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THE TECHNIC.

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THE Purdue disaster has fallen upon the college world like a thunderbolt. To say that we, of Rose, were stunned would not express our emotion. Although we could not, at the first report of the wreck, realize the horror and fearfulness of the blow, a notable depression fell upon us. Then as the details of the catastrophe reached us words failed to come, and our hearts went out in pity for the bereaved and wounded. The public is, of course, greatly appalled at any such occurrence as this, but students alone can realize the shock of the calamity. It seemed as though it had happened to us.

To-day, as Purdue stands by the side of those who have left her halls forever, and sits by the bedside of her wounded, we, of Rose, wish to tender her our sincere sympathy. There are only about two hundred of us, Purdue, but we would stand, to a man, at your side and grasp your hand in heart-felt sympathy.

The following resolutions have been sent to the Purdue Athletic Association:

Whereas, The Athletic Association of the Rose Polytechnic Institute has learned of the appalling railroad accident in which so many Purdue students have suddenly lost their lives; therefore, be it

Resolved, That the members of this association through its board of directors, hereby assembled, express their deep sympathy for Purdue University and its Athletic Association under this heavy blow, and their horror at the sad and dreadful accident which has thus become a source of grief not only to relatives and friends, but also to the student body of every sister institution.

Resolved, That this resolution be entered upon the minutes of this meeting and a copy of it be forwarded to the Purdue Athletic Association.

Signed: A. S. Hathaway.
J. A. Wickersham.
John F. Regan, Jr.

A REVIEW of our football season up to the present time, by Coach Holste, will be found under "Athletics" in this number. Every Rose student should be sure to read the article. We believe that Mr. Holste knows what he's talking about, and that it will do us good to take advice from one who is as experienced in the subject as he is.

THE Symphony Club has taken in another member, to be known as the Rose Mandolin Club. Several of the fellows interested in this line of music have organized, and are now "hard at it" practicing, in order that they may entertain us in the future. Mr. E. W. Turk, '06, is

President of the club, and Mr. L. C. Beattie, '05, is Secretary-Treasurer. These gentlemen will be glad to meet all interested in any way with the work of the organization.

IT is a well known fact that the average engineer cares little for Parliamentary practice or debate. Although it may be doubted by some, we believe that he would rather wrestle with "Rankine" than stand before an audience and express his views on any subject under discussion. It is due to this fact that the Scientific Society has never had the support it deserves. Last June when a meeting was called, for the election of officers, about three members responded. It looked as though the society were a thing of the past. But those who have seen the good of such an organization have placed it on its feet again. A meeting was held at the beginning of this term and the following men were elected: President, Howard Mullett; Secretary and Treasurer, Chas. Peddle; Senior Councilman, R. W. Hill; Junior Councilman, Edward Spalding.

These men intend to work hard to make the meetings interesting as well as instructive. With your help they will succeed in making the society one of our most helpful organizations.

THE cuts illustrating one of our "Reviews" in this number were loaned us by the *Electrical World and Engineer*. For this courtesy we wish to express our sincere appreciation and thanks.

For the use of the half-tone under "Alumni," we wish to thank the *Architectural Record*, of New York City.

HAVE you ever read "A Message to Garcia?" If you haven't, you ought to; and if you have—read it again. Then if you have ever been manager of a team, or have "endeavored to carry out an enterprise where many hands were needed," you will be surprised to see how the great truth shown in that article applies to college men.

You cannot imagine what beautifully invented excuses some fellows have for getting out of work. Ask this fellow to do some little job and he looks at you with a sheepish grin and tries his best to change the subject. Ask that fellow to help keep the crowd back at a football game, and he will scowl at you and say: "Where's the policeman?"

Once in a while you will find a man who, when asked to help, goes about the work without saying a word. Ask such a fellow to attend to some business and you are perfectly certain that it shall be done. We leave it to the managers of the several teams to tell you what a choice pleasure it is to come across such a person. He is the fellow who, as Hubbard says, "can carry a message to Garcia."

"*It is not book learning young men need, nor instruction about this or that, but a stiffening of the vertebrae which will cause them to be loyal to a trust, to act promptly, concentrate their energies; do the thing.*"—[HUBBARD.

ON Saturday, the 7th of the month, Terre Haute was honored by a visit from two noted members of the Moseley Commission, who inspected the buildings and investigated the work at Rose. The distinguished visitors are two members of the commission now making a tour of the United States to inspect our technical colleges. We quote from the *Terre Haute Gazette:*

Some time ago Mr. Moseley, a large manufacturer of Great Britain, became impressed with the idea that if Great Britain was to maintain her position as a manufacturing nation, commanding the trade of the world, under the new and strenuous competition of other countries, it would be necessary for her to revise and modernize her methods. Believing that the vigor of this outside competition is in large part due to the efficiency of the education in technical schools of other nations, especially the United States, Mr. Moseley arranged to send a commission to the United States to visit the several technical schools, and perhaps industrial establishments in which their graduates were holding responsible positions, thoroughly investigate their work, and report with suggestions for the improvement of British methods.

This commission, consisting of thirty men, eminent in education and science, reached the United States about three weeks ago. They have divided up their work. Two of them are to come here to examine into the Rose Polytechnic Institute.

The two who are to come here are Prof. Magnus Maclean and Prof. Wm. Ripper. Prof. Maclean is the Professor of Electrical Engineering in the Glasgow and West of Scotland Technical College. He is, by-the-by, personally known to President Mees and Prof. Thomas Gray, of Rose. Prof. Ripper is Professor of Mechanical Engineering in the Sheffield Technical College. Both are eminent in their specialties.

The Installation of Power Plants.

By C. J. LARSON, '00.

WHILE the above heading might cover an endless variety of machinery, this article will be confined chiefly to Corliss engine work, with particular reference to direct-connected electrical units.

So much depends upon suitable foundations for engines that a few words about them will not be amiss at this point. The practice in foundation building varies greatly, and much depends upon the soil to be contended with. There is perhaps no better base than a hard gravel or hard-pan. Clay is fairly safe to build upon, but should be sufficiently excavated so that the base will not be effected by variation of moisture; otherwise, the drier the better.

Where a foundation is built directly on bedrock there is some danger of excessive rigidity, and engines operating under such a condition often give trouble from broken bolts, etc., unless the engines themselves are built with considerable elasticity. Where the base is solid rock it is more safe to put several inches of sand under the foundation. This precaution allows an imperceptible movement of the foundation which relieves the engine of much of the jarring effect which it would otherwise have to sustain.

With large vertical engines in particular, the effect of extreme rigidity of foundations is very noticeable in the tendency of the flanged joints between the frames and slide-barrels, to "wink" with each revolution of the engine. On the other hand, there is conclusive evidence that much of the refinement often resorted to for the purpose of securing elasticity is entirely unnecessary, so far as satisfactory running is concerned. It sometimes becomes necessary to provide means of deadening the vibrations resulting from running engines, and prevent their being transmitted to other buildings, in the vicinity. For this purpose, paper, felt, rubber, or other elastic material is placed under and around the foundation. Fiber joints between the engine bed and foundation have also been used with varying success.

Whether the material used for a foundation be brick, stone, or concrete, it should be of good quality, and none but first-class workmanship should be permitted. Inconvenience is often experienced in engine erection due to errors having been made in the laying out of foundations, especially regarding inaccuracy in the locating of bolt holes. Wooden boxes are preferable for this purpose. If the boxes are nailed to a template of foundation, and the latter secured firmly these errors ought not occur.

When crushed rock of suitable quality is available, excellent foundations can be built of concrete. After the mould is completed little skilled labor is required to construct a concrete foundation, and the work is more rapid than with brick or stone. In places where the foundation is above ground and will be exposed to view, very nice work can be done by using dressed lumber in mould and by placing suitable fillets in all corners. Through the lighter portions of the foundations, corrugated or twisted steel rods can be laid in while the concrete is being tamped, insuring an extremely safe construction.

The preparatory work of erection is frequently the most trying. We refer to the unloading and moving of heavy parts, which often has to be done with few facilities, and in close quarters. To take a forty ton crank-shaft off from a car, skid it around several corners, jack it up fifteen or twenty feet, and finally land it in its bearings, is sufficient cause for a sigh of relief when the job is safely done.

In erecting horizontal engines, except in the extremely large sizes, it is easier to bolt the beds, slides and cylinder together complete, and then level and line up the engine as a unit. This is done by setting the engine approximately in place on iron wedges, resting on the foundation.

The shaft, too, can be placed in bearings, before lining and leveling engine. In the case of a cross-compound or twin engine one side can be bolted firmly to the foundation and the other side and shaft set and leveled to the first.

The leveling is done by driving or pulling wedges under the engine; the wedges are of a thickness to make a suitable joint between the iron and masonry.

With vertical engines it is, of course, necessary that the beds be leveled up before any parts of the frames are set. In case of a large compound engine the two beds are set on wedges, approximately in place. The shaft is then landed in its bearings and the beds are wedged to bring themselves and shaft to a proper level, and a sufficient number of bolts put in to hold the beds securely on foundation.

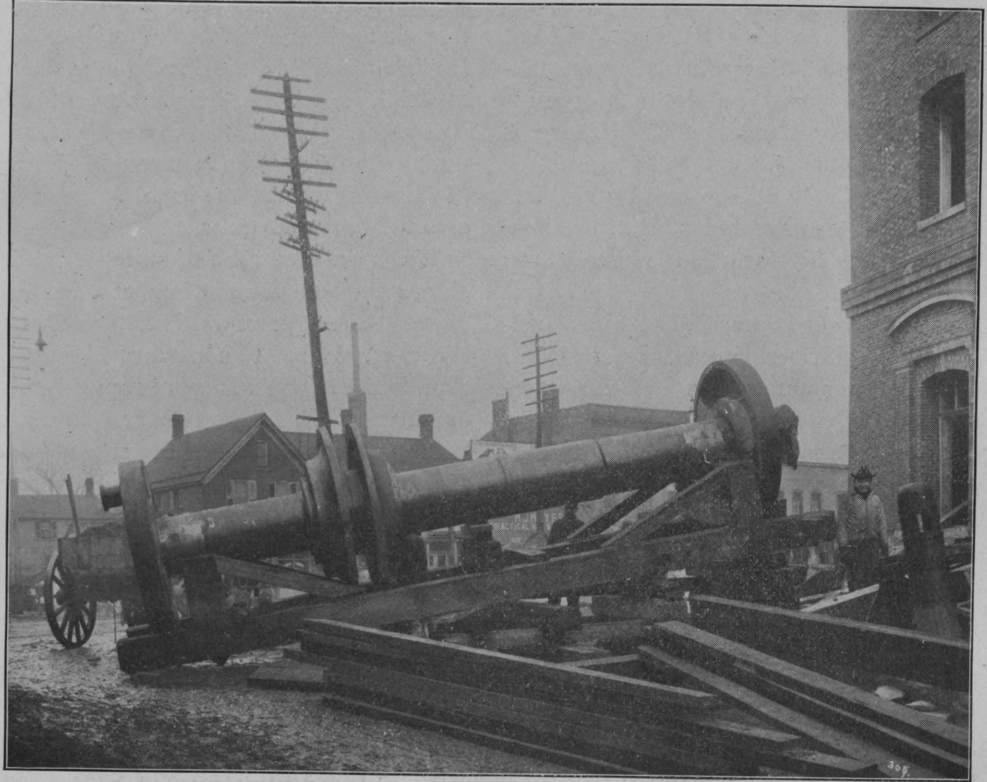


FIG. I. A THIRTY TON SHAFT.

It becomes difficult to handle very large horizontal engines in the manner just described, owing to their great weight. In such cases it is often more desirable to set the beds first and then bring the other parts to their level, a piece at a time. The disadvantage of this method is, that it does not permit of any juggling in case slight errors have been made in locating the holes in masonry for foundation bolts.

At this point of the work it becomes necessary to do some calculating. We would not usually think that a shaft thirty to forty inches in diameter could yield very much. In addition to its own weight such a shaft has to support the wheel and armature, making a total weight of 150 tons or more, and the deflection due to this load is something very perceptible.

It will readily be seen that if the center-lines

of the cylinders were set plumb that the engine would be out of line with its cranks. For this reason, each side of a vertical engine must be set slightly inclining toward the shaft side. The amount of inclination decided upon is determined by setting the beds slightly out of true level, and is to some extent a matter of judgment, as the exact deflection of shaft cannot be calculated, owing to the stiffening effect of wheel and generator hubs.

If the engine is a large one, it is not safe to add any more weight to the shaft until a joint has been made between beds and masonry. This is usually a cement grout poured under the beds. With small engines sulphur is frequently used. The difficulty with any poured joint is the danger of imperfect contact with the iron. This is particularly true with large work.

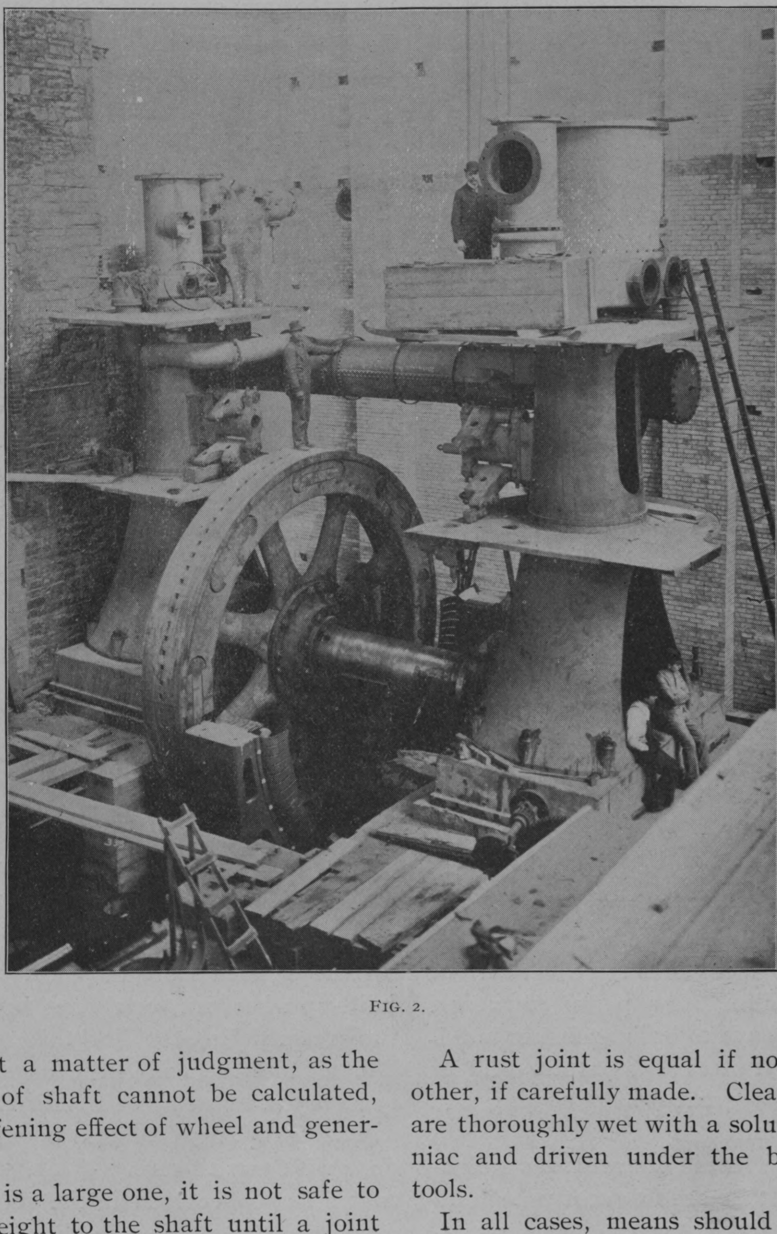


FIG. 2.

A rust joint is equal if not superior to any other, if carefully made. Clean cast iron borings are thoroughly wet with a solution of sal ammoniac and driven under the bed with tamping tools.

In all cases, means should be taken to leave

the bolts free in the holes, as if this is not done the bolts could not be removed, should it ever be necessary to remove engine.

Either cement or iron joints become "rotten" from oil soaking into them, and every precaution should be taken to prevent this occuring. No openings through the beds where oil could possibly get to foundation, should be allowed. The outside of all joints can be coated with shellac when new, making them impervious to oil.

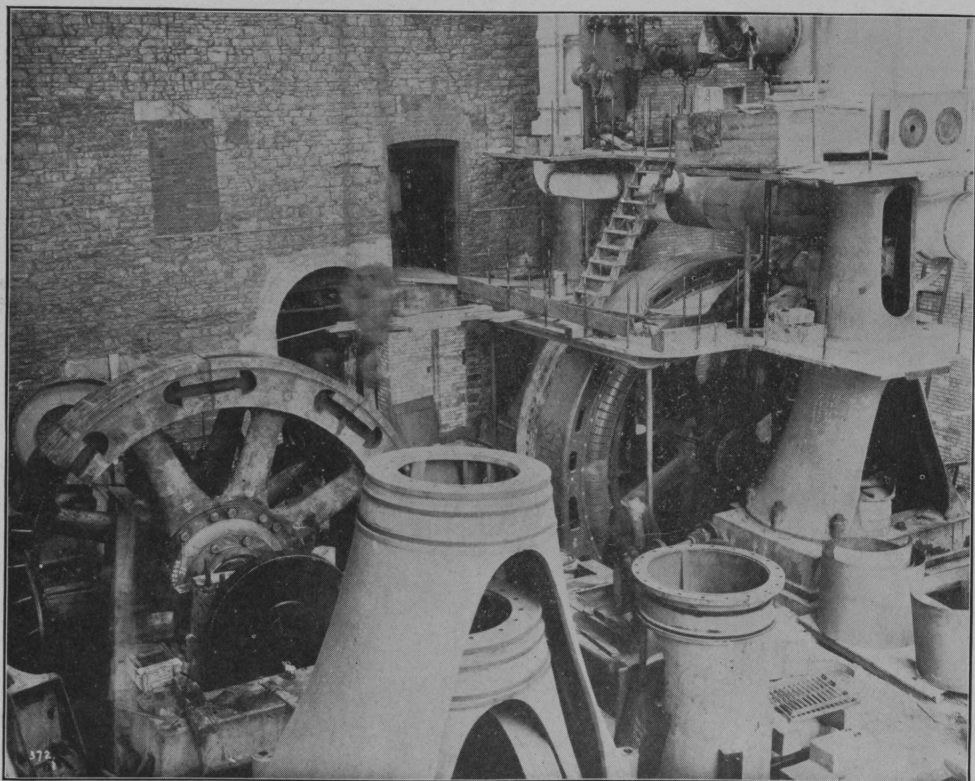


FIG. 3.

The erection of fly-wheels is simple work if one has facilities for handling heavy parts. However, engines frequently have to be installed in buildings not equipped with traveling cranes. Under such circumstances a great deal of rigging and hard work is called for.

Fly-wheels up to 18 feet in diameter and weighing as much as 35 tons are frequently built in halves, and bolted or linked together. It is usually easiest to lower one-half of the wheel into wheel-pit, before shaft is in place, and then run the other half over shaft on rollers and lower on to the shaft, when the bottom part can be lifted into place by long threaded bolts passed through the hub.

The segment or built-up wheel is by far the easier to erect on account of lighter parts. Each segment is lowered into its place in the hub and the bolts driven in ; the links being left out until all the segments are in place. The bolts in a built-up wheel are, or always ought to be, fitted into reamed holes. For this reason, they are difficult to drive, and in the larger sizes frequently have to be sent home with hydraulic jacks.

The shrinking of links in wheels should be done with utmost care. While all links have, of course been measured in the shops, one should never be heated before its dimensions have been

checked. The safe amount of shrinking can be calculated easily. All links in a wheel should have an approximately uniform tension when in place.

The hub bolts of split wheels should be shrunk in, for it is almost impossible to wrench these bolts sufficiently tight. By putting these bolts in cold first, and drawing them up until the hub hugs the shaft snugly, and then marking position of nut on bolt, the proper shrinkage can be made.

The practice of heating bolts and links to a red heat and as soon as they are in place, turning a stream of cold water on them is as dangerous as it is prevalent. The sudden chilling of the metal while it is beginning to strain tends to start surface cracks. We have seen four-inch bolts snap off that were thus treated, and know of cases where a blow from a large hammer has broken steel links whose section was five inches square. The breaking of a bolt or link in a large fly-wheel while under steam is a condition not pleasant to contemplate, as disastrous results are almost inevitable.

Frequently the armature, or revolving field, as the case may be is built solid and has to be pressed on to shaft. The shaft with generator on it frequently becomes too bulky to be shipped, in which case the revolving generator part must be forced on to shaft at place of final erection. This means too, that one crank must be left off the shaft. While it is difficult to do such work with the facilities which one can use about the average power plant, on account of the heavy weights to be contended with, it, like everything else, can be done when it has to.

The shaft has to be jacked up sufficiently to allow the armature to be passed on to end of same. In the case of a hollow shaft a heavy steel rod,

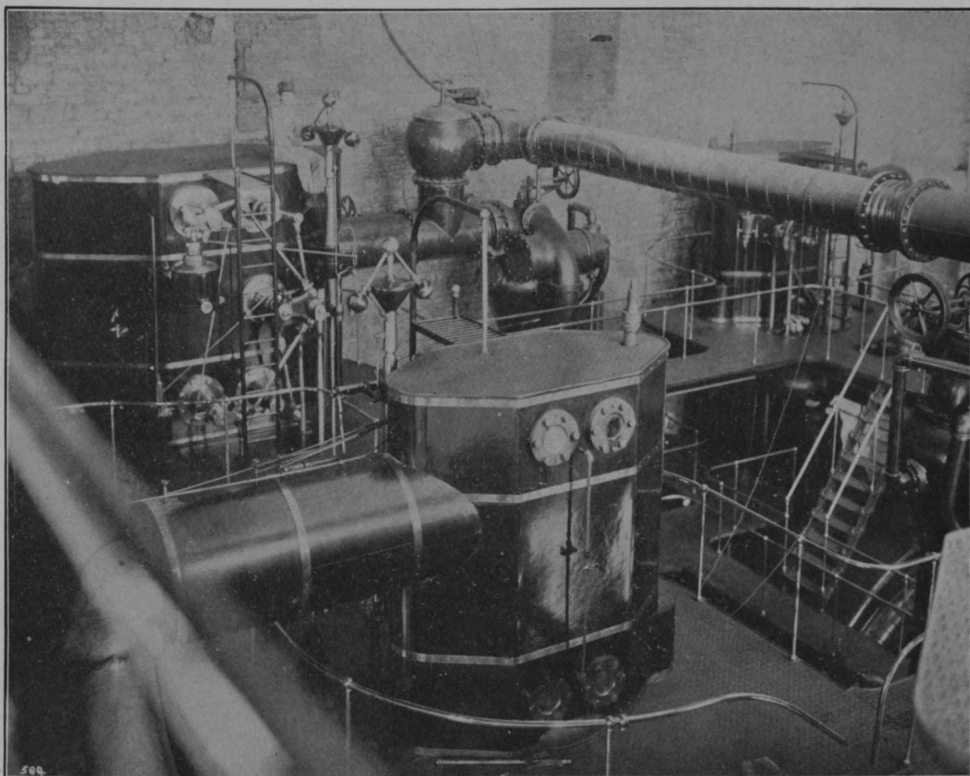


FIG. 4.

threaded on the ends, can be used, by passing it through the shaft, and using heavy timbers or steel beams for distance-pieces. Then if there is an electric crane in the plant the wrench to turn the nut can be operated by raising and lowering the crane. On account of the great pressure necessary for such an operation it is well to provide a conical roller bearing between large washers under the nut on rod. When the shaft is solid, two rods are necessary to be used with a pair of beams of sufficient length to let the rod clear fly-wheel hub. After the armature is in place, the crank is forced on in a similar manner.

After the engines are lined up, the receiver and connecting pipes in place, the whole should be subjected to a steam pressure-test, before any non-conducting covering is applied. Any casting is liable to have a sand hole in it, which must be repaired. Riveted receivers sometimes have leaks started in them by rough handling during transportation, necessatating seams and rivets being caulked.

When it comes to the matter of adjusting the valves and eccentrics of Corliss engines, methods vary with circumstances and conditions. With a small single eccentric engine one can assume a given amount of lead and compression ; and then indicate engine under running conditions. It would require but a few minutes to shift the eccentric should it be necessary. But with large engines, especially those with double eccentrics—and nearly all large engines are now so built — it requires considerable time and labor to move the eccentrics, owing to close quarters, heavy weights and enclosing oil guards.

By carefully considering the condition under which the engine is to operate, the valves can be adjusted to remarkable exactness before the machine has been tried. For instance; we would usually know the speed, steam pressure, vacuum, and load. The percentage of cylinder clearance can be measured or calculated. Given this data, theoretical diagrams can be constructed which give us all necessary information for valve movements to obtain satisfactory results. Proper allowances must be made for expansion of parts when in operation.

This might appear to be an elaborate course to pursue in settling valves and eccentrics, but it is not as laborious as it looks ; and gives one the satisfaction of knowing that the valves are set right and there is no uncertainty of what the indicator will "show up."

While it is one's duty to look for trouble when steam is for the first time turned into a large engine, it should be with a feeling that it will not be found. There should be no reason to expect that a new engine should run hot and that it must "come to its bearings." There is absolutely no excuse for nine-tenths of the difficulty with hot journals while starting new machinery. A shaft or a pin should be *at* its bearings and not have to come to it.

All main bearing shells should be fitted to the shaft by careful scraping until there is a good contact all over their surface. The same is true of crank and cross-head brasses. It matters not how carefully they may have been machined, the contact will not be as perfect as when scraped. By putting a very light coat of oil and red-lead or lamp-black on the shaft and putting shell on shaft and rolling it back and forth several times, the high places on shell will be marked. The process is one of continual scraping and trying until a uniform bearing is secured. Where this is done, and all grit and dust kept out of bearings, there need be no anxiety about any heating ; unless a bearing is run under speeds and pressure for which it was not designed.

All hand-holes into bearings should be securely plugged until the engine is ready for operation. While the world is getting better, there still are a few men left in it who are mean enough to put a handful of sand or emery into a bearing if they had the chance.

Before steam is turned into an engine, the steam-mains should be thoroughly blown out, if new. It is astonishing how many men use the open end of a steam-pipe as a receptacle for their belongings and forget about them. Then some-

body connects the next piece of pipe. Here are some things we have blown out of steam pipes: bolts, nuts cold-chisels, overalls, old shoes, and, in a recent case, a shower of broken glass, followed immediately by an odor that made one of the men think of his old Kentucky home.

The accompanying reproductions represent various stages in the erection of engines at a new power station of the Milwaukee Electric Company, which is just completed. There are four engines of 2,500 horse-power capacity each, direct connected to revolving field alternators which generate current at 13,200 volts. The current is transmitted to sub-stations in the suburbs where the voltage is stepped down and current converted for railway service.

These engines operate under 175 pounds steam, superheated 100° F., and run 96 revolutions per minute.

As will be seen the valves are all placed in the cylinder heads. This design reduces the cylinder clearance to a minimum.

Each engine is equipped with a condenser plant of its own, consisting of barometric-tube condenser, centrifugal injection pump operated by synchronous motor, and steam driven air-pump of the dry vacuum type. The location of condensers is clearly shown in Fig. 4.

Both upper and lower galleries of engines are connected with bridges. The switch-boards are mounted on a balcony on a level with upper engine galleries and are connected to the latter by bridges.

This arrangement of galleries provides rapid access to all parts of the machinery, and reduces the number of oilers necessary.

The problem of regulation calls for particular attention in electric service. Where direct-current generators are run in multiple, it is not absolutely essential that the speeds of the various machines be the same in order to divide the load uniformly, as this can be governed with the field-rheostat. With alternators conditions are different, as here the several machines must run together when once in "step." It will therefore be seen that all the machines should be so adjusted that the speed would be the same if generators operate on separate circuits. Otherwise the load will not be evenly divided.

While the governors of engines operating alternators in multiple should be extremely sensitive in their tendency, they must be dampened with dash-pots or other means to prevent their "hunting," otherwise the load on the various generators will fluctuate rapidly, causing serious cross-currents between the different machines.

The New York "Times" Building.

By EDGAR B. POWELL, '02.

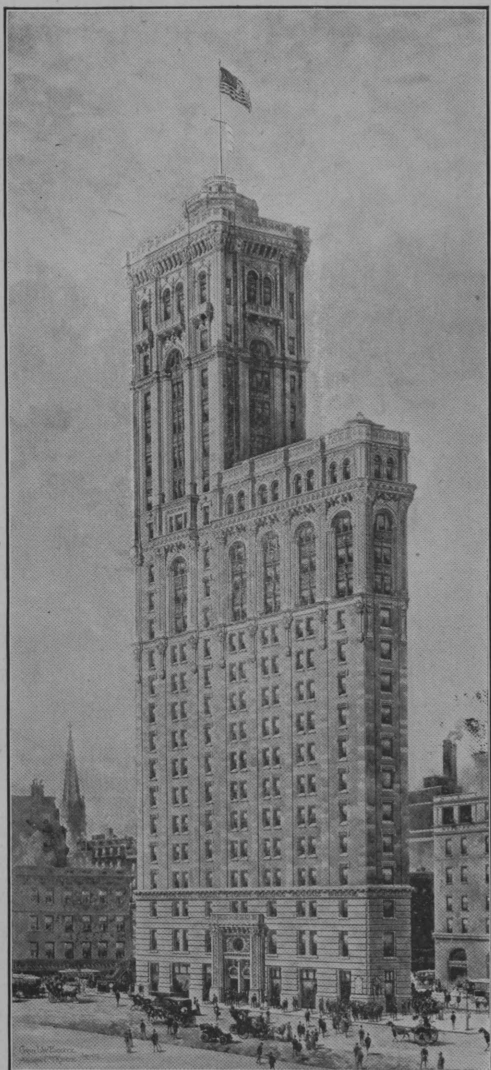
THERE is now being added to the list of New York skyscrapers one which in some respects is the most remarkable. It is situated at the intersection of Broadway and 42nd Street. The plot, whose approximate frontages are 58′–4″ on 42nd Street, 137′–9″ on 7th Avenue, 20′–0″ on 43rd Street, and 143′–0″ on Broadway, is similar in shape to that of the famous Flat-iron Building. But though the ground area is smaller, the building is higher. Great care has been taken with the architectural treatment. The Rapid Transit Tunnel, or Subway, passes through the building.

The unusual attention given to the design has resulted in a perspective of great beauty. It is of the Italian Renaissance style. The first, second and third stories form the architectural base, and are granite. Above this the entire exterior is terra cotta. The 13th, 14th, 15th and 16th stories, together with the tower, compose the architectural capital. These are very elaborate yet studied and refined. The 23rd story is entirely enclosed by the cornice. The lines of the tower follow those of the Campanile, by Giotto, at Florence, Italy. The entire design bids fair to be most successful.

The building in all parts will be sixteen stories high, while that portion included between cols. 1,–4,–13,–16 will rise seven stories higher and will be surmounted by a turret, making the entire height above first floor about 375 feet. Beneath the first floor are the basement, sub-basement and press room. The floor of this latter room is 48′–4″ below the first floor. Above the curb this building is the second highest in the city, while if its height were measured, including its basements, it is higher than any other building so measured.

The first floor will be used as the general offices of the *Times* and shops; the second to fifteenth, inclusive, will be rented as offices; the sixteenth will be used for type-setting machines; The stories above in the tower will be the editorial offices. The basement will be a station of the Subway and small shops. The sub-basement will be the machinery hall. Owing to the Subway passing through this building, these latter two stories will be only a portion of the site. The press room is entirely beneath the level of the Subway, and extends over the entire site, thus a portion will be under the Subway.

The engineering features of this building are most interesting. As before stated, the Subway passes through the building. One track runs between columns 13-E and B-H; another between B-H and G-K; another on the other side



of G-K. If columns 7, 8, 9, 10, 11, 12 and 23 were brought down to the ground they would pass through the Subway. It therefore became necessary to carry them at the first floor. The accompanying plan shows how this was done by means of plate girders and columns of special design.

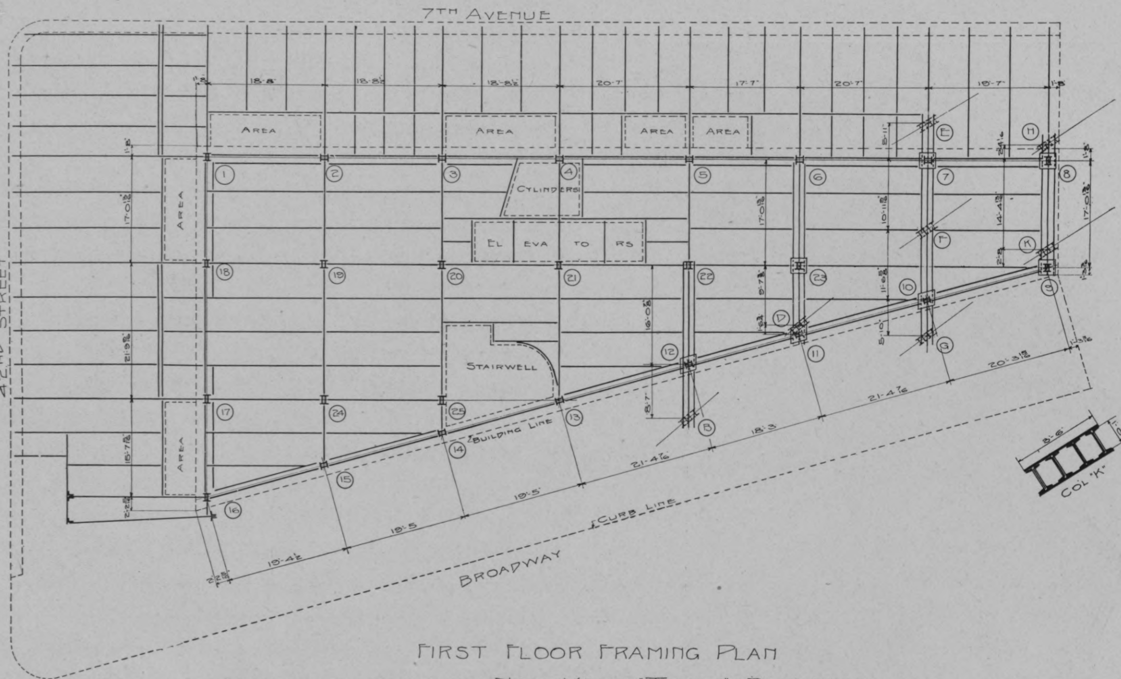
These columns, designated by letters, are placed on the center lines of the columns of the Subway. Their width was restricted to avoid interference. This led to the peculiarity of their section. A sketch shows the section of col. "K." It is made up of 8–12" [s 40 lb.; 4 inside plates 11"x⅞" and 4 cover plates 42"x¾". The outside dimensions are 15"x42". The area is 258.1 sq. in.

The girders, with the exception of those at cols. H-K, are of the same type. They are placed 11" on centers. The greatest moment is that of the girders 22-B, being 3,116,000 ft. lbs. The flange sections of these girders are each 4 Ls 6"x4"x¾", 4 side plates 12"x½" and 8 cover plates 10½"x¾".

To carry cols. 8 and 9 was a problem in itself. Here the wind pressure entered in and added a new feature. Shear was the governing feature in the design of these girders. Instead of but one web, each girder has two, 60"x⅞" in dimensions. Column "K" is situated within col. 9. When the wind blows upon the 7th avenue front the tendency is to lift the girders from col. "H" and for them to turn about col. "K" as a fulcrum. In this event col. "K" would get the entire load, 2,900,000 lbs., which it is designed to carry. To take care of this uplift due to the wind pressure five bolts pass through a steel plate on the tops of these girders and are anchored to beams at the press room floor level. From these beams in turn two anchor bolts, 3" in diameter go down 15'–0" into solid rock. For stiffness in addition to ordinary gusset connections cols. 8 and 9 are attached to the girders by gusset plates 5'–0" wide and 7'–0" high.

Because of the great height of the building on such a small plot, especial attention has been given to the wind bracing. Between cols. 3–20 is diagonal bracing, and between cols. 4–21 channel knee bracing. These two systems run through sixteen stories. In every spandrel where the architectural treatment will permit is a 30" plate girder rigidly attached to columns with deep gusset plates. The transverse beams are also made 20" or 24" beams.

Since the entire excavation was in rock, the foundation was comparatively simple. The footings are built up of granite blocks. To avoid vibration and jar due to the operation of trains



FIRST FLOOR FRAMING PLAN
NEW YORK "TIMES" BUILDING

in the subway, the Subway column footings have a cushion of sand.

In may be interesting to note some of the column loads:

Col. 2	2,404,000 lbs.
" 13	2,746,000 "
" 14	2,508,000 "
" 17	2,539,000 "
" 18	2,610,000 "
" 20	1,697,000 "

The columns are designed to carry an aggregate load of 47,600,000 lbs.

Cyrus W. L. Eidlitz is the architect.

The cut of the building has been very kindly loaned by *The Architectural Record*. It appeared in their issue of August.

My thanks are due to my employers, Messrs. Purdy & Henderson, in whose office the designing and the detailing of the steel work was done, for the use of the drawing and data.

ALUMNI NOTES.

W. M. Wickham, '92, formerly with the Lackawanna Steel Co., is now with the Semet Solvay Co., of Syracuse, N. Y.

J. A. Cushman, '03, has accepted a position with the Nordburg Engine Co., of Milwaukee.

Robert Warren, '02, was in the city a few days the first of the month, called here by the death of his grandmother.

Mr. Ott, 92, was married about Oct. 1st at Rockviile, Ind., to Miss Marcia F. Strouse, daughter of S. R. Strouse, editor of the Rockville Tribune. THE TECHNIC extends its congratulations.

Mr. William Ehrsam, also of the class of '92, became a benedict the 26th of last month. The bride was formerly Miss Virginia Mahone, of Topeka, Kansas.

R. R. Warfel, '01, was in Terre Haute for several days the last of October.

I. John Cox, '03, enclosed the note below to Herbert Shryer, in a letter to a Junior. Prof. Wickersham will be glad to see that I. John is still making use of his German. The note reads: "Wie gehts all the while, Herbe! Wie ist der Cotton und auch der Touzy, und Landrum. Sind sie allen sehr goot oder sehr bum, wie sie einst wahren? So long, I. J. C."

ROSE LEAVES

MINES AND MINING.

By C. G. FRENCH, '04.

MANY of the students of our college, especially the newcomers, do not devote much time to work outside of that in their regular college course. During the first few weeks or terms of his course the average student may find this pretty difficult, but soon he will acquire the ability of getting his lessons much quicker than before, and then he should begin to broaden his education. He may do this by becoming a member of some of the societies connected with the Institute, by reading literature from the library or by observing the work of engineers actually in the field. Not infrequently he can see the course of construction of some large building or other structure. It would be time well spent for him to visit some of the manufacturing establishments of the city. If he is not already familiar with mines and mining processes it would be interesting, to say the least, for him to visit some of the coal mines near Terre Haute. The writer of this article was permitted, by chance or good fortune, to help survey some of these mines, and his statements are based upon this limited experience.

Terre Haute is a great coal mining center. There is a bed of coal underlying the city, but a subterranean river above it makes it impracticable to mine the coal. The coal mined is first-class bituminous. Probably the mines most easily reached from Terre Haute are east along the interurban and Vandalia lines near Seeleyville, Cloverland, Turner and Brazil. Seeleyville is eight miles east of Terre Haute, and at present there are nine mines shipping coal from that station.

The first thing that attracts the attention of a visitor to a coal mine is the tower for the coal tipple. The tower itself is also called the tipple by miners, but more strictly speaking the tipple is the mechanism used to dump the coal. The tower extends high above the other buildings directly above the main shaft. A vertical partition divides the shaft and the interior of the tower into two equal apartments, the inside dimensions of which are about 6′x10′. The cages are worked in these apartments simultaneously and in opposite directions. Adjoining the tower on one side is the loading shed. This covers from two to four coal cars standing side by side, and over the cars are the gravity screens and the scales up nearer the tipple. In the Lost Creek Coal Company's new mine at Seeleyville, which is one of the best equipped mines in the country, the shed holds four cars and there are three screens. The coal goes over the finest first and the coarsest last, thus the coal collected in each car has its respective degree of fineness. Each screen is provided with a cover, making it possible to cover any or all of the screens when desired. Small coal mining cars loaded with coal are wheeled onto the cage at the bottom of the shaft and elevated into the tower to the tipple.

At some of the older mines the tipple is separate from the shaft, so that the cars have to be wheeled off the cage to be dumped, but modern practice is to dump the cars directly from the cage, simply by pulling a trip rope. At some mines the coal is weighed before it is screened, in which case the coal is dumped from the miners' car onto the scales, weighed and then dumped onto the screens. While one of the miners' cars is being dumped, the empty car which has gone down on the other cage is replaced by a full one, and thus the process is kept continuous. Faulty material is loaded on separate cars and wheeled out on a trestle from which it is dumped. A miner's car holds about 3,400 lbs. of coal. The average daily run for this locality is about 600 tons per mine. Some mines will run 1,000 tons per day.

Steam power is used at nearly all mines in this locality. The Lost Creek mine is provided with two 700 H. P. engines. Wire ropes 1¼″ in diameter connect the cages to the drum of the engine. Most mines have their own blacksmith shop, so that they can shoe their mules and make their own repairs at any time. Power from the engine is used for hoisting, pumping water from the mine, and forcing air through the mine.

For the mines of this locality the depth of the coal below the surface ranges from about 35′, as in the case of the Pearl mine at Cloverland, to about 136′, which is the depth of the second vein of the Fox Den at Turner. Most of the mines near Seeleyville are 125′ deep. The coal is found in layers or veins. The thickness of the vein varies in different mines, and sometimes in different parts of the same mine from about 3′ to 7′. "High coal" and "low coal" are the terms used by the miner to express thick veins and thin veins respectively. The veins are generally roofed with solid rock. Where the roof is not solid rock it must be timbered. Roofs composed of slate material are the most dangerous.

Let us now turn our attention to the interior of the mine. We may enter a mine in each of three ways, depending on its depth below the surface. If it is deep we would go down on the cage, if not so deep we may go in through a slope, or if it is a drift mine we would enter horizontally from the hillside. The cage is covered with ¼″ boiler plate to protect the men. Light is generally furnished by means of a lamp hooked onto the cap of each miner. In some mines the main entries are lighted with electricity. Air pressure is generated by means of a revolving fan placed on the surface. Until recently the air shaft was placed next to the hoisting shaft, but since the hoisting shaft is used for the "up-cast" the leakage between the two shafts is very objectionable. It is found to be better practice to place the air shaft over 100′ from the hoisting shaft, and then it will also answer for the escape shaft, which is necessary at any rate after 5,000 sq. yds. have been excavated. At one side of the bottom of the hoisting shaft is located the pumping apparatus. Air and water form very considerable items in mining operations.

In working out a mine, coal is first taken out so as to form tunnels about 10′ wide and of a height equal to the thickness of the vein. These tunnels are called entries. In order to provide for circulation of air in the mine there are always two entries running parallel with about 15′ of coal between them. Two sets of entries called the main entries extend in opposite directions from the main shaft. When the miner wishes to distinguish between the two entries running parallel, he calls the one through which the air returns to the shaft the air course. Near the ends of these entries is a hole between them, called a "break through." As the entries are extended "breaks through" are put every 45′ apart, and the old ones "braticed" (closed up), only one being left open at a time, and that the one nearest the end of the entry, so the air is forced to travel near the end of the entry before it can return through the air course. Gunpowder is used to break down the coal.

Along the main entries at intervals of about 800′, side entries branch off approximately at right angles. Each of these entries is provided with an air course. Rooms are turned off from these entries at intervals of about 30′. A neck 5′ or 6′

wide joins each rooms with its entry. The rooms are about 25′ wide, and they are extended to some boundary line, the room from some other entry or to a fault. Breaks through are also put about 45′ apart in the walls between the rooms, in order to force the air around through these side entries a door is placed across the main entry between the entrance to each side entry and the entrance to its air course. This door will open only toward the direction of the wind, hence it serves as a valve. The end of an entry, air course, or room, is called its face. Tracks for the little coal mining cars extend from the shaft to the face of every entry and room where coal is being mined. In most mines of this locality the cars are hauled by mules. In some mines, however, electric or cable power is used.

Each miner has his particular room or entry to work in. He is provided with cars as fast as he needs them, and his daily duty is to load the coal which was loosened for him the previous night, put up props if it is necessary, and then get his shots ready for the shooting gang to fire after the others have left the mine. The miner works 48 hours per week. If he works more than eight hours some days he is supposed to lay off long enough to make up for it. He generally works from 7 A. M. until 3:30 P. M., and stops half an hour for dinner. One man will mine between three and four tons per day.

According to the law of Indiana each and every person employed in the mine must be provided with 100 cu. ft. of air per minute, and 300 cu. ft. per minute must be provided for each mule. This is done to render harmless all noxious or dangerous gases generated in the mine. The common gases are "fire damp" and "black damp." Fire damp will explode on being ignited, hence the danger of taking a light into it. It is composed mostly of marsh gas (CH_4), but oxygen, carbonic acid, and nitrogen seem to be always present. In every place where it is known or supposed to exist, the place is carefully examined with a safety lamp by a competent fire boss immediately before each shift.

Water is constantly percolating into the mine. It is drained to the bottom of the shaft as far as possible, but where this can't be done readily it is drained into sumps and pumped to the bottom of the shaft. From here it is conveyed to the surface by a lift pump, or in some cases, by a box fastened to the bottom of a cage. Some mines are provided with special water shafts, where the water is lifted in boxes. When water collects in a sump and there is no provision made for pumping it out, they "bail the sump." That is, they dip the water into a water box provided with trucks and haul it to a place where it can be pumped.

The State Geologist appoints an Inspector of Mines, whose duty it is to make a personal inspection, at least twice each year, of all coal mines in the State. All applicants for such office are required to pass an examination touching their qualifications. He is required to make tabulated statement of facts, such as: the number of mines in operation in each county, the owners thereof, the number of men employed, etc., and submit the same, together with a statement of the condition of the mines as to safety and ventilation, in an annual report to the Governor.

The mine boss, fire boss, and hoisting engineer, are required to hold certificates of competency for their respective positions. The mine boss sends to the Inspector of Mines monthly reports of the condition of the mine. No male person under the age of 14 is permitted to be employed in any coal mine in the state.

The state law requires that "the owner, operator or agent of each coal mine shall make or cause to be made, an accurate map or plan of the workings of such mine on a scale of not less than one inch to one hundred feet, showing the area mined or excavated, the arrangement of the haulage roads, air-courses, break-throughs, brattices, air-bridges and doors used in directing the air currents in such mines, the location and connection with such excavations of the mine, of the lines of all adjoining lands, with the names of the owners of such lands, so far as known, marked on each tract of land. Said map shall show a complete working of the mine, and,

when completed, shall be certified to by the owner, agent or engineer making the survey and map, to be a true and correct working map of said mine. The owner or agent shall deposit with the Inspector of Mines, a true copy of such map within thirty days after the completion of the survey for the same, the date of which shall be shown on such copy, the original map and survey to be kept at the office of such mine, open for the inspection of all interested persons at all reasonable times. Such map shall be corrected each year between the first day of May and the first day of September, and a new map and copy of the same shall be filed as required in the original survey, or the original map may be so amended as to show the exact workings at the date of the last survey." The specified time "between the first day of May and the first day of September" is not considered of much importance as long as the survey is made once each year.

The actual work of surveying in a coal mine is necessarily different in some particulars from that on the surface. Since we must depend upon lamps for light, flags cannot be used to sight on. On account of the constant traffic, and in many cases imperviousness of the bottom of the entry, stakes cannot be used for stations. If a good solid place can be found, in the roof the station is made by drilling a hole about 3/8" in diameter in the roof. If the roof is not solid enough for such a station to be permanent, it is generally timbered and then the station can be made by driving a nail in the timber. By the use of a plumb line a nail is driven directly below the station in a tie. This nail is used temporarily for sighting and measuring. White paint is used to mark the stations. If the roof is liable to fall, the station should be referenced to fixed points near by. In taking a sight the nail in the tie can generally be seen when a lamp is held directly behind it. If it cannot you can sight on the plumb bob string when a light is held behind it. On account of irregularities and comparatively poor light, 400' is about the maximum distance a person can sight in a coal mine. Angles and distances between stations on the transit line should be measured very accurately. Other angles need not be read closer than the nearest degree, nor distances closer than the nearest foot. Sometimes the engineer is required to stake out some part of the mine on the surface. This may be done to locate the position of a shaft so that it will hit a certain place in the mine, or to show the workings near some boundary line. Interesting problems sometimes arise in determining the location and direc.ion of a slope of given inclination so that it will enter the mine at a certain place.

ROOTERS' CLUB.

The Rooters' Club held an enthusiastic meeting on October 17. Mr. Wm. H. Hazard was elected Chief Rooter and Mr. Addison Lee was elected Secretary-Treasurer. The ability of these gentlemen to root has been demonstrated many times in the past. Last year the Rooters' Club, with their informal bands, etc., certainly succeeded in making games exciting and interesting.

At the beginning of this year white buttons with old rose "R"'s printed on them were made and sold for twenty-five cents each. Each purchaser became a member of the club. The money realized in this way will help toward paying expenses of delegates sent away with the team to root, and will pay for flags, magaphones, etc. Join the club and get a button. When rooting always get in bunch so that the yells will be effective.

A report of our financial standing is below:

Nov. 9, 1903.

Received from former Treasurer	$ 4.75
Realized on buttons	15.10
Cash on hand	$19.85

A. LEE, Treas.

SCIENTIFIC SOCIETY.

The first regular meeting of the Scientific Society was held on Saturday, Oct. 31. Dr. John

White read a very interesting paper on "Acetylene." The attendance was very encouraging, and it is hoped that future meetings may be as successful. We feel sure that the Freshmen will find these meeting very interesting and instructive. At the last meeting very few Freshmen were present.

TELEGRAPH ASSOCIATION.

The Rose Poly Telegraph Association will be ready for operation early in November. The line has to be prepared and several extensions made. Arrangements have been made with the Terre Haute Electric Co., for current.

MODULUS DANCE.

The Junior class gave another dance in the gym. on Thursday evening, the 5th, which was probably one of the most enjoyable affairs of this Fall. This ball was the first of the year, and should have been attended by more of the students. Those who did avail themselves of the opportunity of enjoying a pleasant evening will not regret it and will speak a good word for the Modulus dances in the future.

The gym. was decorated in the usual manner, and the Ringgold Orchestra furnished excellent music. Several members of the Faculty, and their wives, were in attendance.

Photo by Hill, '04 JUNIOR MONUMENT, 1903.

HALLOWE'EN.

On Hallowe'en, according to the custom of the Institute, the Junior Class placed the '05 monument on the main building. It consists of an iron fence of neat design placed across the front portico of the building. Saturday evening the members of the class appeared on the scene about 10:30 P. M. Competent workmen were on hand and soon had the memorial in place. The class then assembled in the gymnasium where a banquet had been spread for fifty. The good things for the inner man were there in abundance. Toasts were given in a fitting manner as follows:

Toastmaster, W. R. HEICK.

Class of 1905, (the past.) . . . . . . LEWIS A. SNIDER
Our Strong Men . . . . HERBERT L. WATSON
The Faculty . . . . HERBERT E. SHRYER
Class of 1905, (present and future.) . WILLIAM S. HANLEY
The Memorial . . . . EDWARD S. SPALDING
Q. E. D. . . . . O. FRANK REYNOLDS

Foot Ball at Rose—How it is, and how it should be.

By A. F. HOLSTE.

ALTHOUGH the foot ball season of 1903 is not much more than half ended, and we are almost certain of winning three of the remaining four games and have a good chance of winning the fourth, still it ought to be of interest to any one interested in Rose to stop at the present time and take a brief survey of the season up to the present. To myself there appear several reasons for feeling encouraged. Though not satisfied with the work in the Hanover game, and feeling that we should have won the Shortridge contest fairly easily, still taking the past as a whole, I see a gradual improvement, the fruits of which we are now reaping.

When the season opened, about eighteen men appeared more or less regularly for practice for several weeks. These worked fairly hard, but still there wasn't the atmosphere about them that gives promise of a successful season. The St. Louis trip was the first scheduled game, and the fact developed later that a number of candidates had appeared only to partake of the pleasure the game afforded. The outcome of that game is a known fact to you all. After about fifteen minutes of play the team simply quit, another piece of evidence that the trip and not the game was of paramount interest to some.

After the Washington game it became apparent to me that I would have to change tactics. I concluded that strenuous work would have to be the regular program. I was certain that at least eleven men would remain faithful to me, whatever was done. Hard work had always been my method in coaching, and it was the only one I ever knew when I played. So I should have opened up that way at Rose, but for the fact that I found that I would have no one to work with in a short time. I learned that in the past the Rose foot ball teams never worked faithfully and had known no discipline. So it seemed to me that too hard rubbing at the start would meet with poor results. Therefore when I discovered that it was possible to resort to hard work, that line was followed daily. These tactics soon drove the faint-hearted off the field and left only the willing. The result of the work became apparent in the next game played. The surprise was simply amazing. The snap and grit displayed in that game was such as I had dreamed of instilling into the team, but which, on awakening, I found myself unable to do. That game gave Rose students the assurance of a good team. The effects were simply electric. The next day after that game more than two teams turned out and have come out regularly ever since. The aspect of the foot ball field changed to one of business every night. A position on the first team became something to be coveted and worth work-

ing for, and so rivalry showed itself for the first time on the field.

While this evolution, and I might say revolution, took place in the gridiron, the student body did not remain unchanged by the same. When the season opened the student body showed a general interest in foot ball, but it lacked life and vigor. It simply took the form of passively watching developments on the team. It lacked the strength to criticise any player for bad conduct or to force an able-bodied man to come out and work for the team. Every body feared he might hurt another's feelings. Such a state of affairs is deplorable, and will never be found where a school is successful in athletics. In such places you find the student body always alert to all the things affecting the institution in athletics. It will be jealous of its reputation, and resent any slur on the same, whether by students or outsiders. That spirit will drive an able-bodied man to don a suit and do what he can, and criticise any act of a player which is of no credit to the school and the student body. I have often seen a player taken to task by his best friends for failing to do his best, and the former feeling the justice of it dared not resent.

This spirit, as said before, was sadly lacking at Rose at the beginning of the season, and I have been told on good authority, never existed. A player never felt it a disgrace to be thrown out of a team for bad conduct, because those he associated with every day only smiled at it ; no matter how big a baby a boy might prove himself to be, no odium was connected with it. I am glad to say that old feeling of apathy and passive interest has died and a new sentiment taken birth. I have noticed signs of its appearance everywhere—on the foot ball field, in school, and wherever a group of students assemble. It shows itself in heartful enthusiasm at the games, and in practice, in healthy, free criticism of the players, and in defence of the school in general. I have also noticed the effect of this awakening on the players. They feel urged on by this spirit and apt to take no offense from the coach for hard treatment. I hope that this small flame may be fanned into a conflagration before the season is over, and that it will never be allowed to die down. That will be the greatest assurance of winning teams. Coaches and large funds are helpless without it. Don't be afraid of hurting a man's feelings; if you are in the right, he will be bound to respect your frankness and openness. Make it uncomfortable for babies and quitters whoever they are, whether they are on the field or off.

This awakened spirit among the student body and the players is the sign for self-congratulation. They give the assurance of winning all our future games this season, and better things for the next. Let us then, student body and players, continue to co-operate in close harmony in our effort to make this the banner year in the foot ball history of the Old-Rose-and-White.

TENNIS TOURNAMENT.

By PROF. A. S. HATHAWAY,

THE fall tennis tournament has been unusually interesting. The doubles have not yet been completed, but the singles closed Saturday, Oct. 31, in a five-set match between Lee and Cargill which fairly rivalled the foot ball game in excitement and interest. The full schedule of matches in the singles is appended. It is a good showing for such a large number of entries that only one match went by default. The drawing is remarkable for the evenness with which it has divided the two halves. It could not have been made more even by prearrangement between perfect judges of all the players. A look at the scores will show the unquestionable supremacy of Lee in the first half, and of Cargill in the second half, and that each had about the same number of

fairly good players to meet. In the finals, Lee maintained a steady and accurate game throughout. The small number of points which he gave his adversary by missing his stroke would have been creditable to an expert. He made Cargill earn nearly every point that he won, and although that could not save the first two sets, yet Cargill was so weakened after winning these that the result of the match was even then a foregone conclusion. Cargill made a supreme effort in the last and deciding set, but at no time was he able to maintain his pace until he had won out, and the only result was to prolong the set. It was a case of careful and accurate playing and superior endurance against superior skill, and the former won out, as it generally does, when the time is long enough to bring the question of endurance into consideration. It is interesting to compare the score by games and by points, as well as by sets. Giving Lee's score first, these are:

By sets, 3–2; by games, 33–32; by points, 216–217.

It will be remembered that last year, although Cushman lost to Cargill in a five set match, he had the consolation that he had won the most points in the match. This year Cargill has the like consolation.

PRELIMINARY.	FIRST ROUND.	SECOND ROUND.	SEMI-FINALS.	FINALS.
	Kelsall	Kelsall 10-8; 6-2		
	Gillett			
White	Lee 6-1; 6-2	Lee 6-2; 6-4	Lee 6-1; 6-1	
Lee				
Pote	Wickersham 6-3; 6-2			
Wickersham				
Trowbridge	Trowbridge 3-6; 6-4; 6-4	Trowbridge 8-6; 3-6; 6-1	Wells 6-2; 6-2	Lee 6-0; 6-1
Weisel				
Eastwood	Eastwood 6-0; 6-0			
Stalker				
Wells	Wells 6-0; 6-2	Wells 6-3; 8-6		
Wilms				
Heick	Heick 6-4; 6-1			
Miner				
Worthington	Worthington 6-4; 6-2	Worthington 6-3; 6-1	Touzalin 6-0; 6-2	Lee 3-6; 7-9; 6-4; 6-4; 11-9
Ryan				
Benbridge	Benbridge 6-1; 6-2			
Hahn				
Austin	Touzalin 6-0; 6-0	Touzalin 6-0; 6-1		
Touzalin				
Nichols	Nichols (Default)			
Schauwecker				
Wischmeyer	Wischmeyer 6-1; 6-4	Cargill 6-2; 6-1	Cargill 6-4; 6-0	Cargill 6-1; 6-1
Schenker				
Blanchard	Cargill 6-2; 6-1			
Cargill				
	Theobald	Willien 6-0; 6-0		
	Willien			

ROSE SECOND TEAM VS. PARIS.

By E. H. Spalding, '05.

This game deserves mention as being one of the freak games of the season. Rose was outweighed thirty-five pounds to the man, and was unable to gain regularly, though playing the better foot ball from the start. The lack of open work and the continued use of mass plays caused the game to be devoid of interest and gave no chance for spectacular work. In the first half Paris scored twice by repeated line bucking, but in the second half was only able to score in the last minute of play. In this half the superior training of Rose made itself apparent and the ball was in our possession a number of times, but as the line was unable to hold their heavier opponents it was impossible to gain. Every man on the team did his part and accordingly deserves credit, as the combination of a two hundred and twenty pound guard, followed by a two hundred and fifty pound full back, was not a very pleasant proposition to face.

LINE UP.

R. E.	Mullet	R. T.	Cook
R. G.	Nicholson	C.	Wilms
L. E.	Snider	L. T.	Cannon
L. G.	Wycliffe	L. H.	Spalding
R. H.	Benbridge	F. B.	Reynolds
Q.	McNabb		

Time—Twenty minute halves.

SHORTRIDGE H. S. VS. R. P. I.

By A. W. Lee, '06.

Probably many think that the less said about the Shortridge game, the better. But we think that Rose showed such marked superiority over Shortridge, both in defensive and offensive work, that is not easy to say too much. The Varsity eleven showed that they had gotten three things they have not had for years—endurance, team work and spirit.

Rose was certainly crippled in having Demmitt and McBride out of the game. The stars for Rose would be hard to pick, especially where such team-work was shown. Lammers, Daily and Bland rarely failed to gain ground, while Kiely's passing was one of the features of the game. For Shortridge Clark easily took the lead, with Gipe next.

Shortridge kicked to Kiely, who returned the ball 15 yds. Then by steady bucking 35 yds. was gained. Then Lammers was sent for 8 yds., Daily for 8, and Parr for 12. This brought us within a few yards of the line, and Lammers was shoved over. A punt out was then tried, but failed.

Rose 5, Shortridge 0.

In the next kick-off Allerdice caugh his toe in the ground, and kicked only to Speaker. As it was 10 yards, however, the kick went.

Then the steady bucking started again. On Shortridge's 40 yd. line there was a fumble, but Mack fell on the ball. Benbridge was put in for McBride, and Shortridge penalized 5 yds.

Then Rose did her best playing, making from 5 to 10 yds. on a down, and Lammers was again shoved over for a touch-down. Daily failed to kick goal.

Score—Rose 10, Shortridge 0.

Daily kicked 30 yds. to Allerdice. Shortridge had hardly started before she fumbled, and Mack was again on the ball.

But Rose, after making 15 yds., was penalized 5 yds., and failed to make her distance.

Clark was now substituted for Gipe, who took Weer's place. He had hardly gotten in when he went through the line for 30 yds , a run which Daily stopped. Then Poly braced and held Shortridge for downs.

Rose had hardly started when the ball was sent flying from under Lammer's arm. Almost immediately Shortridge fumbled and Benbridge fell on the ball. But after going 25 yds. Rose was forced to kick, and the half ended with the ball on Rose's 50 yd. line.

Score—Shortridge 0, Rose 10.

Daily kicked to Gipe, who was downed in his tracks. Then 2 yds. at a time Shortridge barely managed to go 10 yds.

Then Gipe, with a long sweeping run around end, made a 75 yd. dash down the side line for a touch-down. The goal was kicked, and the score stood :

Shortridge 6, Rose 10.

Allerdice kicked to Kiely, who returned the ball 10 yds.

Then came the hottest contest of the game. Shortridge had worked the ball pretty well into Rose's territory before she was forced to kick. Allerdice punted 35 yds. to Daily.

In a few seconds Daily was forced to punt, but the kick was blocked. Cook fell on the ball, however, and Rose started again. Down the field the ball went, 3 yds. at a time. Then Bland was sent for 6 yds., and Lammers for 18. Then on the 15 yd. line, almost a touch-down, Shortridge braced and held us for downs.

Then came Shortridge's rally. They had barely made their 5 yds. when Clark almost dived through the line for 20 yds. Again he was called on for 20, then Rose braced and it took the visitors 2 downs to make the next 5 yds.

Then, almost in the dark, and with only 30 seconds to play, Gipe swept around the end for a 40 yd. run for a touch-down. The goal was kicked, and the game was over.

Final score—Shortridge 12, Rose 10.

LINE-UP.

ROSE.		SHORTRIDGE.
Speaker	C.	Buser
Mack	L. G.	Payne
Lammers	L. T.	Connor
McBride, Benbridge	L. E.	Patton
Parr	R. G.	Aronson
Poorman	R. T.	Lieber
Cook	R. E.	Weer, Gipe
Kiely	Q. B.	McKinney
Douthett	R. H.	Gipe, Clark, (Capt.)
Daily, Bland, (Capt.)	L. H.	De War
Bland, Strecker	F.	Allerdice

Linesman—C. B. Jamison.
Referee—Prof. Kimmell.
Umpire—Frank Ray.
Time of halves—25 minutes.

ROCKVILLE HIGH SCHOOL VS. ROSE SECOND TEAM.

By A. W. Lee, '06.

On Saturday, October 25th, the second team bucked against Rockville High School in a game that will not be easily forgotten by those who saw the contest. For "Poly," Strecker, Brannon and Spalding were the stars, while for Rockville no one could compare with their quarterback, Hargraves.

In spite of the score the second team did some bad work, mixed in with their pretty plays, many fumbles marring the game. Then, too, a surprising ignorance was shown in regard to the rules governing a place kick for a goal. But altogether it was an exciting up-hill game.

The scrubs kicked off to Hargraves, who ran 80 yards for a touch-down, no goal being kicked. On the second kick off Poly got the man, but by a run around end they were again scored on and goal kicked, making the score 11 for Rockville. Then inside of the next ten minutes the scrubs showed their worth by making two touch-downs in rapid succession, Strecker kicking both goals. The half ended with Rose 12, Rockville 11.

In the second half Rockville kicked off to McNabb, who fumbled, but recovered the ball. Then end runs, mixed with fierce line bucks on the part of Brannon, Strecker, Reynolds and Spalding soon carried the ball over the Rockville goal and Strecker kicked a pretty goal.

The final score was: Rose 18, Rockville 11.

LINE-UP.

SECOND TEAM.		ROCKVILLE.
Snider	L. E.	Sutherland
Cannon	L. T.	Dugger
Wood	L. G.	Kennedy
Wilms	C.	Pierce
Jones	R. G.	Watson
Nicholson	R. T.	McChord
E. Brannon	R. E.	Bal
McNabb	Q.	Hargraves, (Capt.)
Spalding	L. H. B.	Reeder
Reynolds, (Capt.)	R. H. B.	Skelton
Strecker	F. B.	Wrisell

Referee—H. J. Brown.
Umpire—Prof. Kimmell.

HANOVER VS. R. P. I.

On October 31st the first game of the new minor league series was played, the Varsity team winning by the score 16–5. Although by no means a creditable game for Rose, still she won, and that counts for good deal. Almost all our

men played as if they were stale, and frequently half-hearted work only made a yard or two where the quick, snappy work which has lately characterized the work of the team would have made anywhere from five to ten yards.

Captain Green won the toss for Hanover and chose to defend the north goal. Daily kicked off 50 yards to Edwards, who returned the ball 15 yards before being tackled. Hanover tried a series of line bucks, but after making a few downs fumbled the ball. Bland picked up the oval and crossed two tapes before being tackled. Then a series of rapid-fire bucks by Daily and Strecker carried the ball to Hanover's 5 yard line, where Lammers was shoved over for a touch-down, Strecker kicking a pretty goal. Time, 3 minutes. Rose 6, Hanover 0.

Daily kicked 50 yards to Farber, who returned 20 yards. Hanover, in a few downs, was forced to punt to Bland, who heeled for a free kick and was given 20 yards for being tackled. After a few downs Rose was forced to punt, the ball going back of Hanover's goal line. Hanover punted out from the 10 yard line to Kiely, who returned 5 yards. Douthett made a pretty run of 30 yards around left end, and after a few more downs Lammers was shoved over for the second touch-down. Daily punted out to Bland, who heeled the ball. Strecker missed the goal and the score stood, Rose 11, Hanover 0.

Daily again kicked off to Farber, who fumbled but returned the ball 10 yards. By a peculiar formation, Hanover gained 10 yards, but "Poly" braced, forcing Hanover to punt to Kiely, who, by a brilliant run, crossed 6 tapes before being stopped. Then straight foot ball by Daily, Strecker and Poorman carried the ball to within a few yards of Hanover's goal line, when Strecker was sent over for a touch-down. No goal was kicked. Time was called just after the kick-off, with the score 16–0 in favor of Rose.

In the second half, Hanover kicked off to Kiely, who fumbled, but recovered and made 25 yards before being tackled. Daily added 10 more, but Rose punted out of bounds and Hanover had the ball on her own 30 yard line, Being forced to punt, they booted the oval to Kiely, who fumbled, but secured the ball. Poorman hit left tackle for 10 yards, but Hanover braced and held for downs. McBride stopped a play around his end with a five yard loss, forcing Hanover to punt. The ball then see-sawed in the middle of the field until by a succession of line bucks on their own right tackle the Presbyterians carried the ball over for a touch-down. No goal was kicked. Score—Rose 16, Hanover 5.

Hanover kicked to Kiely, who returned 15 yards. Then the first ginger of the game was shown on the part of the Varsity players, who quickly carried the ball down the field to within one foot of the goal, when the ball was lost on downs. Time was called with the ball in Hanover's possession on her own one foot line. The summary:

ROSE 16.		HANOVER 5.
McBride	L. E.	Edwards
Lammers	L. T.	Kramer
Parr	L. G.	Sipe
Speaker	C.	Vance
Mack	R. G.	Dushane
Poorman, Heick	R. T.	Deputy
Douthett	R. E.	Leonard
Kiely	Q.	Wallace
Daily	L. H. B.	Green (Capt.)
Bland (Capt.)	R. H. B.	Gore
Strecker, Cook	F. B.	Farber

Touch-downs—Green, Lammers (2), Strecker. Goals from touch-downs—Strecker (1).

Time of halves—25 minutes.

Referee— Spalding, of Hanover.

Umpire—Prof. Kimmell, of I. S. N.

Linesman—McNabb, of R. P. I.

ROSE—ILLINOIS NORMAL.

Before one of the largest crowds that ever attended a foot ball game on the local campus, the Eastern Illinois Normal went down in defeat before the college eleven in one of the hardest fought games ever played in Terre Haute. The Normal team was slightly heavier than the Rose men, but they lacked the speed and training, and incidentally the men, of the Poly team, as was so well shown by the way in which so many of the

visitors' plays were stopped before they were well started.

Daily kicked off at 3:15 P. M. 35 yards to McDonald, who returned the ball 10 yards. Then began a series of line bucks which "Poly" for while seemed to be unable to stop. Finally a lucky fumble gave Rose the ball, and a series of cross bucks and plunges soon carried the ball to the Normal 5 yard line, where a fumble proved disastrous to the rooters' hopes of a touch-down. After making 15 yards by steady foot ball Normal was forced to punt. The ball was returned 10 yards by Daily. Rose was then held for downs and Normal kicked to the centre of the field. After losing 5 yards on off side, Douthett was sent around left end for 35 yards, but the Illinois men again braced and the ball went over. McDonald made 15 yards through tackle, the first down, and on a trick play Rose was caught napping by Henderson, who made 25 yards before going out of bounds. Time was called, with the ball in possession of the Teachers in about the center of the field. Score—Rose 0, Normal 0.

Normal opened the second half by kicking to Kiely, who returned 10 yards. By hard line bucking and a 30 yard run by Douthett the ball was carried to the 25 yard line, where the Illinois team held for downs. Almost immediately Capt. Henderson was forced to punt, but the kick was blocked and the ball went over to Rose. By steady work the ball was then advanced to the 10 yard line, where Daily, after squirming and wriggling through half the opposing team, finally managed to plant the ball behind the Normal goal. Daily missed a try at goal, and the score stood—Rose 5, Normal 0.

Normal chose to kick to McBride, who made up 5 yards. A fumble soon gave the Normalites the ball, but Poly immediately braced and took the ball away. Then Lammers was sent around end and through tackle for gains of from 10 to 20 yards at a time, and this style of play soon carried the ball to the Teachers' 20 yard line, where Daily circled the end for a touch-down. Owing to the nearness of the teams to the side lines, however, he was forced to run out of bounds. Consequently the score could not stand, and the half ending immediately after, left the ball in possession of the Varsity team, on the Normal 4 yard line.

Although every man played well, still the work of Lammers and Daily in carrying the ball, and that of Kiely, who was in every play, deserve special mention. L. McDonald and Montgomery made most of the gains for the Normalites.

The summary :

Rose 5.		Eastern Normal 0.
McBride	L. E.	Housel
Lammers	L. T.	Sergeant
Parr	L. G.	Chumley
Speaker	C.	Kearney
Mack	R. G.	Coffee
Poorman	R. T.	E. McDonald
Demmitt, Benbridge	R. E.	Runyan
Kiely	Q.	Wentz
Daily	L. H. B.	L. McDonald, Perisho
Douthett	R. H. B.	Henderson (Capt.)
Bland (Capt.)	F. B.	Montgomery

Touch-down —Daily.

Referee—Prof. Briggs, E. I. N.

Umpire—Prof. Kimmell, I. S. N.

Linesman—McNabb.

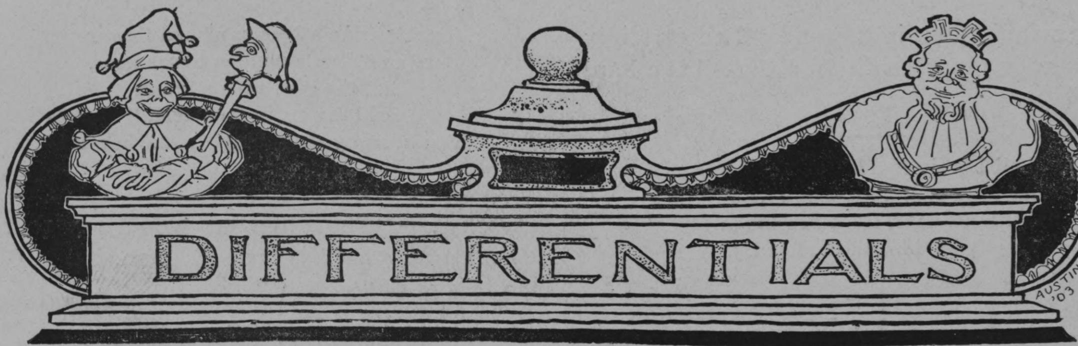
Time of halves—25 and 20 minutes.

BASKET BALL CAPTAIN.

Cecil Trueblood, '07, has been elected captain of the R. P. I. basket ball team for 1903. Mr. Trueblood is only a Freshman, and although it ordinarily is very bad policy to make a captain out of a man who has never earned his "R," still Mr. Trueblood is so eminently the man for the place that all custom had to be set aside for the moment. Here's hoping for a winning team and a good schedule to play to.

CAPTAIN OF TRACK TEAM.

Addison W. Lee, '06, has been elected captain of the track team for the following year. Mr, Lee was one of the best men in last year's squad and there is no one in school better fitted for the place than he. There is plenty of good material on hand, and Rose ought to be represented by a winning team next spring.



Hallowe'en, when ghosts and devils
Come to haunt these lower levels,
Looking for all kinds of trouble,
Which always seems to grow and double
When they are thus aggravated, now is past.

Next upon our schedule showing
Is the good old time Thanksgiving,
When we're thankful for our living
In a land where this gay season
Is observed with such profuseness.

The Glee Club has several recruits from the Sophomore and Freshman classes. A concert may be expected in the near future.

Senior :—What did you get in the Mechanics quiz, Mac?

McFarland :—90, using a safety factor of 3.

Heard in the corridor the day after Hallowe'en. "Its up to '06 to provide gratings for the windows next year, and for '07 to supply Sam with a uniform and musket the following year."

Staff, (soliloquizing) : — Gamma — Gamma — where have I heard that before — Oh yes ; that's what Jojo used to feed us last year.

If it's wrong, blame it on Tip.

Johnny S. :—I can recite on next week's lesson in Thermo just as well as to-day's.

Dorn has been elected an Athletic Director of the Senior Class to succeed Brannon, resigned.

A. W. Lee has been elected captain of the Track Team.

"I expect I'll be fired," remarked the locomotive, "unless I tender my resignation."

"O, pshaw," exclaimed the baggage car, "the company 'steams you too highly for that."

"Well, I hope so," answered engine, "but you see I've been running out of nights, and having an occasional toot, and I'm afraid they'll get on my track and turn the tables on me." — [*Ex.*

The Rooters have been doing some very effective work at the last few games. The only criticism which might be offered, is that they don't root hard enough when we're losing. That's when the team needs encouragement.

The Rose Polytechnic Mandolin Club has recently been organized and admitted into the Symphony Club. This will doubtless prove a success, as it includes all of our best players. In all probability the Mandolin Club will join with the Orchestra and Glee Club to give a concert in the near future.

Trueblood, '07, is to be captain of the basket-ball team this winter. Here's wishing him and his team a long season of victories.

The finish of the Fall Tennis Tournament was very exciting, A. Lee beating Cargill in the deciding set by the close score of 11–9. The players were very nearly evenly matched, Lee's en-

durance winning out in the end. Lee certainly deserves very great credit, for Cargill is a hard man to beat.

"Shall I brain him?," cried a hazer,
And the victim's courage fled.
"You can't do it, it's a Freshman,
Simply hit him on the head."

—[*Ex.*

"Say, sulphurous acid forms sulphites, doesn't it?"

"Yes."

"Then what does a Normal acid form?"

Tenderly she laid the silent, white form beside those that had gone before. She made no outcry, she did not weep. Such a moment was too precious to be spent in idle tears. But soon there came a time when it seemed as if nature must give way. She lifted her voice and cried loud and long. Her cry was taken up by others who were near, and it echoed and re-echoed over the grounds. Then, suddenly, all was still. What was the use of it all? She would lay another egg to-morrow. —[*Ex.*

Hath, absent-mindedly:—"Those at the board may take their seats; those at their seats may take the board."

Ryan, at St. Mary's, pointing to a row of beehives:—"I wonder what they're going to do with all those cases of beer?"

Ambitious Freshman:—"When I get ready to write my thesis, I'm going to make me one of them steam-boats that runs by gasoline."

Dr. White:—"Mr. Lee, will you name the three different classes of salts?"

Addy:—Rock salt, cooking salt and table salt.

Addy has lately formed the habit of carrying a dirty towel under his coat. However, all great men have peculiarities.

A noble young Roman named Caesar
Once called on a maiden to squaesar,
But the girl, with a blush,
Said the Latin for "tush,"
You horrid young thing, let me baesar!

—[*Ex.*

Wicky:—"The grammar would say that 'I buy me a new hat,' is poor English, but in German it is good English."

Gray:—(at "A Chinese Honeymoon") See that fellow playing the Caronet.

Jojo:—"The resistance of a conductor remains constant if it does not vary."

Freshman:—"Say, what's the Sultan's National anthem?"

Soph:—"Why! Infant; It's "Turkey in The Straw," of course."

FIRST CANIPTION.

There was a Soprano named Anna
Who stepped upon a banana,
The Tenor, quite low, laughed hi! hi! he! ho! ho!
I've heard, now I've seen your hos-ana.

—Sigfried.

Prof:—"Can you explain this, Mr. Jenckes?"

Sig:—"Yes, sir."—"You take layers of nothing and add them together to get the distance."

Reynolds:—(in French)—"And she never arrives on time tardy."

Prof:—"We have here two magnetic bars:—One of them is the Northern bar and"————

Here the class got a different kind of a lecture.

EXTRACT FROM AN ORATION.

"In some future year when Little Patsy McBride comes marching up the stone steps of 'Old Rose,' he will point to that same Iron Grating and say 'Look! fellows, see what Pa's Class did.'"

Katzenbach attended the Sigma Nu State Conference at Bloomington as a delegate from the Chapter here.

Jo :—This is a soft iron rod which is steel.

W. S. Hanley, J. S. McBride and H. E. Shryer, all of '05, have trod the burning sands of the desert and become P. I. E. S.'s.

THE ENGINEER.

Who comes with Faber sharpened keen,
With profile long and sober mien,
With transit, level, book and tape,
And glittering axe to swat the stake?
The Engineer.

Who sets the level, bends his spine,
Squints through the glass along the line,
Swings both his arms at rapid gait,
Yells, "Hold that gol-darned rod up straight?"
The Engineer.

Who raves and snorts like one insane,
Jumps in the air and claws his mane,
Whene'er he sees a scraper take
A whack at his most cherished stake?
The Engineer.

Who swears he'll charge "an even ten
For stakes destroyed by mules and men ;"
While on all fours he tries in vain
To find the vanquished stake again?
The Engineer.

Who saws the air with maddened rage
And turns with hate the figured page,
And then with patience out of joint
Ties in another reference point?
The Engineer.

Who calls it your unrivalled gall
Whene'er you kick for over-haul,
And gives your spine a frigid chill
Whene'er you spring an extra bill?
The Engineer.

Who deals with figures quite profuse,
And tells you solid rock is loose,
That hard pan is nothing more than loam,
While jumbo is lighter than sea foam?
The Engineer.

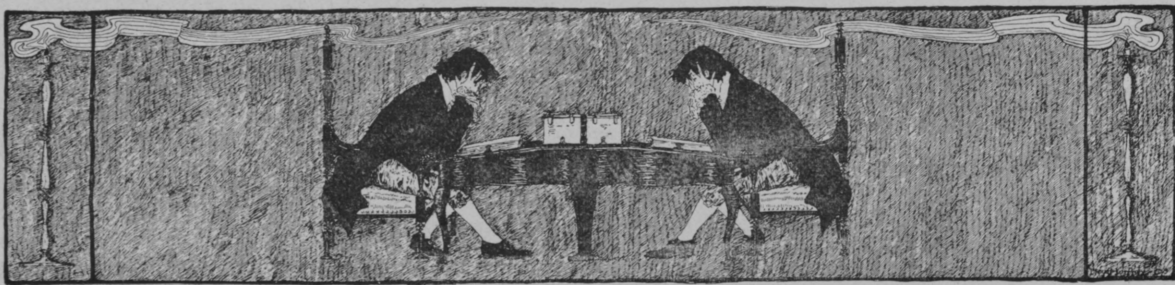
Who, after all, commands our praise,
In spite of his peculiar ways,
While others harvest all the gains
That spring from his prolific brains?
The Engineer.
—[*The Technigraph.*

The Junior Class gave its first Modulus Dance for this year on Nov. 5. 'Tis a good thing; push it along.

Rev. Chas. W. Tinsley of the Centenary Methodist Episcopal Church addressed the Polytechnic Y. M. C. A., at its regular meeting on Friday Night, Oct. 16. On the following Friday Evening Prof. Wagner presented a deeply interesting and instructive lecture to a good sized attendance, and on Oct. 30, Rev. S. E. Long of the United Brethren Church addressed the society on "The Value of Christianity to Success in Life."

These lectures are proving quite popular and will no doubt be continued in the future.

Gray of '05 has been made a Sigma Nu. From the way in which "Sir Tom" has been working in the blacksmith shop since that event we would judge that riding the elephant is pretty good training.



REVIEWS

WE are indebted to Mr. C. J. Larson, '00 for a catalogue of "The Nurnberg Gas Engine" which is built by the Allis-Chalmers Co., with whom Mr. Larson is connected. The Nurnberg engine is of the horizontal type "double-acting," and on the four cycle system. The following is an extract from their catalogue :—"The advantages of the four cycle, double-acting gas engine as compared with the original four cycle, single-acting gas engine are obviously the same as those of the double-acting steam engine as compared with the single-acting steam engine. The considerations which retarded the development of the double-acting gas engine were, the disinclination to use stuffing boxes and the supposed difficulty of rendering it sufficiently accessible, of efficiently cooling the piston and cylinder, and of properly lubricating these parts. These difficulties are now entirely overcome and the double-acting gas engine is entirely superceding the single-acting gas engine for large powers."

If any of our readers wish to see the catalogue, the Review Department will be pleased to furnish same. F. L.

China Objects to Wireless Telegraphy.

ACCORDING to a dispatch from Pekin, the first wireless telegraph station of Marconi on the coast of China was opened October 17, in the presence of the Diplomatic and Military Corps and representatives of the Board of War and the Board of Foreign Affairs. Congratulatory messages were exchanged with the Italian flagship *Vettor Pisani*, which was lying off Taku. Wireless telegraphy, as an auxiliary defence for the legations was first suggested as a mutual plan between the legations, but to Italy is due the credit for the realization of the scheme. It is reported that the Chinese Government has already offered worship to heaven to confound the electrical spirits.
—[*Electrical World and Engineer.*

The Pollak-Virag Rapid Telegraph.

AT a general meeting of the Hungarian Academy of Sciences at Budapest on May 6, 1903, the Wahrmann prize of 2,000 kronen was awarded to the inventors of the Pollak-Virag Rapid Telegraph. A complete description of this system appeared in our columns several

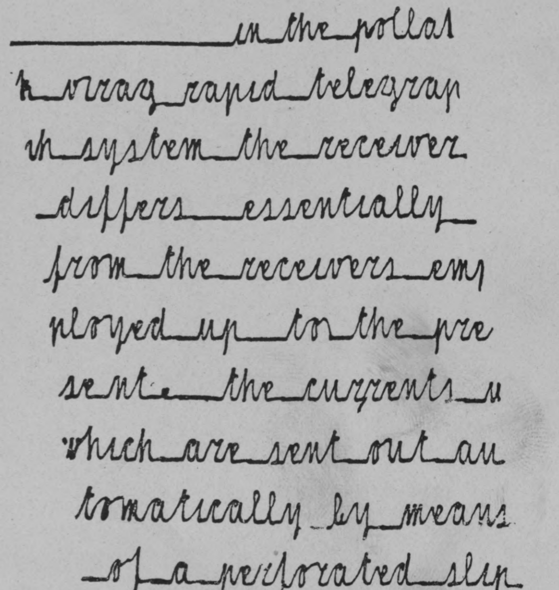


FIG. I.

years ago, and it suffices to say here that in its latest form it is a writing telegraph requiring the use of two wires and a ground.

Fig. 2 is a fac-simile of the transmitting tape and of the message as received. The upper row of dots corresponds to impulses sent over one line and the lower impulses sent over the second line. The first mentioned impulses act upon a diaphragm to give vertical motion to a mirror and the second set act to give a horizontal motion. A pencil of light striking the mirror is thus given a motion compounded of the aforesaid horizontal and vertical motions, and when this pencil strikes a sensitized strip of photographic paper, the trace consists of the italic characters shown in the lower part of the cut. Fig. 1 is a reproduction of a message as received by the system.

It is claimed that 45,000 words per hour can be transmitted with this system as against 12,000 words by the Hughes typewriting system, and 18,000 by the Wheatstone rapid system. A perforating operator can perforate 2,000 words

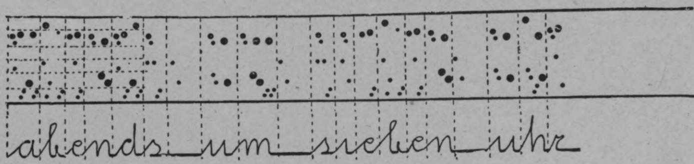


FIG. 2.

hourly, so that one set of rapid telegraph apparatus will keep 23 perforating machines at work. The inventors have been successful in constructing a photographic arrangement whereby the development requires only from five to six seconds and the fixing from six to seven seconds, at the end of which time the telegram comes out of the apparatus ready for delivery in the form shown in Fig. 1.

In official reports of experiments on Hungarian State telegraph lines, it is stated that messages were dispatched between stations 120 miles apart at the rate of 45,000 words per hour. In another experiment, the largest number of words transmitted was about 40,000 in an hour. The head of the Hungarian Postal Telegraph Department, in his report, regretted that the system could not be applied in Hungary, for the reason that there is not enough telegraphic service to provide sufficient work even for a short time for a rapid telegraph system. At present the system is being regularly worked over a line between Berlin and Frankfort, Germany, a distance of 360 miles.

Of the money prize awarded, one-half is to go to the widow of the late A. Pollak, whose family was left in straitened circumstances.

—[*Electrical World and Engineer.*

The Morse Thermo Gage.

THIS is a highly interesting apparatus for gaging the temperature to which steel is heated in the process of hardening or annealing. The principle of the apparatus is as follows: A tube contains an incandescent lamp which has its filament arranged in spiral form and which is connected to the source of electric current, through a rheostat and ammeter or voltmeter. The instrument is used by simply looking through it at the piece of steel being heated, at the lead bath or into the furnace in which the steel is to be heated, the spiral being, in effect, superposed upon the object looked at. Should the filament be at the higher temperature, it will appear as a bright spiral, while should it be at a lower temperature it will appear as a relatively dark spiral, but, when the two temperatures are the same, the filament will apparently merge into the object looked at and disappear. The temperature at which the best results are obtained in any given case may be fixed for future use by regulating the current to bring the filament to the same temperature which may then be repeated at any future time, or a given temperature in degrees may be obtained by suitable graduations of the ammeter. F. L.

The Edison Nickel-Iron Storage Battery.

THE Edison nickel-iron alkaline storage battery which has recently been placed upon the market, has been tested by a number of authorities in the storage battery field. From a report made by Mr. W. Hibbert on tests in England the following details are gathered. The Standard-Edison automobile cell is of rectangular shape, 13 inches high, has a cross-section of 5.1 x 3.5 inches, and weighs 17.8 pounds. It contains 14 positive and 14 negative plates. Each plate is made of sheet steel, nickel-plated, punched with 18 rectangular holes. In each of these holes is inserted a flat pouch or pocket containing the active material. The walls of these pockets are perforated by exceedingly fine, short slots to allow easy diffusion of the electrolyte.

Both positive and negative plates are alike, except in respect of the active material. The pockets in the negative plate contain finely divided iron; those in the positive contain "peroxide of nickel." The liquid is a 20 per cent solution of potash. A small quantity of electrolyte suffices, as it acts merely as an electrolytic channel for "lifting" the oxygen from one electrode to the other.

The proximity of the plates does not apparently involve danger of short-circuiting. The plates are thin, but being made of steel their rigidity is exceptionally good. Mechanical stability is further assured by vulcanized rubber

separators, the whole forming a compact mass, calculated to resist all the ordinary mechanical shocks it is likely to undergo.

The only special mechanical difficulty which seemed probable was the chance that the gases evolved during charging might eject some of the active material from the pockets. During the test, therefore, the pockets were watched carefully, especially during very heavy charges, but without any evidence of loss.

The cell is sealed in its steel case. Two stout connecting pins (from the two sets of electrodes) come through liquid-tight bushings of vulcanized rubber. These pins are made slightly conical, as are also the connectors which fit on them, and the mechanical finish and easy grip of the terminals add to the ease of using the battery. On the top of the case there are also a spring stopper with rubber flange, covering the hole by which the electrolyte is introduced, or distilled water added from time to time (to make up for the loss of water during charging;) and a vent hole guarded by a gravity valve. This latter provides for the escape of the gas evolved during charge. The hole and valve are covered by a gauze nipple, which prevents escape of spray while allowing gas to pass. Acting on the principle of Sir Humphrey Davy's safety lamp, the same gauze further prevents any chance of explosion should a flame be brought near to the exit.

The e. m. f. is 1.33 volts. The internal resistance is 0.0013 ohm. The output at a discharge rate of 60 amp. is 210 watt-hours, or 11.8 watt-hours per pound of total weight of cell. The cell recovers its normal voltage all most instantaneously when the current returns to an ordinary value. An important point in traction cells is the rate at which they can be charged. Experiments on this point demonstrated that the Edison cell of the type under test may absorb 70 to 75 per cent of its full charge in one hour. A discharge after a one hour's charge showed that the cell could deliver 124 ampere hours out of the 175 put into it at this high rate.

After three months' work with very many charges and discharges the capacity of the cells was the same as at the beginning. It had neither increased nor diminished. Examination of the plates after three months' work did not indicate any signs of corrosion.

—[*Electrochemical Industry*.

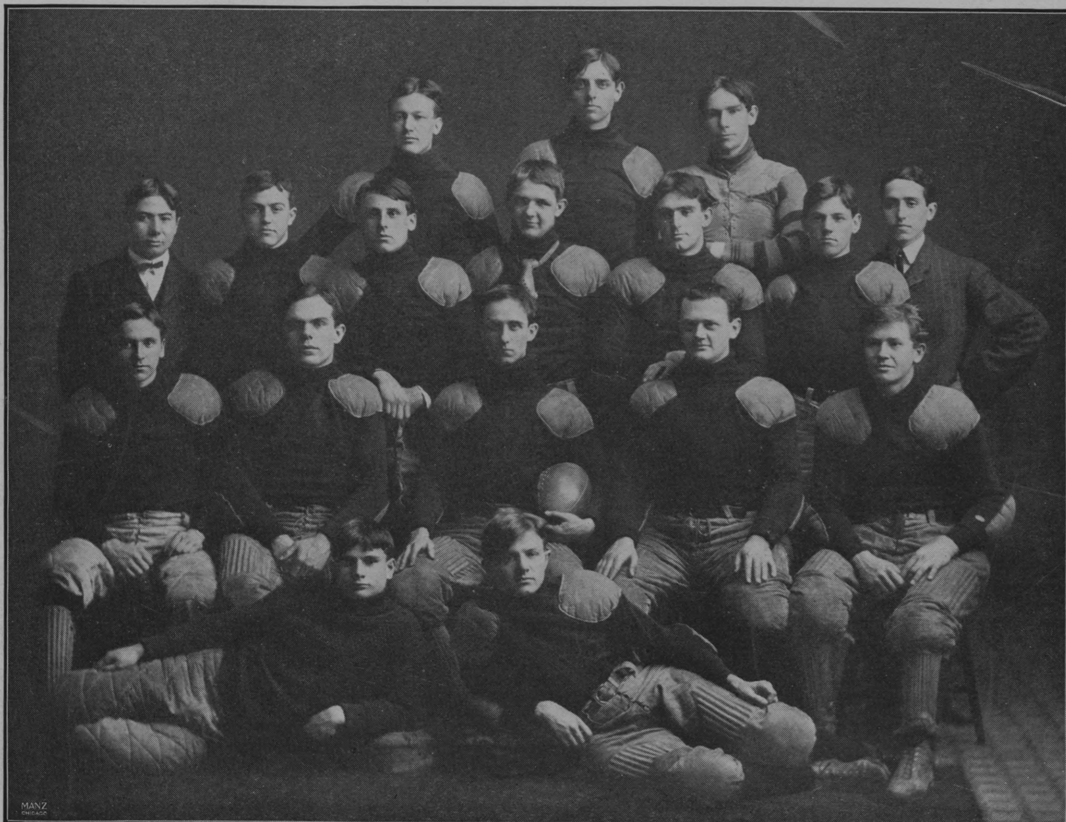


Photo by Bundy, Terre Haute

FOOTBALL TEAM OF 1903.

Heick, Speaker, Wilms.
Holste (*Coach*), Cook, Benbridge, Lammers, Daily, Snider, Watson (*Mgr.*),
Doughett, C. Brannon, McBride (*Capt.*), McFarland, Demmitt,
Unckrich, Spalding.

NOT IN PICTURE.
Poorman Kiely, Katzenbach.