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Push Button High Speed Transportation
Safer and Surer than Human Hands and Heads

FOR many years, thinkers who watch mechanical progress with a friendly eye have asserted that the goal of machinery is to set mankind free from routine tasks, to give him time and opportunity for those tasks of the mind for which evolution has particularly fitted him.

In two of our most important industries there have been recent developments which may be truthfully said to have ushered in a new epoch. The dial telephone system, after years of experiments, has proved itself a practical and efficient servant of man. And the Otis Signal Control Elevator, also a product of unifying effort and experiment, marks a revolutionary step forward.

The transportation system of a modern building requires fewer elevators of this new type, than were heretofore required of other types. Control is entirely automatic, the car being operated by the pressing of car or hall button.

This type of control automatically brings the elevator to a stop within an exactness of level which eliminates the delays of readjustment experienced under the old system, and also opens the doors as the car stops. This accuracy of landing greatly eliminates the possibility of accident.

In view of these epoch-making developments in the telephone and elevator industries, it is most appropriate that the four new monumental telephone buildings stretching across the country, and located in New York, Cleveland, St. Louis and San Francisco, should be equipped with the latest type of Otis Signal Control Elevators.

OTIS ELEVATOR COMPANY
Offices in all Principal Cities of the World
Summary of Contents

FRONTISPIECE
FEDERAL VALUATION—E. S. Butler, '06 ................................................. 2
THE OIL ELECTRIC LOCOMOTIVE—R. F. Ferris, c., '27 ....................... 3
BIOGRAPHY OF SVEND JOHANNESSON ..................................................... 5
THE WORK OF THE NEW YORK STOCK EXCHANGE—Colonel A. Swalls, c., '27 ................................................................. 7
ROLLING MILL SAFETY—V. E. Schlossberg ........................................... 9
SCIENTIFIC NOTES .................................................................................... 10
EDITORIAL NOTES .................................................................................. 12
ALUMNI .................................................................................................... 14
ATHLETICS ................................................................................................. 16
BOOK REVIEWS ....................................................................................... 18
FRATERNITIES ......................................................................................... 20
HUMOR ..................................................................................................... 22
Federal Valuation

By E. S. Butler, '06

It is evident that profit percentage cannot be estimated without knowing the amount of profit producing capital. The railroad business of our country is so extensive that an infinite amount of valuation work must be done before proper taxes and rates can be fixed. The accompanying article gives an excellent resume of the bases for federal valuation, together with portions of the statutes determining its progress.

During the year 1925, the railroads of the United States paid taxes totaling about $360,000,000 or nearly $1,000,000 per day and the number of cars loaded totaled about 51,000,000 or nearly 1,000,000 cars per week.

To June 30, 1925 total expenditures of railroads on federal valuation work were $83,380,350.00. Expenditures of the Interstate Commerce Commission to the same date were $26,893,108.18, making a grand total in excess of $110,000,000.

These figures make it evident that the fixing of value of the railroads is no ordinary undertaking. They convey some idea of the magnitude of the task and of the effort that has been expended upon many problems involved. In 1917 the government's valuation organization reached its peak of nearly sixteen hundred employees.

The work was begun in 1913 and is still under way.

Fundamentally, federal valuation is based on a combination of the following:

1. The Fifth and Fourteenth Amendment to the Federal Constitution, which provide that no person shall be deprived and that private property shall not be taken for public use without just compensation.

2. The Interstate Commerce Act, an act to regulate commerce approved in 1887, and amendments and additions thereto.

3. The Valuation Act (Section 19a of Interstate Commerce Act) approved in 1913, which provides that the findings made by the Interstate Commerce Commission thereunder shall be accepted as prima facie evidence in the courts in matters coming under the act to regulate Commerce.

4. The Transportation Act (Section 15a of Interstate Commerce Act) approved in 1920, which provides that the values findings under the act shall be used in fixing rates; in recapture of excess earnings, in consolidation proceedings and for the issuance of securities.

5. Decisions of the United States Supreme Court based upon the Fifth and Fourteenth Amendments of the Constitution. These decisions may not apply to federal valuation but are used as a guide in the work. The most quoted is the decision in 1898 in the case of Smyth vs Ames 169 US 466, a part of which appears below:—

We hold, however, that the basis of all calculations as to the reasonableness of rates to be charged by a corporation maintaining a highway under legislative sanction must be the fair value of the property being used by it for the convenience of the public. And in order to ascertain that value, the original cost of construction, the amount expended in public improvements, the amount and market value of its bonds and stocks, the present as compared with the original cost of construction, the probable earning capacity of the property under particular rates prescribed by statute, and the sum required to meet operating expenses, are all matters for consideration, and may be given such consideration as may be just and right in each case. We do not say that there may not be others matters to be regarded in estimating the value of the property. What the company is entitled to ask is a fair return upon the value of that which it employs for public convenience."

Government regulation of railroads, such as the fixing of freight and passenger rates by State Commissions, led to proceedings in the courts in which the question arose of whether or not certain rates so fixed did not take private property piecemeal for public use without just compensation. Such a situation was an alleged violation of the Fifth and Fourteenth amendments to the Federal Constitution and in these cases the value of the property was one of the principal elements to be considered. These cases in turn led to decisions by the Supreme Court of the United States, one of which is quoted in the accompanying article. It is apparent that these cases furthermore led to the necessity for an authoritative valuation of the railroads for use in properly administering the Interstate Commerce Act under which rates are fixed. Authority of congress for such a valuation was asked by the Interstate Commerce Commission first in 1903 and the Valuation Act was passed in 1913. The Transportation Act passed in 1920 designates certain specific uses to be made of the valuations being made under the act of 1913.
The first valuation Report of the Interstate Commerce Commission is in Valuation Docket No. 2, Texas Midland Railroad, submitted December 14, 1917, decided July 31, 1918. Many somewhat similar reports on other railroads have been issued since that time and this part of the work has not been completed.

These reports, excepting the earlier ones, show a single sum value based upon a consideration by the Interstate Commerce Commission of all the information as to the particular railroad covered by the report available to the Commission, including:—

1. Cost of reproduction new based on inventory as of June 30 of some year between 1914 and 1920 depending on date of inventory and prices as of the year 1914 (pre-war prices).

2. Cost of reproduction less depreciation. The following is quoted from Texas Midland Report mentioned hereinbefore:—

"In estimating the cost of reproduction less depreciation, depreciation has been treated as covering the lessening in the number of units of capacity for service as compared with those existing in the same elements when installed; and upon ascertaining what part of the remaining capacity for service remains, the depreciation which has already accrued is subtracted from the cost of reproduction new and the remainder is given as the cost of reproduction less depreciation. Due consideration is given to existing salvage or scrap value. Depreciation is not taken merely as the equivalent of deferred maintenance or loss of service efficiency."

These deductions for depreciation are made even though the railroad under consideration is maintained to the highest possible standards.

3. Present value of land, again quoting from Texas Midland report:—

"Is stated by ascertaining the number of acres and multiplying this acreage by a market value of similar adjacent and adjoining lands, due allowance being made for any special value which may attach by reason of the peculiar adaptability of the land to railroad use; but nothing additional is added for the expense of acquisition, for severance damages, for engineering, and for interest during construction. . . , the reproduction cost of carrier lands, and the present cost of condemnation and damages, or of purchase, of a carrier's lands, are not estimated."

4. Working capital, materials and supplies based on a theoretical estimate of the amount necessary to operate the railroad rather than upon the amounts actually on hand on or about the date of valuation.

The Commission does not state in detail how the single sum values are arrived at. The part of the reports stating the single sum value reads as follows:—

"After careful consideration of all the facts submitted in this proceeding, including appreciation, depreciation, going-concern value, working capital, and all other matters which appear to have a bearing upon the value here reported, the value for rate making purposes, of the property of the carrier is found to be"—etc.

A portion of the transcript in a valuation hearing held before an Interstate Commerce Commission examiner gives the result of one carrier's analysis of a number of these single sum values. The analysis included 389 valuations and in all these cases the single sum value was very close to the sum of "Cost of reproduction less Depreciation" and "Present Value" of land plus 5 per cent of the total thus obtained plus an allowance for "Working Capital, Materials and Supplies."

Thus it appears that valuation figures announced from time to time by the Interstate Commerce Commission do not include additions and improvements placed since 1920 or some date prior to 1920; are based on unit prices prevailing in 1914, and are not adjusted for increase in prices since that date which increase at this time is at least 60 per cent; do not include for land any amounts in addition to value based upon acreage value of similar and adjoining naked lands for purposes other than railroad although it is a well known fact that a railroad in acquiring lands must pay in addition to such acreage value, improvement damages, severance damages, expense of acquisition, taxes and interest during construction, etc.; and do not include actual working capital, material and supplies but do include a lesser figure arrived at according to the Commission's formula; also that deduction is made for depreciation, which deduction amounts to about 20 per cent of cost of reproduction new. Also nothing is included (unless in the 5 per cent referred to hereinbefore) for cost of seasoning roadbeds, for producing and operating business organization and developing the business; all elements of cost of obtaining a going concern and are in addition to the cost of the bare physical plant.

A knowledge of valuation matters is required for proper understanding of the Commission's announced figures.

The Valuation Act provides that:—

"(f) Upon the completion of the valuation herein provided for the Commission shall thereafter in like manner keep itself informed of all extensions and improvements or other changes in the condition and value of the property of all common carriers, and shall ascertain the value thereof, and shall from time to time, revise and correct its valuations,—"

"(g) To enable the Commission to make such changes and corrections in its valuations of each class of property, every common carrier subject to the provisions of this act shall make such reports and furnish such information as the Commission may require."

This phase of the work is also under way but no reports of revised value have been issued by the Commission. In hearings before the Commission in which a valuation as of a date later than the original valuation is required estimate of cost of reproduction new and cost of reproduction less depreciation have been submitted based on inventory as of date of inquiry and prices as of year 1914. In addition the U. S. Department of Labor all commodity curve has been submitted by the I. C. C. Bureau of Valuation to give the Commission information as to change in the purchasing power of the dollar between year 1914 and the date of inquiry. How the Commission will use this last mentioned information in bringing valuations down to date has not been announced.
The steam locomotive of the past and present has served America altogether too well to receive no mention in the history of railway engineering. In the past when, as today the duty of engineers was to provide the cheapest and best kind of railway transportation; the steam locomotive seemed, as far as reliability and practicability was concerned, to be thoroughly satisfactory. In fact it was so far in advance of most other existing machinery of the time that even today when any number of other sources of motive power all much cheaper, cleaner, more efficient and more reliable are waiting to serve, the steam locomotive apparently reigns supreme in its field of supplying railway motive power.

Electrification of railroads is being considered by every great railroad of the country, and will certainly be realized to a very great extent in the next decade, but the original outlay is too great to merit hasty steps toward its adoption. The engineers of these railroads all realize that the thermal and mechanical efficiency of steam locomotives is much less than that of electric machines. If satisfactory distribution of electric power could be accomplished cheaply, all railroads would be electrified immediately.

A Reward Of Research

The oil-electric locomotive is distinctly a product of American industrial research, and its advent into the realm of practically is just another illustration of the opportunities for high professional accomplishment which are always open to engineers who will maintain, after graduation, the alert, student attitude of inquiry and accurate observation. Incentive for the development of the oil-electric locomotive is bound up inextricably with those other marvels of an age of transportation wonders—the automobile, the airplane and the coal-less ship. Basically, it is the story of the development of the internal combustion engine, now recognized as a supremely important agent in the advancement of industry. Specifically, it is the story of the adaptation of the heavy-oil engine, already an economic savior in ships and manufacturing plants, to the much more severe requirements of railroad service.

The oil-electric locomotive, as now established in actual service on American railroads, represents years of patient testing and experimentation by American engineers.

How It Works

Briefly, the oil-electric locomotive is one in which an internal combustion engine, using low-cost fuel oil, drives an electric generator which furnishes power to electric motors geared to the axles of the driving wheels. Its advantages include more economical and speedier operation, greatly reduced maintenance cost, and the absence of noise and smoke.

Description Of Engine

The oil-engine used in the new locomotive is of the vertical, six-cylinder, four-cycle, single-acting, variable speed Diesel type having direct fuel injection. Cylinders, cylinder heads, and combustion chambers are completely water jacketed.

Fuel oil injection is accomplished by means of two opposed spray nozzles in each combustion chamber to which oil is delivered under pressure by an injection system driven from the main shaft. No compressed air is used for fuel injection. Ignition is produced by the heat of compression only.

One fuel injection pump serves all cylinders. The fuel oil distribution is obtained by a distributor timed to admit oil to the spray nozzles of each cylinder in their proper firing order.

The fuel oil for such an engine should be a clean hydrocarbon oil with viscosity at 70° F. not higher than 150 seconds Saybolt and flash point not lower than 150° F.

The lubricating system is entirely enclosed and of the force feed type. Lubricating oil is pumped to the moving parts of the engine by a gear-driven pump in the crank case. Oil in contact with the cylinder walls is passed through a filter and returned to the crank case oil reservoir.

A closed cooling water system is used on the engine. The water is circulated by a centrifugal pump driven from the crank shaft. The temperature of the water in the engine jackets is regulated by a thermostatic
valve, which controls the circulation of the cooling water from the engine to radiators on the locomotive roof.

To start the engine, compressed air at approximately 200 pounds pressure is admitted to each cylinder in succession through mechanically operated starting valves. While in operation the engine drives a small air compressor which maintains pressure continuously in the starting reservoirs.

The Generator

The generator is a 200-kw., 600-volt, direct current, compound-wound, commutating pole unit, separately excited. The generator, together with its exciter, is specifically designed for this service and is direct-connected to the oil engine. The combined characteristics of generator and exciter are such as to produce a machine of practically constant output. The voltage of the generator is regulated by the current demand of the traction motors, so that, making due allowance for the generator losses, the product of this current and voltage is equal to the engine power. The kw. output of the generator varies with the output of the engine, and at any position of the throttle it is constant throughout the whole working range of the power plant.

The Exciter

A 6-kw., 60-volt exciter is mounted on the same shaft with the main generator and serves to excite the field windings of the main generator. A 32-volt storage battery is charged by this exciter through one of the field winding in series. The exciter and storage battery circuit is controlled automatically by a switch on the main throttle of the locomotive.

The Control System

With this generator the control of the locomotive becomes extremely simple. There are two control handles. One is a throttle lever which controls the output of the engine. The other is a master controller, or electric switch handle, which connects the traction motors in series or in parallel for forward or backward motion. No rheostats are used in the power circuit, which reduces to a minimum the loss of power during acceleration.

In operation, the electric control handle is set for forward or backward motion, with the motors in series for speeds below 5 miles per hour or in parallel for speeds above 5 miles per hour. The position of the throttle lever now determines the power delivered by the engine, and the generator and motors transmit that power to the driving wheels, automatically adjusting the proportion of tractive effort and speed to the load on the locomotive and automatically changing these proportions to suit the varying requirements of acceleration or grade.

Motors.

The locomotive is equipped with four motors mounted on the trucks and geared to the driving axles. Each motor is of series-wound, totally enclosed, commutating pole, split frame type; the axle brackets and suspension lugs, being on the lower frame, render the motor readily accessible for inspection and repairs. A large hand hole, fitted with dust-proof cover, is provided from the commutator end; through which the commutator and brushes may be inspected. The armature is carried in separate heads clamped between the motor frames and is provided with self-aligning frictionless bearings.

Advantages of Oil-Electric Drive.

The oil-electric locomotive may be operated with fuel cost of 1/3 to 1/6 that of an equivalent steam locomotive.

It makes possible the elimination of coaling plants, ash pits, turn tables, roundhouses and hostling services—all of which are required for steam locomotives. The danger of fires from sparks and ashes is completely eliminated. Very little water is necessary, thus eliminating costly watering stations and troubles due to bad water conditions.

Its availability for service is approximately eighty per cent, or double that of the steam locomotive, and its cost of maintenance is approximately half that of the other.

Because of its smaller mechanical parts, it eliminates the necessity for heavier shop machinery.

The new type locomotive provides uniform, continuous torque at the wheel rims, which results in less wear on the tracks, and provides higher tractive effort at starting and slow speeds on lighter axle loads.

The oil engine can be loaded full at all speeds, which aids in securing fuel economy.

The electric transmission has the advantage over gear transmission in that it is self-shifting. The speed ratio between generator and the driving motors automatically adjusts itself to meet the demand of the service. This type of transmission also protects the oil engine from the stains and shocks to which it is subjected with a mechanical driving transmission between engine and driving wheel.

There is no fixed relation between the engine speed and the locomotive speed; thus the engine can always be run at its most economical speed, whether the locomotive is running at a high speed on level track or at a low speed during acceleration, or when hauling a heavy train. The electric transmission is equivalent to a gearing with an infinite number of gear changes.

It is possible to articulate two or more of these locomotives and operate them from one control station with a single crew.

The oil-electric locomotive is so easy to operate that any steam or electric engineer can learn to manipulate it in a few hours; and it may be substituted for any other form of motive power without disturbing personnel or mechanical equipment of any kind.

Making Service Records.

The most convincing proof of the extraordinary economy and efficiency of the oil-electric locomotive is found, of course, in its records of performance in the actual service of the railroads. These records have naturally been followed with keen interest by railroad operating men; and many of them are striking enough to indicate, even to the most disinterested layman, why it is claimed so confidently by engineering authorities that this new type of motive power is destined to mark a long step forward in the American system of land transportation.

It was demonstrated early in January of this year, for instance, that a 60-ton oil-electric locomotive can make a long run at an average fuel cost even lower than that of a Ford automobile. The locomotive was that now in operation on the Baltimore & Ohio Railroad, and the run, which was made unattached, was over a circuitous route of 733 miles from Erie, Pa., to New York City. The entire cost of fuel and lub-

(Continued on Page 18)
SVEND E. Johannesen, '93, B. S. in civil engineering, now a developmental engineer in the Pittsfield Works of the General Electric Company, was among the thirty employees of that company to receive the Charles A. Coffin Foundation awards for outstanding achievement during 1925. The suggestions are practical in their nature, and of a kind that not only promote the interests of the Company, but help the workmen in their every day tasks. A certificate of award and an honorarium of $300.00 in bonds of the G-E employees securities corporation go to each recipient.

Mr. Johannesen was born in Christiana (now Oslo), Norway. At the age of four, his father moved to America and settled in Erie Pa., where the former received his college preparatory education. He entered Roanoke College, where he matriculated for the Bachelor of Arts Course.

The floods which occurred in the south and middle west in the spring of 1889, where great damage was done to private and public property, caused him to decide to become a civil engineer the profession for which his father was educated and which the latter had practiced in Norway.

In the fall of 1889, he entered Rose Polytechnic Institute, graduating in 1893, receiving the degree of Bachelor of Science in Civil Engineering. The following year he was employed in the Testing department of the Wagner Electric Manufacturing Company of St. Louis, Mo. He was promoted later to the Engineering department of that company.

In 1902 Mr. Johannesen accepted a position with the Westinghouse Electric and Manufacturing Company, Pittsburgh, Pa., as section head and designing engineer of all types of air-blast and oil-cooled transmission transformers used for single-phase railway systems and all transformers and transforming apparatus for single-phase locomotives or railway cars. In addition to this work, he acted as the Westinghouse Company's engineering representative and witness in all transformer patent litigations in which that company was involved.

In 1906 Mr. Johannesen entered the employ of the General Electric Company of Schenectady. In 1907 he was transferred to the Pittsfield Works and in the fall of that year he was put in charge of the distribution transformer engineering.

Mr. Johannesen has been in transformer work for a period of nearly thirty-three years and in the early part of his career he did considerable pioneer work in this branch of electrical engineering. His recent contribution for which he has received the Coffin award was the redesigning of distribution transform...
How many engineers know the process of placing their corporation's stocks and bonds on the market? It is the purpose of this article to give a comprehensive view of the New York Stock Exchange, and in general, the method of buying and selling securities in the largest money center of the world.

The New York Exchange as an institution, is little known and less understood by the average engineer. Almost everyone knows of its existence and some have their own idea as to what it is and what it does, or what is done there. However, not only among engineers but also among many well educated American business men there are many who ask, "What is the Stock Exchange? Of what usefulness is it?" To answer these questions in a short conclusive statement would be impossible. About the best way to introduce answers to these questions would be to give a history of the Stock Exchange and its creation.

As Edward Meeker says, "The history of the New York Stock Exchange's swift evolution is one of the greatest romances in the economic development of America. One of the very oldest wheels in our modern financial machinery, it has evolved within the past century from the simplest beginnings to a great national organization, housed in a splendid marble edifice in Wall Street, and equipped with every appliance for facilitating its business that science as yet has made available.

New York has always been a national center for business on account of its location, its natural ports, and the like. As early as 1752 there was established an "Exchange" at the foot of Broad street, for dealing in slaves and certain commodities. After the Revolution was fought, America possessed a heavy national debt. Congress authorized the sale of $80,000,000 worth of bonds. Later the first United States bank was established.

The stock of the new bank, along with the issue of the $80,000,000 worth of bonds started the first wave of security speculation in this country. The frequent reselling of these securities created the need of a stock market-place.

In 1792 the first brokers agreement was formed. This agreement stated that no subscriber to the agreement could buy or sell stock for anyone for less than a certain per cent commission and that preference was to be given each other. There were twenty-four signatures to this agreement.

The stock market grew very rapidly. Insurance companies grew up; the war of 1812 created another heavy national debt, and other securities were put on the market.

In 1867 the stock ticker was adopted. This gave national publicity to the business of the exchange. The next year European securities were added to the listed securities. This addition was made possible by the Atlantic cable. European capital also came to this country. Foreign investors made several of our Western railways possible. The Exchange has more than kept pace with other institutions in its rapid development.

Today the Exchange is modern in all respects including the machinery of the floor. Each broker on the floor has his own number, and by flashing it on a board in the center of the floor he may be summoned to the telephone booth. Pneumatic tubes are used to send bills, etc. to each other. Stock posts are stationed all over the floor. Telegraph stations are also located there.

Only members, employees, pages, tube attendants, etc. are allowed on the floor. Even partners of members are barred during the illness of the partner member. In 1920, however, the Prince of Wales and the King of Belgium were allowed on the floor during business hours. This rule is to keep inexperienced people away from the posts.

Of 1,100 members, about 400 are generally present. In addition there are about 280 employees, and about 550 telephone clerks.

The exchange opens at 10 A. M. at the striking of a brass gong. Many men rush about the posts shouting bids and offers and waving their hands. A spectator, from the spectator's gallery above, might think there was a great deal of confusion, but the fact is that each man acts in a very efficient, though energetic manner. Very few errors are made in transactions amounting to many millions of dollars.

The Exchange has expanded continually and as a result construction on a new building has been begun. Members of the exchange are divided into two classes—the brokers, and the dealers and traders. "The broker executes orders to purchase or sell securities for someone else". The dealer or trader buys.

Sales are divided into two classes—cash sales, in which immediate payment is made and immediate delivery made, and credit sales, which take in the element of time. Credit sales furnish a greater part of the business turnover. In floating large bond issues use is made of credit in the way of deferred delivery, etc. If dealers anticipate a rise in stocks, they will buy stocks with the view of selling later. Such dealers are said to be "long" on stocks. Others anticipating a drop in stocks sell stocks, which they haven't as yet, to be delivered later. They will buy the stocks at the lowered price and obtain a profit. Such dealers are said to be "short" on stocks. This is really selling on credit. Many money lenders supply the cash necessary for certain stock transactions. The money is lent to the stock purchaser and the stock lent to the money lender. Interest is paid to the lender and dividends paid to the borrower. Such lenders keep in constant touch with the exchange.

(Continued on page 14)
Rolling Mill Safety

By Victor E. Schlossberg, e. e., '27

Those who have had experience in steel mills know that there cannot be such a thing as too much safety. It has been the writer's opportunity to work in one of the large steel finished product plants and to note the many possibilities for accident at all times. That mill owner, manager, and workers have come together as an executive committee in each other's interests, is indeed commendable. The author of the following graphic description of mill safety is in close cognizance with conditions in rolling mills.

During the year 1922 a certain rolling mill had an average of one serious accident a day. By serious accident we mean one which involves outside medical attention and the payment of compensation. Minor accidents were attended to by the company's first aid department. The serious accidents were inflicting deep scars and causing men the loss of fingers, hands, legs, and even life itself. These accidents necessitated large payments of compensation, and each day brought greater strain and anxiety upon the manager. Greatest of all, were the untold suffering and heartaches of those who loved the workers.

Accidents were attended to by the company's first aid department. The serious accidents were inflicted attention and the payment of compensation. Minor accidents brought greater strain and anxiety upon owner, manager, and workers. Something had to be done!

Accordingly, a Safety Committee composed of owner, manager, and workers was organized. They met without delay on the company's time and decided on a plan of action. The committee then went through the mill, and compiled a list of safety suggestions such as guards for flywheels, gears, belts, and shears. They proposed railings for dangerous places, noted opportunities for the strengthening of iron floors and the improving of runways. Further suggestions made were the providing of bells for cranes and tractors, fans for better ventilation in extremely dusty and highly heated areas, new water fountains, etc. The master mechanic was instructed to cooperate with the Safety Committee and to follow its orders. In a week all the new safety devices were in operation.

With all this there was not, however, any appreciable reduction in the number of serious accidents. Even after a great poster and slogan campaign the toll of carelessness continued. In this midst of all this a man working at one of the great hammers lost a hand. Work was discontinued in that department for the day—a great shutdown for a mill which runs continuously from six o'clock Monday morning until three o'clock Saturday afternoon. Following this accident the workers were drilled in safety; they were told to stay in the clear, to keep their hands from the hammer anvils. Furthermore, they were instructed to work slower, speed being no advantage to them because of day rate wages.

One particular morning the plant manager awoke in a fright. He went to the phone. "No!" was the answer to his question. "No one has been hurt; everything is running fine." He felt that someone was getting careless. He knew the thing was safe for the careful man, but he did not think it had been made foolproof. The day grew to high noon. Things were running smoothly and the hammer was working fine. A load was placed under the hammer. A boy was trying to light a cigarette. He stood close to the hammer. He was a signal boy. He gave the signal, and the operator lifted the steam lever. It looked to see that everyone was in the clear. The signal had been given. Down went the control lever. The boy who gave the signal was dead, his head crushed under the mighty hammer. He had been careless and had paid the supreme penalty. The mill was closed for the day; men who had seen men come and go shook their heads as they left the mill.

The safety Committee met at once. They knew their careless men had to be taken into account if safety measures were to be successful.

When the workers in that department came to work the following day, they were astonished, and said, "It will not work". Tables had been built on both sides of the hammer. A railing which kept the men three feet away from the hammer had been installed. Extra hands had been employed. The material was to be placed on the tables and pushed under the hammer. At first, production was reduced; but later on account of the increased confidence due to the safety device, the rate of output increased 100 per cent.

This mill has kept under constant study the various devices and measures which make for safe production. They have installed every sort of a safety device, and serious accidents are now few and far between.

The cooperation of owner, manager, and workers has resulted in much better feeling for the good of all.

Let us have safety now and forever. Always be careful.

New Method of Heat-Treating Gears

A new method for the toughening and hardening of gears is spreading throughout many of the gear manufacturing factories. Such a statement at once shows that the process must be an advantageous one. Two electrically operated furnaces, one an annealing furnace and the other for hardening the gears after carbonization are of course, necessary to the operation. But it is economy, efficiency and rapidity that counts today. It is here that the improvements of this new system play the prominent role.

The annealing furnace has four conveyor tracks entering the heating chamber. Two of these tracks carry work entering at one end; the other two carry the already treated machine parts in the opposite direction. Thus, the work to be heat-treated absorbs heat from the hot work coming out of chamber. The former is thereby preheated, the latter partly cooled.

The hardening furnace is equipped with a vertical pusher type conveyor and is used almost completely for ring gears. The gears go through the furnace in vertical stacks. By means of a slide at the side of the furnace, and a plunger which raises the gears into the desired positions, these vertical stacks are formed and remain in place. With its mission accomplished, the plunger returns for another gear.

The two furnaces, requiring but three operators, and working in an untrilling manner makes this new method truly one of merit.
Automatic Grease Cups

Compactness, simplicity, effectiveness—a grease cup meeting these requirements has long been desired. At last such a cup has been developed. A piston mechanism, reciprocated by a spring and provided with threaded ends to connect with a grease gun and a bearing opening; are the parts that make up this new grease cup.

The grease is forced into the container under pressure and compresses the spring. This action gives a constant and regular supply of lubricant to the bearing which is delivered through a small bore metering tube.

The flow of the grease is controlled by a quite clever method. Numbered brass pins, of varying thickness are used to regulate the discharge of oil and grease. If the discharge is too great, a metering pin marked with a lower number is inserted in the metering tube. These pins are easily removable, and are changed until the exact regulation is attained. As soon as all of the grease has been absorbed by the bearing, the piston moves into the lubricator, and another supply of grease is brought to the bearing.

The new device, called a grease-o-meter, can be cleaned easily, due mainly to its extreme simplicity. Wherever grease cups or forced-greased lubrication have replaced the oil can, this product will find a ready market.

Coal Carbonization

RECENTLY, in both America and England there has been much thought, discussion, and experimenting on engineering's most recent development, or perhaps more correctly, its unattained goal; an efficient coal carbonization process. The advantages that could be derived are numerous and are known to be true; on of the other hand it is a project in its infancy. Perfection and completeness of machine design and a realization of the desired results are but partially solved problems.

Despite these stumbling blocks, leading engineers of both nations agree in their statements. They believe that the next stage of evolution in central power operation will be the combination of low temperature carbonization with combustion under the boilers. By adopting such a method, raw coal would naturally be subjected to pretreatment. Tar, oils, and ammonia are possible by-products from the coal, while only the remaining semi-coke and gas will be used for boiler fuel.

In England, where the fuel question is more critical than in the United States, research has been carried on incessantly. Here several such plants have been in operation for a considerable length of time, and is from these sources that we get reports of the numerous advantages obtained from coal carbonization.

The engineers of the United States, however, have not been idle in regard to the great possibilities herein invested. Repeated experiments have been made, in an effort to commercialize the operation. In so short a time, any advantages to be realized have not had sufficient time to prove their consistency, and this permits a statistical report.

The processes of the methods, depending on internal heating, are comparatively simple and result in a saving per ton of coal carbonized. Non-coking or weakly coking coals much be used, the gases obtained are as a rule of a low calorific value, and the lighter oils cannot be collected. Nevertheless, should a diminishing petroleum supply create a demand for a low fuel oil, this method can readily supply gases of a low heating value.

Another process, of a relatively higher cast, and using externally heated retorts, produces a high-priced, smokeless, domestic fuel. A cheap grade of coal can be used in this case to produce a fuel of high B. T. U. standard.

Thus, as these experiments, would indicate, economic conditions and the type of coal available determine the selection of the most suitable process.

In addition to a few of the advantages occasionally listed above, the following characteristics are predominant. Operating at lower temperatures, less fuel will naturally be consumed, and less heat will be lost in the condensing system because of these lower temperatures of the various products evolved. Another pleasing result is that the size of pipes, tanks, etc., required in handling the volatilized products will be smaller. Low temperature gases, being much richer than those evolved at a higher temperature, find a ready market. The relative prices of production, however, favor greatly power generation through coal carbonization.

Such an engineering possibility presents an attractive field for the technical man, especially for the chemical engineer. It seems certain that some process of this nature will be adopted to an advantage, in America, as well as abroad. At the present time there is much room for one to exercise his scientific and engineering skill in perfecting and promoting the project. The many companies and other interests that seem ready to take up such a process make condition so as to assure a reward for him who devised a method that is workable and economically successful.

New Electrolytic Cell for Chemistry Type

Recently a new piece of equipment has been added to the industrial section of the chemistry laboratory in the form of an electrolytic chlorine cell. The cell is of the Allen-Moore type, which is widely used, and consists of two compartments separated from the cathods of perforated iron by diaphrams of asbestos cloth. It uses as raw material a purified brine (NaCl sol.) which is fed into the anode compartment and maintained at a constant head. Graphite is used for the anode, being the most servicable material for resisting the action of chlorine.

In the process chlorine is liberated at the anode and is conducted away for use, while the sodium which is liberated at the cathode unites directly with the water, forming a sodium hydrate solution. The latter is drawn off through suitable outlets in the bottom of the cathode compartments of which there are two. Since the cell is identical with those used in commercial practice, it will enable the intensive study of an industrial electrolysis at close view. When fully installed, a good supply of pure chlorine gas and the by-product, sodium hydroxide, will be available for both organic and inorganic preparation and experiments.

Scientific Notes
Intercollegiate Broadcast Successful

SESSIONS of a Collegiate League of Nations were broadcast recently by WGY when natives of twenty-one countries, representing seventy-five universities, a total of a thousand men, sang and cheered into the microphone of the Schenectady station.

The second annual Intercollegiate Night of the Edison Club was not all college cheers, however. The programs were produced and broadcast on two successive Saturday evenings. Perhaps in no other city could as many college men, representing as many colleges and countries, be assembled for a similar affair.

WGY used its 50 kilowatt transmitter for the occasion and it is reasonable to assume that these programs of many nationalities were hurled beyond the border lines of the United States. Telegrams came from all parts of the country, usually from alumni who thrilled to the songs and cheers of their college days.

Many of the college songs, as well as the cheers, were familiar to radio listeners but other songs, particularly those by the foreign-graduate bodies were new and of special interest.

One of the novelties of the second program was the offering of six Chinese engineers, graduates of four Chinese colleges and two American universities. They sang native college songs and cheered in six different Chinese dialects. A feature was a musical number on a Chinese instrument that looks like a cathedral, feels like a miniature organ, (being about twelve inches long,) and sounds like a flute. It is called a "sen."

The British Empire group made up of men from England, Scotland, Ireland, Canada, and South Africa, Australia, India, and New Zealand, gave an exceptionally fine program of song. The Indians' college song was a combination of song and yell.

The following is the list of colleges which were represented on the International Intercollegiate Smokers held February 27th and March 6th, from Station WGY:

Alabama Polytechnic, Arkansas Univ., Brooklyn Polytech, Bucknell, California Inst. of Technology, Case School of Applied Science, Clemson, Cornell, Drexel, Georgia School of Technology, Johns Hopkins, Idaho State College, Iowa State College, Kansas Agriculture College, Leland Stanford Univ., Mass. Inst. of Technology, Michigan Agricultural College, Mississippi A. and M., North Dakota State, New Hampshire, North Carolina State College, Norwich University, Oklahoma State College, Oregon A. and M., Pennsylvania State College, Pratt Institute, Purdue, Rochester, Rhode Island State College, Rice Institute, Rose Polytechnic Institute, Rutgers College, South Dakota College, Syracuse University, Texas A. and M., Tufts College, Tulane University, Union College, United States Naval Academy, University of Arizona, University of Idaho, University of Illinois, University of Kentucky, University of Maine, University of Michigan, University of Minnesota, University of Kansas, University of Nebraska, University of Nevada, University of North Dakota, University of North Carolina, University of Pennsylvania, University of Southern California, University of Texas, University of Utah, University of Vermont, University of Virginia, University of Washington, University of Wisconsin, Virginia Polytechnic Institute, Washington State College, West Virginia University, Worcester Polytechnic.

The foreign universities which were represented are as follows:

Tsing Hua School of Technology, Chiao Tung University, National Institute of Technology, and Wen Hui University, of China; Royal Institute of Technology, Stockholm, Sweden; Technical University of Berlin, Technical University of Hamburg, Technical University of Dresden, and other German cities; University of Toronto, McGill University, Queens College, Canada; Victoria Jubilee Technical College, University of Bombay, and Madras College of Engineering, India; Cambridge University, University of London, University of Edinburgh, University of Melbourne, University of Sydney, University of West Australia, and Canterbury College, New Zealand, Witswatersand University.

John Klenke, a graduate of Clemson College, South Carolina, and a native of South Carolina, was master of ceremonies and chief announcer and among other duties he read the telegrams from Sally, Irene and Mary, as well as Tom, Dick and Harry.

The Edison Club quartet and the club orchestra took part on both programs but the heavy work, the accompaniment to eight hours of song, was admirably provided by "Doc" Fendley, University of Kentucky.

Twelve graduates of as many German Universities reproduced a night in a German fraternity. The leader announced each new song by rapping on the table with his sword. A toast followed each song and approximate beer consumed in stein quantities.

A feature was the Scandinavian program produced by graduates of Norwegian and Swedish technical schools. The songs of this group produced the heaviest volume of fan applause.
St. Pat's Passes Into History

Another St. Patrick's Day has come and passed into the annals of nineteen twenty-six. To omit mention at all would not seem fair in view of the rationality of the whole celebration. 'Twas true, as Manager Garver of the Indiana Theatre said, "Boys, this is the best show you have put on yet." A casual observer did stop to remark that the acts showed quite a bit of preparation—and that remark is unusual, coming from the unconsidered public. The parade showed some very original ideas, many quite cleverly worked out, including the free use of the traction lines as a source of electric current. As a whole however, the turnout of floats was rather disappointing; several large groups having little or nothing to demonstrate their powers along exhibition lines.

We hope that they had reasonable excuses, but at this writing none have appeared anxious to put forth any. The loss of Rosie, the sacred elephant, following her storage after the parade casts a spell of gloom over the reiteration of the night's events. The blame for her loss is not with any students of the Institute, since it is evident that emissaries of an afraid-to-be-seen enemy spirited her away under the cover of darkness. What we cannot quite make out is why the deed should be done in such a cowardly manner, no answer to this question is possible now. Passing to the dance and with it the closing of the day's celebration we have good evidence in support of the statement that the St. Pat's dance of 1926 was far above the average of those of past years. Thus was brought to a close a most successful anniversary in honor of St. Patrick, the patron saint of engineers.

The Same Old Secret

Half a dozen newspaper writers sat in the National Press Club in Washington a short time ago discussing the wizard-like ability in finance of young Seymour Parker Gilbert, Jr., now permanent agent for reparations under the Dawes Plan. He went to the United States Treasury Department when he was twenty-five years old, having graduated from Harvard Law School at twenty-two. At twenty-eight he was made Under Secretary of the Treasury, and now he is only thirty-two. Bankers and politicians the country over recognize him as the greatest financial genius the world has ever produced since Alexander Hamilton.

"I don't get it," one of the journalists confessed; "don't see any special genius in him, though I know he's got it. But how do you explain it? What's the real secret of his amazingly rapid rise to the top of the world's finances?"

"Well", drawled another writer, "you know they keep what they call an entrance book over there at the Treasury Department which gives a record of everybody entering and leaving the building after regular office hours, including the time they go in and the time they come out. It was in this book that I found the secret of young Gilbert's genius. The book showed that in one month, which included four Sunday's and a holiday, Gilbert had been at his desk until after midnight fifteen nights, and that on one of these occasions he had worked there until half-past two o'clock in the morning. It's the ancient 'secret.'

Yea, Verily: The Slant Changes

Another undergraduate riot has graced the history of Yale.....Street cars were stopped, trolley poles pulled from their wires, fire-alarm boxes were broken open and firemen called to the scene were roughly handled......This is the best riot......since a portion of the Yale fence was burned in 1923. .........Thirty years from now some of these young men, thanks either to their own efforts or to the fortune amassed for them by a considerate father, will be men of affairs and captains of industry. And they will read, some morning, of a strike in Lawrence, Passiac, Butte or Brockton—and discover that two bricks were thrown through a factory window by some one in a crowd of desperate men and women. How pleasant it will be when this day comes, to frown at the morning's news and murmur, "Bolsheviki", "hoodlums", "vandals"! What comfort it will be to recall fine old precepts of "law and order", "self restraint", "respect for duly constituted authority"! What rich memories, by this time, will cling to dear old Yale. Alma Mater, which equipped us for life's struggle! And up in the Gothic tracery of Harkness Hall, when this day comes, the gargoyles will be cackling.

—New York World by courtesy of The New Student Alpha Chi's Lead in Scholarship

With the posting of the mid-year averages for 1925-26, the Alpha Chi Sigma fraternity, with an average of 76.0 leads the organization ratings in scholarship. The Theta Kappa Nu was a close second with an average of 75.5, and the Non-Fraternity men were third. The following is the rating of the different organizations with their respective averages.

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<tr>
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<td>Alpha Tau Omega</td>
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<td>Sigma Nu</td>
<td>66.9</td>
</tr>
</tbody>
</table>

—E. W. W.
One dream come true

For the man whose Castles in Spain are built in the laboratory, here is the promise of a dream come true.

In communication research, men have seen a thousand great visions in little test tubes, hundreds of new thoughts reflected in the mirrors of galvanometers.

A lifetime of this work is waiting for the man who loves it, and under conditions that he has always longed for. A wealth of apparatus and materials, an abundance of knotty problems, a group of associates who are helping in the great work—these are a natural part of this far-reaching industry.

The requirements of communication call for deeper, ever deeper inquiry, and not only along electrical lines but in chemistry and mechanics as well—all science contributing the stuff of which the researcher’s dream is woven.

Western Electric Company
Makers of the Nation’s Telephones
W. H. Webster '10 writes that John T. Montgomery '98 who is president of Mead and Co., large wholesale jewelers in Chicago, is chairman of the building committee of the new Jewelers building. The building which is to be the largest in Chicago will include forty floors and total 525 feet in height. From the sketch of the building which Mr. Webster included together with a description it is easy to believe that it will be one of the finest and most completely equipped buildings in Chicago.

Arthur P. Stone has gone to Fairbanks, Alaska as civil engineer for the Fairbanks Exploration Company.

Robert K. Rochester, with the Pennsylvania Railroad, has received a promotion and after April 1st will be General Superintendent with offices at New York.

Walton L. Woody has moved from Cleveland to 85 Hickory Street, Hinsdale, Ill. His business address is 2610 West 25th place, Chicago, Ill. Mr. Woody who has been acting manager of the steel works of the Malleable and Steel Casting Co. of Cleveland has been promoted to executive manager of the Chicago works of the same company.

Chester Cotten is with Horne Company, Ltd. Aalska, Japan. Ernest E. Hess has gone to Lufkin, Texas as Machine Designer for the Lufkin Foundry and Machine Company.

Lester S. Stinson is now in Watertown, New York. Address 138 Winthrop Street.

Malcolm Scott, now teaching music at Elnora High School, Elnora, Ind., won a prize in a “best song” contest. The title of this composition was, “I am Going to Float my Boat Right Back To Terre Haute.”

W. F. Lisman, with General Electric Co. has been transferred from Ft. Wayne to Cleveland where he is concerned with small motor applications sales and estimates.

Bob Reddie is in the Power Sales Department at Wilkinsburg, Pa.

Curtis Lehner, ex '24 returned from Florida where he was in the engineering business with Joe Fox and is now at Mansfield Ohio.

Joe Reifenberg is in Springfield Ohio in the Heating and Ventilating Engineering Section.

G. W. Ashley is working for the Indiana Power Company at their Dresser plant.

The third booth is more complicated. Over a thousand issues are listed there.

Prices of bond sales as they occur are reported on report boards. Simultaneously the telegraph operator is informed and the prices appear throughout the country on the bond ticker slips.

Formerly most bonds issued had a minimum denomination of $1000, but the growth of small scale investing has induced several governments and corporations to issue bonds of smaller denominations, in order that they might be within the reach of most investors. Some bonds are as low as $50, while there are many for $100.

Sales of these small unit bonds are made on the Exchange, only at a slight price concession. However the proper number of Liberty bonds, of small denomination may be readily exchanged, for a higher unit bond, at any Federal Reserve Bank.

Specimen section of bond ticker tape.

(Continued on page 20)
Waste!
World's Champion Wrench Thrower

WASTE throws wicked wrenches at machinery, in the form of excess friction, needless wear and misalignment. Today engineers in every field are applying Timken Tapered Roller Bearings to protect their designs from Waste.

Timkens put steel-to-steel rolling motion in place of the old sliding bearings. This alone saves up to 30% of power costs where Timken Bearings are used. And far less lubricant is needed, another great economy.

Timkens, with their tapered design, also give machinery higher capacity for bearing stresses from all directions, while simplifying the bearing mountings. Size, weight, and costs are thus reduced. Resistance to every form of wear is far increased.

Added factors in Timken endurance are Timken-made bearing steel, and the exclusive design which produces positive roll alignment in Timken Bearings.

Having so many possibilities for improving machinery in every way, Timken Bearings are of vital interest throughout manufacture, construction, mining, agriculture and transportation. Timkens are bound to enter still more deeply into the career of the engineer of tomorrow. You can inform yourself by sending for the valuable little stiff-covered Timken book, mailed free.

THE TIMKEN ROLLER BEARING CO., CANTON, OHIO

TIMKEN Tapered Roller BEARINGS
ATHLETICS

TRACKMEN MAKE GOOD SHOWING IN F. A. U. MEET

The thin clads from Rose showed up well in the Indiana-Kentucky F. A. U. championships in the annual carnival of athletics held at Louisville, Kentucky on March 13. The meet, which was an indoor affair, was held in the big armory. More than 500 athletes from many states competed in the big carnival of athletics representing colleges, athletic clubs, Y. M. C. A.'s and high schools.

The Rose track men who made the trip were, Captain Ed Dunning, and Al Porter, sprinters, John Derry, hurdler, Bob Wade, 220 dash man, and Allan Reeves, distance man. This team succeeded in making a total of 14 points in the meet, winning two firsts, a second, and a third.

Cpt. Dunning was the first man to place for Rose taking first in the 60 yd. dash finals after winning his heats in the preliminaries. His time was fast, the distance being covered in 6 3-5 sec. Then Allan Reeves, who was running his first race, added five more points for the Engineers when he won the novice mile run. There were 17 starters in the race. John Derry won his heat in the 60 yd. hurdle race and in the final heat finished second. He was handicapped in his running however due to a bad spill received in the prelim of the 70 yd. hurdles. Bob Wade drew a bad start in the finals of the 220 yd. dash and was crowded wide on the first turn. But the plucky little speed merchant won third place for Rose by a fast finish.

The Rose men made a very creditable showing in the meet and Coach Clark was well satisfied by the performances of his thin clads. There is a quantity of good track material from which to choose this year and all indications seem to point toward a winning cinder aggregation.

TRACK

Prospects for a winning track team at Rose are brighter this season than for a number of years. The cinder track while still incomplete is in shape for training purposes and it will be in condition for the one home meet with Central Normal on May 1. A good track on which to train is an important factor in getting the men interested in track and field sports.

The dropping of the Freshman rule which permits Rose to use its first year men is also an important factor in giving the Engineers a strong track squad.

Five men went to Louisville, Ky., March 13, where they competed in the annual Carnival of Athletics, in which more than 500 athletes from colleges, athletic clubs, Y. M. C. A.'s, and high schools took part. Dunning of Rose was first in the 60 yard dash. Reeves won in the novice mile run. Derry placed second in the 60 yard hurdles while Wade was third in the 220 yard dash. The Engineers brought home some fine medals.

The interclass meet held late in March on the Rose track was a two day affair in which more athletics took part than ever competed in any athletic pastime at Rose. Sixteen men started in the 100 yard dash.

Dunning was first, McNaught second, and Wade third. The freshmen won the meet with 47 points, juniors 43, sophomore 25, and seniors 11.

The interclass meet proved that Rose has some first class hurdlers in Derry, Piper, and Lahti, while Pennington gives promise of showing something in the hurdles before the season is over. Wade and Drompp, are Rose's best 440 yard men. In the 220 yard dash the Engineers have Dunning, McNaught, Porter, Davis, and Burt.

Never has Rose been represented by better distance runners. Mutz, Swalls, and Reeves, half and mile runners, showed their class in the meet. It was a great race between Lake and Gammill in the two mile, the former winning by a close margin.

In the field events, Big Bob Atken, Piper, Barrett and Kadel won the points in the weight events. Piper was first in the high jump and Derry captured the broad jump. Max White won the pole vault. Rose has reserve in every event and the 1926 team is sure to be an evenly balanced combination. Ed Dunning sprinter, is captain.

Rose met the Oakland City College track team at Oakland City on the first Saturday in April. The second meet of the outdoor season was scheduled with Eastern Illinois State Normal at Charleston for April 17, while on May 1 the Central Normal team from Danville will meet the Engineers on Rose field. Then a series of three big track meets will be held with Rose represented in each. These events are the Hoosier Relays at Danville, Ind., May 8; the little college meet at DePauw May 15, and the big Indiana Intercollege conference meet at Bloomington May 22.

BASE BALL

Cold, rain, and bad weather of late March and early April caused the first two games of baseball on Rose Poly's schedule to be postponed. These games with Eastern Illinois Normal and DePauw University will be played in Terre Haute later in the season. This would make the game with Eastern Illinois at Charleston April 7, the opening base ball tilt of the season.

Captain Harvey Mayrose, second base, has a squad of likely appearing baseball candidates this year. Thompson and Sawyers are both after the catcher's job. Babillis, Wells, Pierce, Harvey, and Sweeney are all pitchers. Kehoe fits in well at first base and "Red" Taggart is showing plenty of speed at second. "Red" Sweeney is an all around player and can take care of any infield job. Wesley and Dowen are other third base possibilities. Houston is trying out for second base job, while Donovan plays short stop. Kasamey, left field, Witty, center field, and Goddard, right field, seem to be fixtures but Metcalf could be used in any of the out field positions. There are a total of ten games on the Rose base ball schedule. Two games are to be played with each of the following teams: Eastern Illinois Normal, Walshah, DePauw, Indiana Central College and Oakland City College.
In 1871 Simon Ingersoll, the father of the present Ingersoll-Rand Company, brought out his first rock drill. Ingersoll-Rand, the pioneer, is now the world's leading manufacturer of compressed air machinery.

By constantly utilizing the latest advances in engineering, by selecting the best materials, by maintaining high quality of workmanship, and by standing behind its machines with efficient service, Ingersoll-Rand Company has broadened its field and has increased its usefulness to industry.

I-R rock drills and pneumatic tools are used in mines, quarries, and tunnels; in oil prospecting; and in general contracting work of every description.

I-R air compressors are available in a great variety of sizes and for many different pressures. I-R gas compressors are used for booster stations and for the extraction of gasoline from natural gas.

I-R heavy oil engines are reducing the cost of power. In steam power plants I-R vacuum pumps and condensers are maintaining high vacua.

The oil-electric locomotive is the latest triumph of I-R pioneering and engineering.
ATHLETICS (Continued from Page 16)

TEENIS

Lee Berry and Chester Trigg have been chosen tennis managers. The amount of schedule that Rose tennis players can have during the 1926 season will be limited because the Rose tennis courts have not been completed. The back stops are in place and the cinder covering of the courts has been in for a year. The top or surface layer of sand and clay, however, was not on the courts on April 1, and it would seem that some time will be required before this work can be completed and the courts graded and rolled ready for use. In the meantime tennis enthusiasts who wish to try out for places on teams should see the managers at once.

RECORD ROSE POLY BASKETBALL TEAM

SEASON 1926.

Rose 35, Oakland City College 17.
Rose 27, Indiana Central 28.
Rose 24, Central Normal 37.
Rose 24, Indiana State Normal 34.
Rose 38, Browns Business College 10.
Rose 50, University of Louisville 42.
Rose 28, Vincennes University 25.
Rose 22, Oakland City College 30.
Rose 25, Manchester College 51.
Rose 37, Normal College of the N. A. G. U. 31.
Rose 24, Indiana State Normal 26.
Rose 18, Hanover College 30.
Rose 38, University of Louisville 26.

Total Score: Rose 466, Opponents 469.

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<th>Foul Goals</th>
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*Player did not stay with Rose Poly basket ball team until close of season.

BOOK REVIEWS


The reader of this book will be well rewarded for the time spent in reading it from cover to cover. Although a translation from the Swedish, the free style of English makes it both interesting and understandable to even the layman. Though prepared for the popular reader, the style is not so condescending as is that of the general popular treatments of scientific subjects.

Historically, the treatment of alchemy is given as a romance of man’s attempts to identify the common materials about him. After discussing at length this ancient art the progress of chemistry beginning with the discovery of fire are presented. The author intimates that fire is the first artificial chemical process from which man consciously derived any benefit. The use of fire for the production and refining of the various metals and alloys is considered as man’s next step toward appropriating natural forces in his behalf. Ceramics, or the use of fired earth is treated in this connection.

On the whole, however, the work is one of future predictions based upon present tendencies. The author points out that our fuel resources are being depleted and that there is grave danger in store for the power user of the future unless conservation and research go hand in hand at the present time.

Chapters on electricity and chemistry: dyes, perfumes, and drugs; and cellulose and rubber should especially interest the average layman. The author is Director of the Nobel Institute and President of the Swedish American Foundation.

W. R. F.
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In April, for instance, there is an article by E. H. Johnson on "Blasting Coal for Mechanical Loading," which covers this subject clearly and thoroughly. Those interested in hard rock mining will find in "Mining Methods of The Cresson Gold Mining Company" some practical explosives data. The construction engineer of the Queenston-Chippewa hydroelectric canal tells about that unusual project which, when completed, will utilize a part of Niagara's wasted energy. "Mining for Oil" describes a new process of extracting petroleum from oil sands. And, of course, a Blaster Bill cartoon and the usual bibliography of all articles on drilling and blasting and a list of new patents, digested from the technical press of the world.

Our new subscription rate—Three Years for One Dollar—is less than might reasonably be asked, but professors tell us they would like to have their mining and engineering students read the Explosives Engineer regularly. Therefore, we have gone as far as we could to encourage this.

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Name: ____________________________
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The alumni chapter of Indianapolis has been giving
regular bi-weekly banquets this year of which cer-
tain nights have been set aside either in honor of one
chapter in the division or in honor of some person
active in the affairs of the fraternity. The night of
May 3 has been set aside as Rose Poly night, when a
banquet will be held at the Lincoln Hotel after which
there will be bowling at the recreation building.
The annual rough week at Beta Upsilon took place
during the week of April 4 after which the fraternity
deemed the pledges worthy of initiation. The fresh-
men must trod rough road, but their quality is dis-
played and their efforts rewarded.
Brother Foster Schilt, who was formerly in the
class of '26, but is now enrolled at Purdue University,
stopped off at the house on his way home at Olney,
Illinois for spring vacation.

THETA KAPPA NU

Indiana Gamma of Theta Kappa Nu announces the
initiation of Clarence Ellis, class of '27, and the follow-
ing members of the class of '29: Fred Andrews,
Richard Johnson, Gilbert Knott, James Lawyer, Rog-
er Mace, James Pennington, Albert Porter, and Allan
Reeves. "Rough" week was held the week of March
29 to April 3, with formal initiation the following
week.

On Saturday, March 13, the officers and degree
team of Indiana Gamma journeyed to Urbana, Illinois,
where they put on the work of installing Beta Lamda
of the University of Illinois as Illinois Beta of Theta
Kappa Nu. The men who made the trip report a very
impressive installation. A formal banquet was given
Saturday evening in honor of the visitors from nearly
every chapter of Theta Kappa Nu in the surrounding
states.

THETA XI

The eventful affair of St. Pat's has come and gone,
and everyone pronounced it a great success. As
guests for the occasion Kappa entertained Brothers
"Chuck" Johnson of Alpha Gamma, Armour Tech.,
J. C. Cline of Alpha Beta, Illinois, E. G. Johnson of
Alpha Gamma, and "Gene" Lyons of Kappa, who has
for the past year been located in Chicago.

The afternoon and evening of March 25 marked a
reception for the mothers of the actives and honor-
aries at the chapter house. At that time a Mothers' 
Club was organized. Following a tasty buffet dinner,
a theatre party was in order.

Friday evening, March 26, the dads and friends
of the actives and honoraries were entertained at the
chapter house with a smoker which was enjoyed by
everyone.

Saturday afternoon, March 27, the chapter house
was thrown open to host of girl friends at which
time a bridge tea was given.

Friday, April 2, a pledge party was given at the
house. Everyone enjoyed the occasion and we hope
that there will be more affairs in the future.

Among a number of recent visitors at the house
were Brothers H. E. Schoonover '25 who is located
with the Louisville Cement Co. at Speed, Indiana;
"Bill" Junker '21, secretary of the Cincinnati Tech
Club, "Joe" Anstead who is located at Sullivan, Indi-
anna; H. H. Merrill '25 who is located at Indianapolis
and often visits us over the week ends; and "Bill"
Turner, who is located in Chicago.

Continued on Page 28)
T H E  R O S E  T E C H N I C

THE ORIGINAL UNIVERSAL MILLING MACHINE INVENTED IN 1861-2 BY JOSEPH R. BROWN. THIS MACHINE MAY BE SEEN AT ANY TIME AT THE PLANT OF THE BROWN & SHARPE MFG. CO., IN PROVIDENCE.

A Machine that lightened man's burden of toil

BEFORE the middle of the nineteenth century much of the work done in the metal working shops was hard, slow hand work. The results were rarely accurate. A striking example of these toilsome methods was the making of twist drills. Until 1861 the flutes were filed in the drills by hand with a rat-tail file!

An increased demand for drills in 1860 spurred the inventive genius of Joseph R. Brown, one of the founders of the Brown & Sharpe Mfg. Co., and in 1861-2 he built the Universal Milling Machine. Spiral milling was at last made possible, and the flutes of the drills were milled on this machine accurately, at a tremendous saving in time and, especially, labor.

Hundreds of other uses were soon found for this remarkable machine. It has relieved the machinist of much toil as its usefulness increased along with its continual improvement. The modern Brown & Sharpe Milling Machine is one of the most versatile of all the machine tools.

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BETTER LIGHTING NEEDED IN INDUSTRIAL PLANTS.

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

In considering the present condition of lighting as found in the various plants, only 9% ranked as excellent, about 1½ ranked as good, 29% fair, 3.5% very poor, and 7.8% partly good and partly poor. It was found that the lighting in the offices was far superior to that in the shops; 19% being excellent, 36% good, 31% fair, and only 15% poor and none very poor.

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

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

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

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

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HUMOR

Rule For Automobilists
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He Couldn't Complain
Dad (arriving on the scene): How is it, sir, that I find you kissing my daughter? How is it, I ask you?
The Sheik: Oh, its great, sir!

How Minds Do Wander
Bill: They say all the girls that are getting married now are working girls.
Henry: No, they are working men.

One of Our Own Gallery

"Is this the speedometer?" asked the pretty girl tapping the glass with her fingers.
"Yes, dear," he replied.
"And that’s the clutch?"
"That’s the clutch, darling," he said, jamming on his brakes to avoid a fast approaching lorry.
"But what on earth is this?" she inquired, at the same time giving the accelerator a vigorous push with her foot.
"This, dear," he said in a soft celestial voice, "is heaven." And picking up a harp he flew away.

The Brute
1st Co: I like engineers, they're so rough and ready.
2nd Ed: Yes, the one I was with last night was too ready to suit me.
—California Engineer.

The Protector
The forman was talking to a negro who was looking for a place as fireman, and asked him if he had any children.
"Yes suh," was the answer, "I se got a boy."
"What's his name?" asked the forman.
"His name am Weatherstrip," was the reply.
"How'd he ever get such a name as that?"
"Well, you see it was just this way. He was born jus' befo' de wah, and he sho' kept me out of de draft."

An Engineering Definition
SLIP STICK: An excuse for approximate figures.
Inquiring Visitor: "To what do you attribute your long life, uncle?"
Oldest Inhabitant: "Well, I don't rightly know. Several of them patent medicine comanies is barginn- ing with me now."
"There's one person that agrees with me," said the cannibale.
FRATERNITIES
(Continued from Page 20)

ALPHA CHI SIGMA

A professional meeting of active and alumni members of Iota chapter was held at the fraternity's rooms in Chestnut street on the evening of Monday, March 15. Guests of the evening were Brothers R. Cook and E. Gossnell '25, Rev. Bailey of the Tabernacle Baptist Church, and Bro. P. W. Wilson, chief chemist at the Indiana Gas and Coke Company.

Rev. Bailey challenged our complacency by an informal talk designated by the question, "How Is Your Liver?" Bro. Wilson gave some interesting facts concerning the process of low temperatures carbonization and its present status as a working system in the United States. Informal discussion of kindred subjects and otherwise occupied the remainder of the evening.

Actives Pifer and Corban attended the Student Meeting of the Indiana Section of the American Chemical Society at Indianapolis, Friday and Saturday, April 2 and 3. They report a good representation of the chemical students from the colleges and universities of the state and a very interesting reception. Several industrial plants of interest were visited by the students and members of the Society. On Saturday afternoon a student symposium was presided over by Dr. Otto Eisenheim who spoke upon the subject "The Chemist and His Job." Saturday evening the Professional Chapter of Alpha Chi Sigma gave a banquet for visiting alumni and actives.

PROM DATE SET

The Junior Prom committee has signed a contract with Goldkette and his thirteen Victor recording artists to play for the Junior Prom which will be held May 13 in the Rose gymnasium. This is one of the best, if not the best, orchestras that ever played in Terre Haute. For this reason it should contribute largely in making this year's Prom the best ever held. Try these artists on your Victor, then hear them in person at the Prom.

WANTED—A TRACER

What has become of the new Rose songs which Mrs. Carrie B. Adams prepared and kindly sent back to the Institute from her home in far away Oregon? It is doubtful if the student body as a whole knows anything about these songs, purported to be of high quality and of suitable character to become worthy bearers of the name of Rose.

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Work of the New York Stock Exchange

(Continued from page 14)

When an interest bearing bond is sold, the buyer must pay the accrued interest to the seller, unless otherwise agreed.

The bond market, like the other branches of the Exchange has grown so that it will be much relieved when the new building is completed, thereby giving it more room.

The last market which will be considered here is the Security Collateral Loan Market. Because of the inability of Federal Reserve banks, under the present law, to rediscount for their member banks loans secured by any securities other than government obligations, and also because of the peculiar method of settlement on the Exchange, such collateral security loans are handled in a separate market. This is the only money market of its kind in the world. As much as $40,000,000 has been handled in a single day.

There are two types of collateral security loans—time and call loans. The time loan has a specified time at which payment is to be made. The lender is protected by an agreement which says that the borrower will put up more security in case the selling price of the collateral security goes down.

The loans are never made on the Exchange floor, but are made directly between the borrower and the lender, or through a broker, who charges about 1/32 per cent for his services.

The call loan is renewed each day, often at a different interest rate, either higher or lower depending on the market. Call loan money is obtained at a "money desk" on the Exchange floor. This money is the surplus money from banks all over the country.

Collateral security loans are also classified as, all Rail Loans, all Industrial Loans, or Regular loans*. All Rail Loans, as before stated, used to be quite common, but of late they are continually growing scarcer.

The Stock Exchange has a system of "daily settlements". Unless otherwise specified, delivery of sales effected on the Exchange is made on the following day at 2:15 P. M. Delivery of Friday and Saturday sales is made on Monday, on account of the Exchange closing at noon on Saturday. This "daily settlement" is effected only by means of the clearing system.

The clearing system is somewhat like a bank clearing house; the difference being that money, stocks, and bonds are cleared instead of money only. However only about 250 of the listed stocks are cleared and only Liberty bonds are cleared regularly.

It might be well to give an example of the operation of the clearing house. A sells 100 stocks to B at 85, in turn sells them to C for 86. The clearing house directs A to deliver the stocks to C. A gets a check for the stocks at 86 and makes out a check for $100 in favor of the Exchange, while B draws a draft for $100 against the Exchange. This makes a transaction complete in every way.

Quoting again from Meeker, "A great responsibility to the people of this country rests upon the Stock Exchange. In the difficult and necessary tasks which will fall upon them in the future, their hands must be upheld by a wise and patriotic opinion".
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Receives Foundation Award

(Continued from Page 7)

erers and the development of a winding machine and special tools for their production, which has resulted in a more uniform product and has greatly expedited manufacture.

Between 1893 and 1902 a number of Mr. Johannesen's articles were published by the leading electrical journals. In 1889 he was awarded a certificate of distinction for high scholarship by Roanoke college. In 1895 he received the Master of Science degree and in 1898 the degree of Electrical Engineering from Rose Polytechnic Institute. In 1915 he was awarded a medal by the Jury of Awards as collaborator in exhibits of the General Electric Company at the Panama-Pacific International Exposition. He is a fellow of the American Institute of Electrical Engineers and a member of the Mathematical Society.

Mr. Johannesen's hobby is music, to which he devotes some of his spare time. While at college he was leader of the glee club and of the orchestra. When he was with the Wagner Company he was chief musician and director of the First Infantry band, M. N. G. At Pittsburgh he was director of the Westinghouse Electric Club Orchestra. He has been leader of the Pittsfield Works General Electric Band since its organization, twelve years ago.
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TERRE HAUTE, INDIANA
The Ox Woman

On an East Indian farm, where the crop is tea, a wooden plow turns up the rich black soil. A woman drives, another woman pulls—and a black ox pulls beside her.

Six hours under a tropical sun, a bowl of cold rice—and six hours more. Then the woman goes to her bed of rushes, and the beast to his mud stall. Tomorrow will be the same.

The American home has many conveniences. But many American women often work as hard as their Oriental sisters. They toil at the washtub, they carry water, they churn by hand—all tasks which electricity can do for them at small cost, in half the time.

The labor-saving possibilities of electricity are constantly becoming more widely recognized. And the social significance of the release of the American woman from physical drudgery, through the increasing use of electricity in and about the home, will appeal instantly to every college man and woman.
Loomis never dreamed he'd make a salesman

E. W. Loomis started life as a farmer boy—a real “dirt” farmer—as did his parents and grandparents before him.

Across the corn furrows, however, he would catch sight on the road of the only kind of engineer a farmer boy of that day saw—a civil engineer—and a civil engineer Loomis determined he would be.

At Delaware University, however, he got a job in the electrical laboratory—he also waited table, played football, wrestled, was commissary of the Commons, ran the battalion and did a number of other things, besides studying electrical engineering. One day a kindly professor said to him—“You understand men even better than you do electricity and engineering, why not go in for the sale of electrical apparatus?” Loomis liked the idea—came to Westinghouse—took the student course—then off to the New York Office as a “cub” salesman.

He worked—he always had—both on the farm and in college. In three years he was head of a section of the industrial sales department. By 1922 he was manager of the Industrial Division of the New York Office—charged with responsibility for the sale of Westinghouse apparatus to all industrial customers in New York State and in the northern half of New Jersey.

Loomis has fifty-two men working under his direction. It is barely eleven years since the wise old professor remarked to him—“Consider selling; it’s a promising field.”

Westinghouse