of the general fund.
Sec. by Glenn. Carried.
Meeting adjourned at 12.20 A.M.

STUDENT COUNCIL MEETING.

December 6, 1923, P. I. E. S. House, 7:45 P. M.
Roll call. McDargh absent. Glenn and Reinking present by proxy.
Report on Technic.
Report on Y. M. C. A.
Report on Rifle Club.
Report on Radio Club.
Jean moves that the honor schedule adopted, with the addition of one point for numeral man, be accepted.
Seconded by Barr. Carried.
Hood moves that the Student Council recommend to the Junior Class that they start preparations for the Junior Prom, and also for the publishing of a modulus.
Seconded by Barr. Carried.
Barr appointed to interview McDargh.
Watson moves that $100.00 be advanced to the Y. M. C. A. from the general fund, which is to be paid back on or before the first of next term.
Seconded by Jean. Carried.
Hood moves that the Student Council arrange for a few free dances to be given after basketball games at convenient times.
Seconded by Kelley. Carried.
Meeting adjourned at 8.40 P. M.

ROSE R. O. T. C.

THE local unit of the Reserve Officers' Training Corps was inspected on Tuesday, November 27, 1923, by Capt. Edward S. Johnston, Infantry, D. O. L., Assistant to the Officer in Charge of R. O. T. C. Affairs, Fifth Corps Area. As this inspection took place during midterm week, no inspection under arms was held.

The unit is now organized as the 1st Battalion of Engineers, R. O. T. C., Rose Polytechnic Institute. The following student officers and noncommissioned officers have been appointed:

Major and Battalion Commander, Carson W. Simms.

Captain and Battalion Adjutant, Richard P. Brettell, Jr.

Company "A."

Captain, Rollin M. Schahfer; 1st Lt., George O. Rall; 2nd Lt., Leo J. Weir; 1st Sgt., Edgar A. Wilson; Staff Sgts., Floyd E. Watson, Harman B. Woerner; Sergeants, Charles G. Haupt; Dan E. Bundy, James H. Brinton, Sidney L. Freers.

Company "B."

Captain, W. Moorhead; 1st Lt., C. Howard Marlar; 2nd Lt., Max J. Skeeters; 1st Sgt., Robert A. Reddie; Staff Sgts., George Y. Jean, Franklin F. Bogardus; Sergeants, Robert L. Wolf, Henry Scharpenberg.

Company "C."

Captain, H. Jack Hocker; 1st Lt., Clay P. Watson; 2nd Lt., Sam S. Forsythe; 1st Sgt., Herbert M. Corban; Staff Sgts., Leo E. Flaherty, Richard I. Graul; Sergeants, Philip A. Minnis, Fred L. Matteson.

Work on the surface rifle range, near the southwest corner of the Institute property, is progressing satisfactorily. The concrete wall of the butts has been poured, as has also the concrete roof for the range house. It is planned to make this range the best in the State. It will have six targets, with room in the pit for two additional targets, which may be added as future needs demand. Firing will be possible at 100, 200, 300, 500 and possibly 600 yards with the service rifle, while pistol firing at any desired range will be available. An outdoor smallbore range is projected alongside the service range, so located that firing on both ranges will be possible at the same time. It is intended to have the range ready for use early next Spring. The range will be known as the Rose Polytechnic Rifle Range, it being entirely the property of the Institute.

The officers and students of the local Unit desire to thank all those who, by their contribution of time, labor, materials, or equipment, made the rifle range possible. Particularly are we grateful to Mr. Anton Hulman and Mr. Johnson, of Hulman and Company, and to Mr. Pine, Mr. Greenleaf, Mr. O'Neill, Mr. Day and Mr. Hixon, of the Institute. Their kindly assistance was greatly appreciated.

The indoor small-bore range, in the basement under the Machine Section, is progressing steadily and should be ready for firing before very long. With challenges for rifle matches already received from the University of Minnesota and the University of Nebraska, besides the Fifth Corps Area Match and the Corps of Engineers R. O. T. C. Match, this range promises to be a busy place during the winter and early spring. The local Student Rifle Club is co-operating with the Unit in the construction of this range.

The Unit is planning a sixty-foot suspension bridge, to be built over Lost Creek, near the site of the Rifle Range, early next Spring. The Senior Advanced Course students have drawn the complete plans and bill of materials for the bridge, which is to be of wood, suspended from steel cables. The towers will be set on concrete abutements. The bridge will serve the double purpose of affording communication between the firing points and the butts and of furnishing a convenient crossing for those desiring to take a "short cut" in walking to and from the City. The materials for its construction are now on hand and construction work will probably start as soon as the weather permits in the Spring.

It has been suggested that a band, or at least a bugle and drum corps, be organized by the Unit, and the suggestion has met with considerable enthusiasm from the students. The plan is to have this corps available for such ceremonies as the Unit desires to put on, while it would also be available for such festivities as athletic contests, St. Pat. parades, "Booster's" meetings, and other jollifications. The Rose Boosters have declared themselves as being heartily in favor of the idea, and have promised their active co-operation. Several difficulties of various kinds must be overcome before the plan will mature, but it is hoped that Rose will have a real bugle and drum corps in the very near future.

His Horrible Motive

The respectable tramp knocked gently upon the door.

"Madam," he began, touching his cap to the lady who appeared, "A while back you gave me three doughnuts. Would you mind adding another one, to make it four?"

The lady was all gracious.

"Gladly," she answered, smiling as she wrapped one up and handed it to the tramp. "So you like my doughnuts, do you?"

"No, Mum," replied the truthful tramy, "but me and some friends down in the holler wants to have a game of quoits."

—Voo Doo.

EXCERPT FROM THE CHICAGO TRIBUNE

Loyola Battles Rose Poly Today

Loyola University, at a big disadvantage in weight, will oppose the strong Rose Poly eleven from Terre Haute, Ind., at Loyola campus this afternoon. The Techs have a versatile attack and combine stiff running and plunging plays with a deceptive forward passing game. In order to offset the lack of avoirdupois Coach Roger Kiley has groomed his proteges in the aerial game all week.

Laugh, footballers and all you fellows who saw that bunch of beefy guys up there! Laugh!

Mr. James Charles Young, '92, succumbed to the ravages of a long illness in Fulton, Mo., on December 12. Mr. Young, after his graduation from Rose, went to Cornell where he took his M. E. degree. For many years he had been a consulting engineer at Hammond, Indiana, but had recently moved to Davenport, Iowa. Mr. Young was a member of the Masonic Lodge and of the Odd Fellows.

Word has been received from Erich Mees, nephew of our former President and graduate of Rose with the class of 1911, that his four-year-old son, Erich Augustus Junior is dead of burns received while playing with matches. Although we realize that nothing we can say or do will alleviate to any degree the pain of their loss, we want Mr. and Mrs. Mees to know how deeply we all sympathize with them in their sorrow.

CAMPUS NOTES

The Junior Class started the new year by tackling the biggest program in the history of the class. The plans of the third year men include first the publishing of the Modulus, a biennial record of the doings of the school; second, the work necessary to finance and carry out a big Junior Prom to be held in May, and the leaving of a fitting memorial with the Institute.

The Modulus staff was elected at a meeting of the class on Friday, December 18, and includes the following men:

M. E. Feldstein, Editor-in-chief.
H. H. Merrill, Managing Editor.
O. W. Motz, Business Manager.
F. L. Bradford, Advertising Manager.
T. A. Yager, Assistant Advertising Manager.

Other members of the staff are to be appointed by the staff elected.

The chairmen of the Prom committees appointed by President McDargh are:

General Prom Chairman, R. H. Bolin.
Finance, O. M. Dunning.
Decorating, O. H. Crockett.
Orchestra, F. L. Bradford.
Lighting, E. A. Ewers.
Publicity, J. W. Moorhead.

The exact character of the affair is as yet unknown, but it is thought that last year's Prom will be used as an example in certain cases only. The program of the class this year requires the efforts of every Junior and it is hoped that each member will put forth his best in that line.

The Sophomore class held its second annual banquet October 24 at Root's Tea Room. The class had as its guests Doctor Mees ,President Wagner, Doctor Johonnott, Professors Faurot, Sousley, Stock, Montgomery, Coach Clark and Instructor Day.

Ed. Kelly, President of the class, was toast-master. The guests and several members of the class gave advisory comment to the second year assemblage.

The Senior Chemists held a delightful soiree in the form of a tea at 3 o'clock on the afternoon of January 7th. Aleck Sherwood, one of last season's most charming debutantes, poured.

Heze is faithfully carrying the left hind foot of the rabbit Pete Watson killed with a donnick the other day. "May it work," pray we.

L. E. Muehler of the Sophomore class has been forced to discontinue his work at the Institute on account of defective eyesight. He intends to return next year if his condition is improved.

J. M. Wilson of the Freshman class has also been compelled to quit school on account of illness.

H. M. Hesser of the Junior class, J. S. Jordan, E. E. Brown, R. H. Jenny and R. W. Shoptaugh of the Freshmen class have also dropped out for various reasons.

On Wednesday evening, December 12, the first annual banquet of the class of '27 was held at Root's Tea Room. The guests of the class were Professors Wagner and Wischmeyer. Urban Fischer acted as toast-master. He called upon the officers and several members of the class for short talks.

After the banquet the class attended the regular evening performance at the Hipp. The first year men showed an over-abundance of pep at the banquet and also at the show, which all helps to insure the fulfilment of the prophesy of great things in store for the class of '27.

In regular assembly Thursday, December 13, Professor Wischmeyer gave an illustrated lecture in which he described the four-wheel drive motor truck. The mechanical features of the chassis and of the different body types were made clear by the use of the slides and by the effective descriptions. A large number of these trucks were used by the United States, British and Russian armies during the war on account of the greater traction afforded by the transmission of power through all four wheels.

It has been planned to provide, at regular intervals, lectures of this nature covering different industrial operations of engineering trend.

At the regular assembly January 3, 1924, Professor Settles and John Barr, Y. M. C. A. President, who attended the International Student Volunteer Convention at Indianapolis, gave reports of the proceedings at the big meeting. Both speakers appealed to the student body to uphold the standards set forth by this powerful organization of Christian young men.

Sweaters were also awarded to baseball, basketball and track men. The sweaters were a gift from the student body and are of the usual type with a large "R" in rose.

The gathering of Campus Notes is, at times, rather difficult due to the various proceedings of student organizations and to the peculiar nature of current events about the school. These difficulties also tend to delay the appearance of articles classed as Campus Notes. Therefore, if you wish to see your Campus Note material in the Technic, please hand it to the Campus Note Editor as soon as possible after the occurence of the meeting or event or whatever is the subject of the material.

The Department of Physics was recently the recipient of a valuable gift from Dr. August F. Knoefel, in the form of a fully equipped X-ray machine. This outfit is of modern type and will be very acceptable to the department. This opportunity is taken to return thanks to Dr. Knoefel.

ROSE RADIO CLUB

ROSE MAY HAVE BROADCASTING STATION

THE ROSE RADIO CLUB has brought very close to realization their hope of establishing a broadcasting station at Rose. Dr. A. F. Knoefel has placed at the disposal of the club his complete transmitter, to be used as the club sees fit for a considerable time. Few students fully realize the tremendous possibilities in this offer. At the present time it is estimated that there are about three million listeners-in every night on radio receiving sets in this country. No one vehicle could possibly reach as many people as a good broadcasting station, and so there could be no better advertising medium. Rose needs a little advertising. The Radio Club believes that even as small an outfit as is available, if well directed, would double the applications for entrance next fall. Every technical school needs a good radio station in addition to the other engineering equipment. If we should investigate, we would find very few of our contemporary engineering schools without this most technical of electrical devices. So let's get behind the club and put this over.

It is planned to operate at first on a very limited schedule, but to maintain a very high standard of programs broadcast. Perhaps if we start out on a small scale and show just what can be done, it will be possible to persuade the Alumni or the Board of Managers to back a powerful station at Rose.

The apparatus which has been offered the club by Dr. Knoefel consists of complete 20-watt transmitter. The apparatus used throughout the outfit is Radio Corporation. The only thing needed to make the set complete for broadcasting is a good microphone. The probable range of such a set will be in the neighborhood of 200 miles. It will probably be necessary for the club to build another receiving set in addition to the one already completed for the Y. M. C. A. room to use in operating the station. The Physics Department is co-operating with the club and the apparatus will probably be set up in the Physics Laboratory. The stack at the rear of the building will probably be used as one of the antenna masts, and it will be necessary to devise another mast to carry the opposite end. The old windmill on the campus can probably be pressed into service for this purpose.

The Radio Club takes this opportunity to thank Dr. Knoefel for his kindness and to express their appreciation and their determination to care for the apparatus which he is lending them to the best of their ability.

THE STUDENT VOLUNTEER MOVEMENT

THE ninth International Convention of the Student Volunteer Movement, with more than six thousand student delegates from colleges representing the entire United States and Canada terminated a five-day session at Indianapolis on January first. This movement has as its objective the evangelization of the world through foreign missions and consecrated Christian endeavor in all fields of life work.

The trend of student thinking on international, inter-racial and social problems was marked through all addresses, discussion groups, and student forums. The manner in which students of all nationalities united in serious consideration of measures to alleviate much of the world's present distress portends a unification of the world which, although immediately impossible, is ultimately inevitable.

A significant step was taken by the students themselves on the last day of the convention when they recommended a closer relation to the other peoples of the world, and denounced any organization fostering racial discrimination of any sort. Turning their attention to international affairs and war, the following sentiment was expressed by a large majority: "We believe that war is unchristian and that 'a' League of Nations and the World Court is the best means of preventing it, but we would resort to war in case an unavoidable dispute has been referred to the League or World Court without successful settlement."

Rose students who attended meetings of the convention are : Reddie, Barr, Kelley and Greenleaf. Professor Settles was Faculty Representative.

DEVELOPMENT OF HEAVY ELECTRICAL TRACTION

The Virginia Railway has started the electrification of its line from Roanoke to Mullens, a distance of 134 miles, involving 213 miles of single track. The traffic is nearly all coal and very heavy trains are hauled. It is planned to increase the tonnage of loaded trains from 6,000 tons to 9,000 tons. The system will be 11,000 volts, single phase, 25 cycle. The locomotives will be of the split phase type, weighing about 385 tons each. The total cost is estimated at $13,000,000.

—Electric Traction.

NEW HELIUM PLANT

It is proposed to bring up a bill at the present session of Congress to authorize the expenditure by the Bureau of Mines of $5,000,000 to purchase helium-bearing gas and gas fields. A new helium extraction plant on a semi-commercial scale will be put in operation shortly at Fort Worth by the Bureau of Mines. It is expected that this improved process will produce helium at much less cost than former processes.

—Wisconsin Engineer.

The new vehicular tunnel under the Hudson River, connecting New York and Northern New Jersey, will be equipped with special electrically driven ventilating apparatus which will pump 3,600,000 cu. ft. of fresh air per minute. Air will be discharged in the tunnel continuously, limiting the amount of carbon monoxide to four parts per 10,000 no matter how dense the traffic. The tunnel will have a capacity of 3,800 vehicles an hour.

—Heating and Ventilating Magazine.

ALUMNI NOTES

1892

Luther S. Rose has left the Big Four, and is General Manager of the P. & E. Railway, stationed at Indianapolis.

1900

Harry Leser is now with the Brooklyn City Railroad Company.

Herbert F. Madison is Research Chemist in the Coke By-Products Plant of the Illinois Steel Company.

1903

J. Simms Brosius is now Wholesale Representative for the Walter F. Wright Company of Cleveland, selling the Willys-Knight and Overland cars.

1905

Dudley D. Wright has been transferred by the Westinghouse Company from Chicago to Ispheming, Michigan.

The lost is found! Ralph C. Blanchard is Mining Geologist in New York City, with headquarters in the Canadian Pacific Building, Madison Avenue.

1907

J. Boyd Shickel is with the Howell Electric Motors Company at Syracuse, New York.

Charles C. Scharpenberg visited the school on Friday, December 14th.

1909

Ray Stephens is Engineer of Maintenance of Way with the Toledo Terminal Railroad at Toledo.

Henry J. Bangert has left the Eisendrath Company and is now a Consulting Chemist of Callahan & Company, at Chicago.

1910

Earl D. Hay has resigned from Des Moines University, and is established as a Designing and Consulting Engineer at Des Moines, Iowa.

Ernest C. Bradford is now Superintendent of the Grolan Manufacturing Company, at Dayton.

W. Lindsay Clore is now foreman of the Hydrogenation Department of the Van Camp Company at Louisville, Kentucky. Cupid hasn't got him yet!

1912

Richard Fishback is Advertising Engineer for the Ohio Brass Company, at Mansfield, Ohio.

W. Scott Mace is with C. S. Hutson & Company, Los Angeles. Address: 557 South San Pedro Street.

James E. Spindle has moved from Lansing to Grand Rapids, where he is General Superintendent of the Grand Rapids Gas Light Company.

Carl J. Krieger with the Underwriters Laboratories has been transferred to New York.

1914

Harry M. Leathers, with the Dingle-Clark Company, has been moved from Cleveland to Pittsburgh, where he is District Manager.

1915

J. R. Sage, Master of Science in Civil Engineering, 1915, who taught mathematics at Rose in 1912-15, is now Registrar of Iowa State College at Ames, Iowa.

E. Dwight Brauns has been transferred by the Holt Manufacturing Company, from Indianapolis to Dayton, where he is District Representative.

Henry Coles, who took his M. S. degree at Rose in 1915, is now Manager of the Guardian Metal Company, connected with the Mosler Safe Company of Hamilton, Ohio.

John C. Harger is with the Industrial Supply Company in Terre Haute.

Ernest E. Hess is with the Oil Well Supply Company at Oil City, Pennsylvania.

1916

Ray Trimble has been transferred from St. Louis to Dallas, Texas, where he is District Manager for David Lipton's Sons Company.

George S. Anderson has left Chicago and has taken a position with the American Blower Company, at Detroit.

1917

Raymond S. Davis paid us a visit on December 6th.

Henry C. Gray has been transferred by the Pennsylvania Railway Company to Zanesville, Ohio, where he is Engine House Foreman.

W. Edward Richard is in Evansville, Indiana, Chief Engineer of the Sunbeam Electric Manufacturing Company.

Lester J. Blackman has been transferred by the Ferro-Concrete Construction Company, from Cincinnati to Pittsburgh, where he fills the position of Resident Engineer.

1918

Louis S. Bake has been transferred o the DuPont Company from Lodi, New Jersey, to Wilmington, Delaware. Address: 1001 Gilpin Avenue.

LeRoy Allen has been transferred to the Indianapolis office of the Indiana Inspection Bureau.

1920

Frederick B. Ray is Chief Draftsman with the Insley Manufacturing Company, of Indianapolis.

1921

Robert E. Sewell, of the Kentucky Actuarial Bu has been transferred to Paducah, where he is Branch Manager.

Edwin H. Carnarius has been transferred by the Commercial Solvents Company to the Peoria plant.

1922

Adress Herman L. Mitchell care of William Mitchell, 2375 Scarf Street, Los Angeles, California.

Harry S. Fitzsimmons, Bob Henderson and John McCormick were recent visitors.

1923

Joe Anstead is at the Erie, Pennsylvania works of the General Electric Company.

Frank Wente '12, Cheslie Gray '13, and Raymond S. Davis '17, were out-of-town Alumni who attended the opening basketball game.

ALUMNI NOTES CONTINUED

William J. Davis, who has been Pacific Coast Engineer for General Electric at San Francisco, has been transferred to the Railway Engineering Department at Schenectady.

1893

Taylor W. Ross, may be addressed care of Thomas Graham and Company, Madison, Indiana.

1908

Hiram B. Cannon, who has been for some time in Sarnia, Canada, has taken a position with the Carborundum Company at Perth Amboy, New Jersey.

1911

Harold O. Wimsett has joined the ranks of the State Highway Commission.

1916

George Maier, with the American Radiator Company, has been transferred from Buffalo to New York City.

1919

Frederick M. Crapo is now with the Indiana Steel and Wire Company. He is still at Muncie, however.

1922

Duncan Baker is Junior Hydrographic and Geodetic Engineer for the U. S. Coast and Geodetic Survey. Address 202 Burke Building, Seattle, Washington.

1923

Len Quinlan is with the Kentucky Actuarial Bureau at Louisville.

WHAT OTHER SCHOOLS ARE DOING

The University of Virginia has adopted a new five-year curriculum for the School of Engineering. Below is a brief summary of the changes:

All Sophomore courses are identical with the exception of that for the Chemical Engineers, where a science is required in place of the humanity option in order to maintain continuity of chemical instruction.

In the Junior year the curricula diverge and choice is made of a major study for all who have not chosen the Chemical course. Thereafter the content differs depending on the student's major interest; and the satisfactory completion of any of the five curricula of four-year duration will be recognized by the award of the degree of Bachelor of Science in Engineering.

The fifth or graduate year in all curricula is devoted to advanced work in the student's major with opportunity afforded to elect an approved humanity. On the satisfactory completion of the graduate course the appropriate degree of C. E., M. E., E. E., Ch. E. or E. M. will be conferred.

The lengthened course makes it possible to include several humanities which were not found in the old curricula and at the same time secures the added time for presentation of advanced subjects in the major lines of engineering.

The outstanding changes with respect to the humanities are the requirement of two years of English instead of one; the lengthening of the course in Cost Accounting from one term to three terms; the introduction of optional courses in such subjects as History, Government and Commercial Law; and the requirement of a year of German for the Chemical Engineers. In the graduate year of all courses, election on approval of the Faculty will permit courses in Philosophy, Architecture, Fine Arts or other subject to be taken.

In the Mathematics and Science group an important change has been made in the Sophomore year by the addition of a Mathematics Laboratory course for all students. This course will consist of intensive supervised problem work in Calculus and is expected to strengthen greatly the understanding and facility of application of that most important engineering tool. The old Sophomore Applied Mathematics course has been placed in the Junior year and the Junior Applied Mathematics of the old course is now placed in the Senior year.

At the State University of Iowa, the College of Applied Science is soon to have one of the largest radio stations in the Middle West as a part of its equipment. Plans have all been drawn up and the station is to be completed this winter sometime.

This year the old course in freshman forge shop is changed to include subjects introductory to such courses as Mechanical Laboratory, Heat Power, and the like. Formerly the work of the entire term was in hand forging. This now occupies only about a third of the time, the rest being devoted to a variety of allied subjects. The new work will be of great value in teaching freshmen a few fundamental facts about their profession.

Bill Went Home for Christmas and Had Some Tough Luck. Here's What He Had to Say About It.

Dere Pete:—

Well, here I am back in Dear Old Rose after the Xmas interlude and take it from little Willie, I sure did have a flock of holidays what were a knockout. You see school was out the Friday before Christmas, so Friday nite at 8 bells I am sniffing the home-town ozone from my own front porch. Boy, a good look at Dad and Mother is as welcome as pay day and from appearances, they is also sorta tickled to cast their glimmers upon my quite obvious countenance.

But there remains a "bug in my hair-tonic" of pleasure—i. e., my sweet woman seems to have her speech all cluttered up with icicles when I call her up for the express purpose of regaling my ears with the sound of her cheery voice.

I get suspicious as a Volstead sleuth and so after supper I nose my benzine chariot out Lincoln Avenue to demond (?) an explanation for the seeming loss of affection. The explanation begins to filter through when I sights the "Fierce-sparrow" roadster of "Sheiky Smith" pulling out of the drive at my true (?) love's domicile.

This here "Sheiky Smith" is the son of the local oil Croesus whose monthly income figure looks like the pound capacity rating what is painted on the side of the average freight car. And take it from yours poorly, "Sheiky' 'is no slouch at hurling a liberal fraction of papa's sheckles to the proverbial bow-wows.

To get back to how it happened, I starts to drive around "Sheiky's" hack, but he recognizes my flivv in the rear-vision mirror and starts tramping the gun pretty heavy. However, I didn't have a racing head on my motor just to decorate it, so I, also, tramps on it enough to accelerate around him. Pete, ole timer, my suspicions became convictions and the green-eyed god of jealousy punched the clock for a lot of overtime, for nestled cozily at the side of "Sheiky Smith" is the fickle flapper who was the erstwhile light of my life. Well, I sure realized that I had been stang very completely and it was Christmas before I abandoned my idea of adjourning to the South Seas to be a polygamous beach-comber.

Christmas was a nice sunny day and to quote a hackneyed line, "a good time was had by all." Honest, it was heaven to eat one of Mother's swell meals after doing the chow act at these one-arm beaneries all term.

About three days after Christmas, my old friend, Rusty Thornton, comes around to see what Santy has fetched me, etc., and I winds up by telling Rusty about my ill-fated love affair. You know, Rusty is an almost-civil-engineer for Stone and Webster in an up-state burg, so he was home only an abbreviated while. I was telling him about how shabbily my woman had treated me, but all I get is the razz and a ha-ha. "Come out of it, Bill. What you need is a new one!" So he kids me into going back to Thomasville with him to a New yrs. party which his gang is going to throw. Petey, old sock, I am sure tickled that I went. Rusty's outfit is the livest bunch of fellows and the keenest flock of flappers that I have viewed for many a moon.

One of the fellows has gotten indulgent and purchased a concoction of raisins and fusel oil what is alleged to be used as a beverage. He passes it to Rusty who up-ends it for a drag but comes up for air rather prematurely. Rusty blows out a cloud of smoke and steam and gasps, "Omigosh!!! when did they start selling turpentine at 8 berries a quart?"—but contrary to impressions, the party was the alligator's ear-rings. Rusty dates me up with a straight-haired brunette sister whose handle was Alice and right here I hasten to stutter that this kid would have made this here "Alice of Old Vincennes" look like a dumb-bell rack in the Y. M. C. A.

Then, too, little Alice is about as slow as Tommy Milton on Memorial Day, so your friend Bill gets deeply enamored by the time the refreshments are handed out. Hence, en route home, he springs a super-sentimental bit of prose about "love at first glance" and then edges over to watch her take it under. Instead she nods patronizingly and chirps, "Well said, my boy—now turn the record over and play the other side."

These sweet words gums up my program quite a quantity but what's the diff?—action says it better than flowers.

Remembering your habit of leaving letters lying around the house after you've read them, I'm going to refrain from giving you the gruesome details. I'm going to say, though, that it's not only trombone and cornet players who have "Hot Lips." Yea, verily—"I learned about women from her!"

So you see, Pete, I've went and fell again.

Your old side-kick,

BILL.

P. S.—According to Alice, a dumb waiter is a guy what asks a girl for a kiss and then waits for her to say "yes."

B.

STUDENT COUNCIL MEETING.

P. I. E. S. House, January 3, 1924, 8:00 P. M.

Roll call—McDargh and Reinking absent.

Report of Financial Secretary.

Hood, Werner and Schahfer appointed as committee to audit the books of the Financial Secretary. Committee to meet Wednesday, January 9.

Glenn re-elected Financial Secretary for the coming year.

Jean moves that a roster of the Freshman Class, embodying weekly assignments together with a set of rules pertaining to the work to be done in the Y. M. C. A. Room by them, be posted.

Seconded by Glenn. Motion carried.

Jean moves that a contract to furnish music for the St. Pat's dance be awarded to the Columbians of Indianapolis.

Seconded by Hood. Motion carried.

Hood moves that the Student Council go on record as supporting the Sweater Hop to be given by the Athletic Association, and agree to stand the expenses of the hop to the extent of $75.00.

Seconded by Watson. Motion carried.

Jean moves that Financial Secretary be allowed money from the General Fund for the purchase of a bill file suitable for his needs.

Seconded by Glenn. Motion carried.

Glenn moves that the meeting be adjourned.

Seconded by Reinking. Motion carried.

Meeting adjourned at 9:30 P. M.

THE LARGEST GENERATOR IN THE WORLD

The largest generator in the world is being installed by the General Electric Company for the Niagara Falls Power Company, on the American side of the Falls. This machine, when completed, will supply 87,000 horsepower. The electric power generated will light more than two and a half million household Mazda lamps, which is sufficient to supply the electrical needs for a city of the size of Boston. Each generator—there will be two—will weigh 700 tons, and will be 26 feet high and 35 feet in diameter.

—Tech. Engineering News.

The New York Central Railway has, operating on one of its divisions, a three-cylinder simple locomotive of the 4-8-2 type. It was constructed by the American Locomotive Co. for experimental purposes to determine whether the divisions of work between three sets of pistons, crossheads and main rods would be desirable for heavy freight service, and also whether three cylinders increase the thermal efficiency by greater expansion of the steam. The two outside cylinders are placed horizontally and two inches above the center of the wheels. The center cylinder is inclined at an angle of 8.5 degrees and cast in the same block with the right cylinder, its valve being driven by the outside valve gears. Some of the major advantages are the great reduction of stresses on the pistons, crossheads and main rods, the increase of 21 per cent in tractive force and the reduction of the piston thrust by about 20 per cent. The efficiency of combustion in the firebox is also somewhat increased by the six exhausts per revolution.

—Railway Age.

THE NEW DELAWARE RIVER BRIDGE

The new suspension bridge across the Delaware River at Philadelphia is attracting considerable attention in engineering circles. The bridge will be the longest structure of its kind in the world, its main span being 1750 feet long. The well-known Brooklyn Bridge is shorter by 155 feet, and the Williamsburg Bridge is 150 feet shorter. The new bridge will have only two cables, while the above bridges have four. Because of the impossibility of bending cables, necessarily so large, over the supporting towers, the swinging supports will be built up wire by wire. Each cable will be composed of 18,666 galvanized steel wires, each of which will have a diameter of two tenths of an inch. The overall diameter of the cables will be thirty inches, the largest ever made. The designers claim that the cables will last almost indefinitely, since those used in the Brooklyn Bridge show no deterioration after forty-seven years of service.

A change in design from the old style is noticeable in the towers. Previous bridges were constructed with stone towers, and were provided with rollers to take up the expansion and contraction in the cables. Now on the Brooklyn Bridge, for instance, these rollers have become corroded and no longer function. The result is that towers have been bent and the masonry cracked in many cases. For this reason, in modern tower construction, steel towers which may be bent considerably without doing any damage are used to carry the cables. The towers of the Delaware River Bridge are to be made of silicon steel and are to stand 350 feet high. They are very slender, and are designed to take care of a maximum deflection of 21.25 inches at the top.

The bridge will carry a roadway 57 feet wide, allowing six lanes of travel. In addition to this, there are four tracks and two 10-foot sidewalks across the bridge. The distance between cables is 89 feet, and the overall width of the span is 125 feet.

The anchorages are to be set on solid rock. It has been necessary to sink concrete caissons in order to work below the water level. Some idea of the vast size of the bridge may be obtained from the statement that 70,000 cubic yards of concrete will be used for the anchorages.

Although to date the work has progressed nicely, it is thought that three or four years will be consumed in the construction of the bridge.

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."

MISSISSIPPI WIRE GLASS CO.,
220 Fifth Avenue,
St. Louis. New York. Chicago.

TECHNICAL METHODS OF METALLURGICAL ANALYSIS

By Wilfred W. Scott, Sc. D. Published by D. Van Nostrand Co., New York. 807 pages of text and 41 pages of tables. Price $6.00.

This book is a comprehensive text as well as a laboratory manual. Procedures are given for use in the analysis of almost every known metallurgical compound as well as systems for the detection and determination of all metallic elements.

Interspersed through the text are 150 illustrations and 2 color plates giving a comprehensive idea of apparatus used in the various operations described.

The author, who is connected with the Colorado School of Mines, worked in collaboration with a number of eminent specialists in the compilation of the reading matter in the book. A text well worthy of consideration in the gathering together of a Chemical Engineer's library.

Ads in This Issue

Thos. Alteneder & Sons
American Sheet & Tin Company.
J. M. Bigwood & Son
Brown & Sharpe Mfg. Company.
The Brunswick Shop.
Citizens Independent Telephone Co.
Bill Cody.
Cox, John S.
Craft Book Store.
Foulkes Brothers
Max Frank.
Freitag-Weinhardt Co.
General Electric.
Gillis Drug Company.
Lee Goodman & Son.
Grand Theatre.
Heinl's Flower Shop.
Hood, A. M.
Ideal Baking Co.
Insley Mfg. Company.
Joseph & Son.
Kramer Barber Shop.
Ed. S. Lammers & Company.
A. B. Mewhinney & Company.
Mississippi Wire Glass Company.
McGuire & Shook.
Myers Bros.
Otis Elevator Company.
Rose Polytechnic Institute.
Harry T. Schloss.
Ed. Sparks.
Terre Haute Engraving Co.
Tune Bros.
Walk-Over Boot Shop.
Wolf, Carl.
Terre Haute Savings Bank.
Western Electric Company.
Westinghouse Electric Company.

Patronize Them

THESE FOOLISH DAYS.

"This song about bananas makes me sick," said the Foolish Old Gentleman. "In my day we had songs with some sense to them. Remember TaRa Ta Ra Ra Boom De Ay' and 'Daddy Wouldn't Buy Me a Bow-wow?'" And the F. O. G. walked superciliously away.

—New York World.

ONE MIGHT.

Now that it has become known that thirty agricultural colleges are giving courses in ice-cream making, might one be pardoned for referring to them as sundae schools?

—Nashville Southern Lumberman.

A SOLUTION OF THREE SERIO S CENTRAL STATION PROBLEMS

(Continued from page 6)

the obstacles of poor power factor. Spasmodically there has been an energetic demand for some solution of the difficulty. Various expedients have been tried, but the industry is confronted at the end of all these years of effort with the staggering idle investment, excess energy losses and poor regulation entirely attributable to this idle current above mentioned.

The company of which I am the executive head has been one of those guilty manufacturing organizations producing the chief offending cause of this idle current—the alternating current power motor. All these thirty years we have been conscious that, while we were building a product generally accepted as equal to the best standards of the commercial world, we were conscious, deeply conscious, that the best motor we could build compelled the central station to invest a dollar as against the necessary investment in the old direct current days of seventy-five cents. Now and then our good central station friends would prod us, as they would no doubt prod all other producing companies, to create, if possible, an alternating current motor equal in its capital investment demand imposed upon the central station for current supply to the direct current motor of the old days. For fifteen years or more we have been diligently experimenting to accomplish this result and we have now succeeded.

What is the solution we offer?

It is a new type of motor which is self-priming, or self-exciting, and which does not require this idle current supply from the generating power house. I will describe briefly the character and operating performance of this new motor.

It is a development of the well-known slipring type of alternating current induction motor into a self-exciting induction-synchronous motor, and we have called it the Fynn-Weichsel motor after the two engineers responsible for its development and production. These men are Mr. Val. A. Fynn, the patentee, and Mr. Hans Weichsel, the designer. In technical structure the motor is the well-known slipring motor with the addition of a small commutator properly interconnected to the armature, or rotor windings, for the purpose of supplying to the motor this exciting or priming current, formerly taken from the power house in the form of idle line current.

The new motor starts exactly as the old type, slipring motor, with the same starting torque and starting current characteristics. When the rotor gets up to within a few per cent of so-called synchronous speed, the direct current supplied by the commutator to the field winding has the effect of pulling the rotor up to synchronous speed and holding it there so that the motor operates under normal conditions at synchronous speed. If overloaded to the point of 150 per cent of full load, the rotor slips back to induction motor speed and the machine thereafter operates exactly as a slipring motor. If the overload is reduced back to 150 per cent of full load, the speed climbs again to synchronous speed and remains there. There are no automatic switches or mechanical devices of any kind necessary. The motor functions by virtue of its inherent characteristics as thus described.

Its electrical characteristics are remarkable.

Figure 1 represents the power factor efficiency and current curves. They are self-explanatory. It will be particularly noted that the power factor is leading at all loads..

Figure 2 shows the same characteristics with the motor so built as to make the power factor practically unity at all loads.

The conditions of Figure 1 make it possible for the new motor to correct the evil influence of an old motor of the same size operating on the same system.

Figure 2 represents the characteristics recommended for a new installation where there is no existing idle current condition to correct.

Figure 3 represents the very interesting effect of combining one new type and one old type motor to secure the elimination of idle current as against two old motors, both requiring inherent idle current excitation.

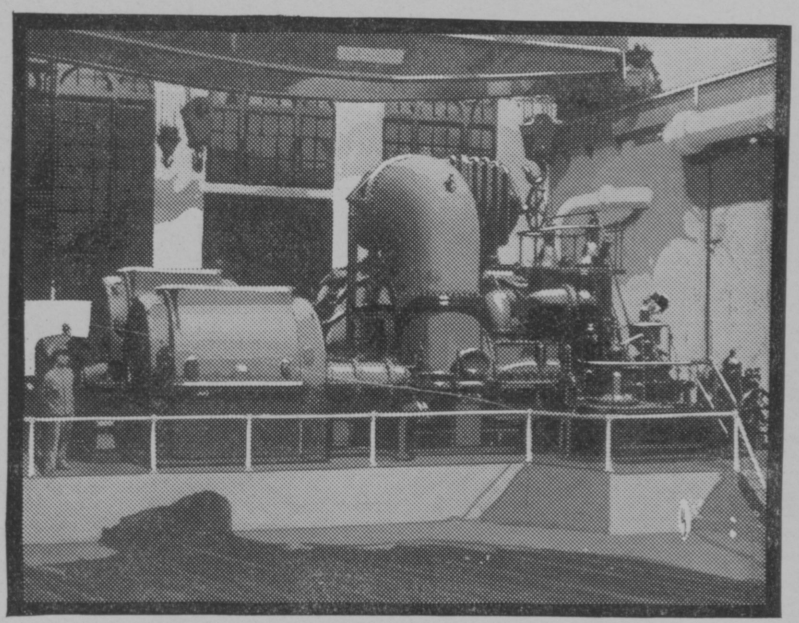
The new motor is remarkably rugged in mechanical structure. There is no element of construction unusual in character or difficult of maintenance. Practical operating electrical men will accept it at once as the substantial equivalent in mechanical and durability characteristics of the existing old type motors.

The new motor is commended with great confidence as a solution of this staggering power factor problem.

A Record Still Unbroken

At 5:20 P. M., March 8th, 1920, Westinghouse Turbine Established World's Record for Continuous Running.

What Engineering Owes to Good Workmanship



45,000 K. W. Westinghouse Cross-Compound Turbine Unit at the Station of the Narragansett Electric Light Company, Providence, R. I.

WHEN Westinghouse installed a 45,000 K. W. Turbine in the power house of the Narragansett Electric Light Company, Providence, R. I., early in December, 1919, there was no thought of more than the average weekly power house run. Abnormal weather conditions, however, brought so steady a demand for power, that the unit was not shut down until March 8th, 1920, after a continuous run of 84 days, 11 hours, and 36 minutes.

This was especially remarkable in that the unit consists of two turbine generator sets, each of which operates independently of the other, so that the result was the mechanical equivalent of operating a single machine continuously for 169 days.

If space permitted, many astounding figures could be cited—about the K. W. H. generated during this period, the water and coal used, the cooling system, the oiling system, etc.

For example, to keep the generators cool, over 8,000,000.000 cubic feet of air passed through them, which equals 2,000 times the total weight of the generators and their bed plates.

Equally impressive, oil was pumped through the self-contained lubricating system to the bearings at the rate of 600 gallons a minute. Had the oiling system failed for only 30 seconds, the bearings would have been wrecked, and other parts of the unit harmed!

There is interesting history back of the operation of Westinghouse Turbine Units of 3,000 K. W. and higher. Notable records have been made in many of the world's great power plants, performance that is a tribute to remarkable engineering and good workmanship.

Westinghouse

ACHIEVEMENT & OPPORTUNITY

WESTINGHOUSE ELECTRIC

The Chicago Temple
Chicago, Illinois
HOLABIRD & ROCHE,
Architects

Drawn by Hugh Ferriss

"Building a Picture"

HERE the architects envisioned a picture, saw the modern office building in terms of the great art of the Middle Ages—and the result is a demonstration that the utilitarian structure, the modern office building of commerce may be as picturesque as it is practical. Vision, imagination, courage and practical ingenuity in stylistic adaptation have enabled the architects of this country to astonish the world with their achievements of today and their promise of tomorrow.

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

OTIS ELEVATOR COMPANY

Offices in all Principal Cities of the World