

Winter 2-10-1892

## Volume 1 - Issue 6 - February 10, 1892

Rose Technic Staff

*Rose-Hulman Institute of Technology*

Follow this and additional works at: <https://scholar.rose-hulman.edu/technic>

---

### Recommended Citation

Staff, Rose Technic, "Volume 1 - Issue 6 - February 10, 1892" (1892). *Technic*. 167.  
<https://scholar.rose-hulman.edu/technic/167>

Disclaimer: Archived issues of the Rose-Hulman yearbook, which were compiled by students, may contain stereotyped, insensitive or inappropriate content, such as images, that reflected prejudicial attitudes of their day--attitudes that should not have been acceptable then, and which would be widely condemned by today's standards. Rose-Hulman is presenting the yearbooks as originally published because they are an archival record of a point in time. To remove offensive material now would, in essence, sanitize history by erasing the stereotypes and prejudices from historical record as if they never existed.

This Book is brought to you for free and open access by the Student Newspaper at Rose-Hulman Scholar. It has been accepted for inclusion in Technic by an authorized administrator of Rose-Hulman Scholar. For more information, please contact [weir1@rose-hulman.edu](mailto:weir1@rose-hulman.edu).

# THE ROSE TECHNIC.

VOL. 1.

Terre Haute, Ind., February 10th, 1892.

NO. 6.

## THE ROSE TECHNIC.

### BOARD OF EDITORS:

*Editor-in-Chief,*

W. A. LAYMAN.

*Associate Editors,*

E. S. JOHONNOTT	Alumni
W. J. FOGARTY	Athletics
F. F. HILDRETH	Local
A. M. HOOD	

L. S. ROSE	Business Manager
W. M. BLINKS	Assistant

### TERMS:

One Year, \$1.00. Single Copies, 15 Cents.

*Issued Monthly at the Rose Polytechnic Institute.*

Entered at the Post Office, Terre Haute, Indiana, as second-class mail matter.

A RECENT issue of the Purdue *Exponent* contained this recognition of a plan we have had in view: "THE ROSE TECHNIC has laid the foundation of an admirable plan which is capable of further development, and which in itself is quite interesting. It consists of short, newsy letters from regular correspondents in which is a summary of the things both great and small which are fully appreciated only by college students. \* \* \* \* A little reciprocity may be introduced right here with the best of results. We will await further developments." This comment was made in connection with the following lament: "We often wonder why it is that Purdue remains so entirely wrapped up in herself, and makes no effort to establish closer relations with Indiana colleges. While a local pride and interest in our own affairs fairly absorb attention, the fact remains that we know only too little about those current events which go to make up the history of our sister colleges." It was appreciation of the lack of hearty coöperation and warm fellowship between the college men of the state that sug-

gested the idea the *Exponent* recognizes. The men of each college confine themselves so wholly to their own interests as to rob the inter-collegiate contests in athletics or oratory of all social coloring, to say nothing of making them wholly devoid of the many little courtesies, that might be and should be exchanged. Our fields of contest are not the arenas of old in which we fight for our lives, nor in which we show no mercy save at the interference of the lookers-on. They are rather fields of combined physical and mental development, in which there is no place for display of the baser elements of human nature, where those who meet should contest as friends and gentlemen. To make them such should be the aim in every college athletic association of the state, and to promote the mutual interest among the college men should be the desire of every college journal. Hence it is that THE TECHNIC desires to tell the students of Rose, in concise form, what is going on in the other institutions of the state. As the *Exponent* says, there is room for development of the idea, and when a better plan than ours is proposed, willingly we will accept it.

\* \* \*

BAD weather and rather mildly enthusiastic contractors are combining to lengthen the time required for getting the shops in running condition. However, the roof timbers are going up, and as soon as a covering is provided the Institute force will have opportunity for working to advantage, and then progress will become more evident. The insurance is practically agreed upon with the exception of that claimed upon the electrical apparatus. The adjusters insist that the apparatus was for "lighting" purposes, and consequently not included in the policies as worded. The trustees claim, and every one who knows anything about it will agree, that the equipment was purchased and has been used for "experimental" purposes. But this difference of opinion will not and does not affect the process of immediate recovery from the fire, being largely a side issue.

IT is an assured fact that the Institute will be well represented at the world's fair. In the coming faculty meeting a committee will be appointed which will have full charge of investigating the matter, with a view to securing every privilege desired. This committee will also recommend the "list of articles" which shall go to make up the exhibit. As the rules for entering are now understood, space in the fair buildings is only allowed for specific things. A request for so many "square feet for a display" will not be considered. The application must be accompanied by a detailed list of articles, and each article will be allotted space. The trustees contemplate going into the fair with a collection of work which will be a credit to the Institute, and this may be taken to mean that when on your rounds through the great exposition halls next year, you will run across the "Rose Polytechnic Institute," presenting an appearance of which you will have no reason to be ashamed.

\* \* \*

THE recent bulletin concerning special work which students of the Institute will be permitted to take, means a little more than surface indications would lead one to infer. On first sight it appears to be a concession; on second it becomes in reality a limitation. The ambitious student who would spread himself over more territory than his abilities warrant, is very courteously informed that there is a limit which, in the absence of recognition on his own part, is discovered for him. He is told that no application to increase his "responsibilities" will be considered unless he reaches the stated standard. More than this is discovered between the lines. He is informed that even should he attain the necessary elevation his spreading proclivities will only be encouraged at the discretion of the faculty. He may secure the required grade and be denied his application, for the convenience of professors is another function in the equation it is attempted to satisfy.

\* \* \*

USE every effort to make the Senior concert a success. The object behind it is one worthy of your support.

HERETOFORE we have been badly in need of a mail box in which contributions for THE TECHNIC could be deposited. This need has at least been satisfied. A neat box has been placed in the front hall and all notes can be dropped into it and the depositor feel assured that no unauthorized person will know what he has contributed. In this connection the statement is again made that no anonymous contributions of any kind will be published. It is necessary that we know the author, not for publication, but for our own protection. From this it will be understood why several recently contributed notes have not received recognition.

\* \* \*

PROFESSOR NOYES will deserve an increase of fifty per cent. in salary should many more Senior mechanical engineers elect special courses in quantitative analysis as phases of their thesis work. One thesis section has just gone through a very thorough course on the analysis of illuminating gas and its products of combustion. Another is ready to launch forth on the analysis of steel. The arrangement is eminently satisfactory to the Seniors. Professor Noyes' side of the story is yet to be heard.

\* \* \*

A MEMBER of the faculty recently made the remark, in conversation on the brilliancy of the two beautiful evening stars in the west, that a good telescope would be a most appreciated addition to the laboratory equipment. We all agree. Although astronomy is only incidental to the course, not one of us would hesitate for an instant to observe any striking astronomical phenomenon which a good telescope would bring within our range of vision.

\* \* \*

ORATORICAL contests are the all-absorbing topic of discussion in every other leading educational institution of the state. Preliminary contests to the final struggle for state honors, are being held on all sides. As Bill Nye would remark, we are not in it. There is nothing to do but "pound iron" and wait for a chance at them in athletics.



# MACHINE DRAWING.

BY PROFESSOR W. L. AMES.

It is comparatively but a few years that machine shops, excepting a few of the largest concerns, have furnished employment for draftsmen. The designer or "inventor" was accustomed to make his machine in miniature, from which the patterns for the castings and the more complicated forgings were made under his direction. A full size experimental machine being then made and defects unnoticed in the model were rectified. This machine was then taken in pieces and the parts used as samples, from which the number of pieces necessary for any desired quantity of the complete machines were made. Parts that required accurate fitting, as journals, bearings, lengths of shafts between collars and the like, were either fitted to the corresponding part and carefully numbered, or the parts left large enough to insure that in no case would they come too small. The parts were then fitted to each other as the machine was assembled, and in some cases required almost as much machine work as had already been expended on them, the machine being essentially constructed by the "cut and try" method. The drafting done was limited to chalk sketches on the hood of the blacksmith's forge and to certain uncertain scribings on the planed surface of a board, to find angles for bevel gears and similar work.

There was, in fact, a felt want for the draftsman long before he appeared. The college man, with all his theoretical knowledge, was so deficient in the necessary practical requirements (and was generally proud of the fact that he knew nothing useful) as to be of no service in the shop, while the shop foreman lacked the mathematical knowledge that would enable him to draft. The few draftsmen then in the country were graduates of French, German, or English technical schools. In the smaller manufacturing towns were to be found the so-called natural mechanic—a "Jack-of-all-trades" who had drifted about from one shop to another and had picked up a store of thumb rules for the solving of many of the problems of mill

work. These men were in demand when any new or special work was to be undertaken.

The advent of the technical school was the beginning of a change in these methods. There was to a great extent the same prejudice as against college men; superintendents were afraid to risk the designing of important machines to boys "who had played with machinery for four years," and disliked to take the chances of expensive mistakes. Many Polytechnic graduates of that time saw in this their opportunity, and opened drafting offices, taking the responsibility of the designing on themselves. They also found employment by firms who had not enough work to keep a draftsman constantly employed. This work proved very remunerative and young men earned readily from \$2,000 to \$5,000 per year. But as the value of the draftsman grew apparent to the management of the shops the amount of work intrusted to him increased, till it was found that the payments to the outside drafting offices were enough to pay the wages of a draftsman. In consequence, a corner of the office or pattern room was rather grudgingly given up and the "necessary evil" installed. Here he finds himself between two fires. The machinists, unused to working from drawings, make many mistakes, which are promptly charged up against the draftsman. While on the other hand his employers as promptly blame him if some of their pet theories fail to work out satisfactorily. By this time the knight of the T square is able to see a new meaning in the statement that "the draftsman occupies a mean position between the machinist and the engineer."

However, in time he proves himself a very necessary part of the equipment of a well managed shop. In many cases where the shop management were men without technical training, and where the machines turned out were the growth of many years of experiment and survival of the fittest, rather than intelligent design, the draftsman has made radical changes in the perfection and the cost of the finished article.



It has been proved by experience again and again that when competition is sharp, and prices low, that it is not economy to cut time or wages in the drafting room, but rather to employ better talent. So that, in progressive establishments, instead of a dark corner of the pattern shop, the drafting room is now the lightest and brightest to be had.

The equipment of the room and the work of the draftsman depends largely on the number of men employed and the class of work built. In large shops where heavy and expensive machinery is turned out, an engineer, or head draftsman, furnishes sketches showing the general design and proportions of important parts. From this an assembly drawing is made and the details given out to sub-draftsmen, who as far as convenient work in one particular line of drawing. In this work the draftsman must have a knowledge of the strength of materials and judgment in so placing his material as to best resist the strains to which it is to be subjected.

In the manufacture of light machinery, the strength of any part (so long as it is strong enough) is generally of secondary importance. The more important features being economy in making, ease of adjustment, renewal of worn parts and the neat appearance of the machine. In shops of this class, in the designing of new machines, if the employer, or superintendent be capable, he may give the draftsman the mechanical principle involved, with limitations as to materials and methods of making, or the draftsman may be asked to furnish a machine to do a particular thing and left to work it out in his own way. In work of this character, the draftsman for the most part makes the complete drawings for his machine. From his original sketches, the construction drawing, and from this the detail drawings.

In a recent visit to a machine shop making special machinery, the six draftsmen employed, were making drawings for the following: a type-writer, a screw machine (making watch screws), a machine for making cams, a pin-making machine, a small stationary engine, while the sixth man was making changes in an existing machine.

This drafting room may be taken as a type of the best present practice. A large airy room, well lighted and furnished with every convenience. Besides the six men employed is a head draftsman, who directs the work and to whom the men are personally responsible. Three or four boys are also employed, one in making blue prints, the others in making tracings. Nine hours constitute a days work.

The improvements in drafting room practice in the near future, will probably be in connection with the improved methods in photography. The camera it is believed will take a permanent place in the large drafting offices as a labor-saving machine and could do away with the tracing and blue printing force. A negative from an ordinary inked drawing can be made much quicker, and much cheaper, than a tracing of the same, with the absolute certainty of truthful copying. In the place of blue print paper bromide, or other very sensitive paper, would be used to make enlarged prints from the negatives. This plan would have the advantage of complete independence of the weather or the light, no small item, particularly in the winter time. Again prints of any size could be made, as full size for the pattern-maker and blacksmith, half or quarter sizes for the machinist when desirable and still smaller sizes for office notes. The one item at present in favor of the blue print is the cheapness of the prepared paper as compared with bromide paper. The price of the latter is now about the same as was blue print paper on its first appearance in the drafting room, and it is reasonable to expect that if it was used to anything like the extent that blue print paper is, the price would be proportionably reduced.

The disadvantage of designing to one-half and one-quarter sizes (whence areas appear at one-fourth and one-sixteenth size) is avoided in some offices by the use of a large black-board on which the design is made full size in chalk. These drawings being made to scale could readily be reproduced by the camera, or with the use of a reversing prism could be shown directly by blacklines on a white ground by using a sheet of bromide paper in the camera in place of a sensitive plate.

It may not be out of place to say a word here in regard to the variance between the drawing as taught in the schools and the same as practiced in actual business. Or as the practical men generally put it, the difference between "college methods and common sense methods." First, it may be said that it is not all of drafting to draw. That is, it is not the style of line, but its position, that is important. As well should good penmanship make an author. Descriptive Geometry is the draftsman's alphabet, but he may be never so expert in juggling with points, lines and planes, if he be unable to apply the principles to concrete problems he may as well get his mental exercise in conjugating Greek verbs. No school course can anticipate all the special lines of work which the student may afterwards take up. Nor would it be wise always to do so if possible. Heed however should be given when practicable to the criticisms of men prominent in the professions for which the schools pretend to educate. As a case in point; complaints have long been made of the mistakes arising in the drafting room from

the use of the first quadrant in projecting. A little consideration serves to show that the use of the third is the more sensible and consistent—and is the common practice. Nevertheless of all the Descriptive Geometries and books treating of Mechanical Drawing but one known to the writer uses the third quadrant. Such differences as this can and should be corrected. Many of the conventionalities of machine drawing on which complaints are based will be found to vary greatly in different shops, and while a particular way of doing a certain thing may be the best for one, it is not necessarily the best for all. The drafting room should be, particularly in the upper classes conducted as nearly as possible like a business office. But even though the methods be identical the knowledge of the cost of an error makes a vast difference between drawing in school and in actual practice. Sixty per cent. is not a passing mark there. It is this responsibility that makes and must always make the transition from school work to real work an abrupt and decided step.

## CARNEGIE, PHIPPS & CO.--CARNEGIE BROS. & CO.

BY A. KENNEDY ASHWORTH, '95.

The various works controlled by the Carnegie, Phipps & Co., Carnegie Bros. & Co., are centered around the city of Pittsburg, Pa. Undoubtedly there is no name more prominent in the steel world to-day than that of the above companies. Among the plants controlled by the firms are the Edgar Thomson Steel Works, Bessemer, Pa.; Homestead Steel Works, Munhall, Pa.; Upper Union Mills, Lower Union Mills, Lucy Blast Furnaces, Keystone Bridge Co., in Pittsburg. These works located in the city employ in all ten thousand men. The Duquesne Steel Works, Duquesne, Pa.; Carnegie-Phipps Rod Mill, Beaver Falls, Pa.; the Scotia Iron Mines, Pennsylvania; Crimora Mines, Virginia, are also owned by the Carnegies.

The Homestead Steel Works, located at Munhall, Pa., employ thirty-two hundred men. At these works are manufactured by both the Bessemer and Open Hearth process, steel plates. The manufacturing of steel armor plates for the United States navy is one of the principal productions; in the new plate mill there are some very massive tools imported from England.

In this paper I shall endeavor to take the reader through one of the many plants of the Carnegie Bros., following the processes from the ore to the finished rails. The Edgar Thomson Steel Works are located on the Monongahela river, at Bessemer, fourteen miles east of Pittsburg. They extend from the river to the Pennsylvania railway; just west of the works is the town of Braddock. The

furnace department is separated from the mills by the Baltimore & Ohio railway. This plant was the first in America to successfully produce steel by the Bessemer process and was named after the engineer who perfected it. The first furnace, Furnace A, was built in 1879, since then eight more have been added, the last being H and I, in 1890. All furnaces, with the exception of Furnace A, are employed in the production of Bessemer metal, A being used for the production of spiegel and ferro manganese.

Furnaces A, B, C, constitute the first set of furnaces; D and E, the second; F and G, the third; H and I, the fourth. Each set of furnaces is furnished blast from its own engine house. The engine house of H and I is a brick building containing five engines, having steam cylinders 40" diameter, air cylinders 84" diameter and a stroke of 60". In a separate building, 42 boilers, 28' long 54" diameter, containing two 18" flues, supply steam to the engine house of H and I. For each set of furnaces there is a similar blast and steam plant.

During the week the metal from the furnaces is tapped into ladles. These ladles are of twelve-ton capacity, each hung on a four-wheel truck and are emptied by tilting them, which is accomplished by means of worm gears. A train of the ladles containing molten metal is hauled by a locomotive to the metal mixers. The mixers, of which there are two, are iron boxes lined with fire brick, having a capacity of about one hundred tons. The metal from the different furnaces is emptied into these for the purpose of producing a uniform grade. This mixing is accomplished by the emptying of the ladle into the mixer from an over-head track. Below and in front of the mixer is another track; on this is run the empty ladle; when it is half filled as is shown by the scales on which the ladle rests, it is taken to the next mixer and filled. In order to empty the mixer it is caused to turn on a huge shaft, through an angle of about forty-five degrees, thus bringing the spout below the level of the molten metal. The shaft is controlled by an engine geared direct.

The converting house contains four ten-ton vessels or converters, two ladle cranes, four ingot

cranes, and one dumping crane. These cranes are all hydraulic and are operated by men on an elevated platform, called the "piano," at one side of the building. The metal is brought from the mixers on an over-head track to these converters, when, after being converted into steel by the Bessemer process, it is cast into moulds. These moulds are 15½" by 17½" at top, 18½" by 20½" at the bottom, and 7 feet long. Eight moulds are arranged on a truck in a vertical position, these are filled with steel and then run out to the department for removing the ingots from the moulds. This is accomplished by means of over-head mechanism operated by hydraulics; a pair of chains pass over to their proper positions, descend and automatically take hold of hooks on the sides of the mould, at the same time a plunger descends and bears rigidly upon the ingot in the mould; by the move of a lever the chains pull up the mould leaving the ingot standing on the truck, held in place by the plunger.

There are nine ingot furnaces arranged in three parallel lines. Natural gas is used in these furnaces. In front of each are car tracks; from the department just mentioned the ingots are brought around on these tracks and "charged" or placed in the furnace by means of a machine called the ingot charger. The charger is a large six wheeled truck running on rails, has on it engines, boiler and driving machinery, by which it can be propelled in front of a furnace, a tongs move forward, grasping the ingot and projecting it into the furnace. Each charger is operated by two boys.

After the ingot is reheated it is taken on a car to the blooming train, which is operated by an engine, 44" cylinder, 72" stroke. The tables are operated by an independent engine. The ingot has now become a "bloom" and is run on tables to the shears, where it is cut into lengths and is then delivered on a series of driven rollers, arranged on a curve, to the switch; and from the switch the blooms are distributed to a car running on a track back of a long line of reheating furnaces. This car is moved to any particular door of the series by an endless iron rope wound around a drum, operated by an independent engine. Each furnace has a charger or pusher,



which pushes the bloom from the car into the furnace. On the other or front side of the furnaces is a similar apparatus, which with an ingenious grip deposits the bloom on a car; it is then taken through the first roughing train.

The first is a three high train, as its name implies has three horizontal rolls; through these rolls five passes are made. Passing over a rolling table it enters the second train, making five passes in it also; finally passing along, still on the rolling tables, it passes through the third or finishing train, coming out in the shape of rails. It requires but one man to each train to handle the levers which lift the tables, move the tumblers, etc. Each train is operated by separate engines, the first is 46" by 60", the second, 54" by 66", the third 30" by 48" cylinders.

The rail leaving the finishing train is a three length one, and passes to the hot saws, where it

is cut into regular lengths by four revolving saws. The sight of the four saws cutting the red hot steel is a very beautiful one, resembling four monster pin-wheels seen at elaborate pyrotechnic displays. After the rails are cut into lengths they are pushed back by means of machinery to the cooling tables. They then pass into the finishing department where they are straightened and drilled.

Nearly all the machinery and appliances have been designed by engineers who are or have been connected with the plant. When the nine Blast Furnaces are all in blast the production of metals is two thousand tons per day. The output per day of finished rails is sufficient to lay ten miles of single track with rails weighing sixty-eight pounds per yard.

There are employed in all the departments of the works thirty-five hundred men.

## ALUMNI DEPARTMENT.

### *ELECTRO-PLATING DYNAMOS.*

A description of the new electro-plating dynamo designed by Mr. H. G. Brownell, '86, for Geo. E. Lloyd & Co., electricians of Chicago, was promised in the last number of *THE TECHNIC*. Before going to work on these dynamos, Mr. Brownell made a tour of the electrotyping establishments of the city, taking pressure and current measurements and learning from the operators their objections to the systems they were using. He found that the best work was done with  $1\frac{1}{2}$  volts in a saturated solution of copper sulphate which afterwards had been raised to 18 on a Baume hydrometer, with sulphuric acid. With this bath and pressure every square foot of surface took about 17 amperes of current.

The operators everywhere complained of great inequality of work turned out, and of the difficulty of keeping down the sparking at the commutator. Both of these were due to the fact that all the dynamos were shunt wound. This caused

a great variation in pressure between no load and full load which could be corrected only by the use of plug switches or rheostats in the field circuit. These regulations were always made by guess, for in no case was a pressure indicator provided. As a consequence work was frequently "burned," and when the tanks were full of "cases," it took nearly twice as long as it should to plate a shell of the required thickness.

Finding that some of the machines were using as high as 30 per cent. of their output in magnetizing the field, he at once designed a compound wound dynamo for 3 volts and 450 amperes, using about 5 per cent. of its total output in magnetizing the field. The compound winding is all in one field, as that is found to produce exactly as good results as if half were in each field.

This will copper plate every two hours fifty square feet in two tanks arranged in series. The voltage does not vary more than 2 per cent. between no load and full load, and the position of

the brushes need never be changed. This first machine ran on a varying load for a month or more, without having the brushes changed at all.

The shells are never burned and are always alike. The operator does not even look at them until their time is up, so confident is he that they will be all right. Every machine but one the company has made, has been sold before it has been completed. They build three different sizes varying from 3 volts and 450 amperes to 3 volts and 1,100 amperes in capacity. The indicators which are furnished with the dynamos show at all times the pressure in volts and also the distribution of the work, for it is necessary that each tank should have just half of it.

#### LOOKING BACKWARD.

In March 1883 preliminary announcement was made of the opening of The Rose Polytechnic Institute. The circular was a terse, pointed statement of the requirements for entrance, the outline of study, and the facilities of the school for doing good work. No boastful claims were made. Great modesty, rather, was evidenced, and the caution observed in admitting students indicated a desire to do justice to those who entered rather than to make a stir in the educational world. Concerning the admission of students the circular says: "A class of twenty-five young men, selected from a large number of applicants, was admitted to the Institute March 6th; those members of the class who pass the term examination in June will constitute the Sophomore class in September, 1883. A new Freshman class will be admitted at that time, as already stated. Several applications for admissions to the Junior class make it probable that that class will be organized. No Senior class will be formed next September."

Concerning the progress of equipment in the shops and laboratories at that time, the circular adds: "The wood room, boiler and engine rooms are in order; the iron room and forge shop will be in order before September 1st, 1883, as all the requisite tools are now under contract." The faculty list was not completed, the departments of language, physics, and engineering being just then

unprovided for. The other departments were in charge of the following professors, the majority of whom are unknown to the students of to-day:

Charles O. Thompson, A.M., Ph.D., late Principal of the Free Institute of Industrial Science, Worcester, Mass., President.

Charles A. Colton, E.M., late Assistant to the Professor of Mineralogy in the School of Mines, Columbia College, New York, Professor of Chemistry.

Edward Barnes, B.S., Graduate Student of Johns Hopkins University, Professor of the Higher Mathematics.

Clarence A. Waldo, A.M., late Assistant Professor of Mathematics in Wesleyan University, Middletown, Conn., Professor of Elementary Mathematics and Librarian.

Edward S. Cobb, B. S., late Assistant Superintendent of the American Paper Bag Company, Boston, Superintendent of Machine Shop.

William L. Ames, B. S., late student at Cincinnati School of Design, Professor of Drawing.

On Wednesday, March 7th, 1883, at 10 o'clock, A. M., the inaugural exercises of the Institute were held in the chapel. The occasion was an auspicious one in all respects.

The first graduating class was that formed in 1883 as a Junior class, and the programme of the commencement was as follows:

#### CLASS OF 1885.

June 25th.

Lathes . . . . . Samuel S. Early, Terre Haute  
Graphical Representation of Strains . . Ozni P. Hood, Indianapolis  
The Evaporative Performance of Boilers . Ben McKeen, Terre Haute

The same day at 3 o'clock memorial exercises were held in honor of President C. O. Thompson. Upon this occasion the programme was:

Hymn . . . . . Student Choir  
Address . . . Gen. John Eaton, U. S. Commissioner of Education  
Music—"Sacred Peace" . . . . . Student Choir

Since that year commencement day exercises have followed the usual routine, the theses programmes being as follows:

# THE ROSE TECHNIC.

121

## CLASS OF 1886.

June 24th.

- The Brown Bridge Truss . . . . Charles C. Brokaw, Terre Haute  
Some Practical Laws of Electro Magnets . . . . .  
John T. Wilkin, Terre Haute.  
Pumping Machinery . . . . . John T. Chapple, Jr., Terre Haute  
The Dynamometer . . . . . Arthur W. Hedges, Clinton, Ind.  
The Design of a Compound Dynamo for Constant Electro Motive  
Force . . . . . Charles M. Sames, Rockford, Ill.  
Bessemer Steel . . . . . Wesley C. Masterson, Terre Haute  
Toothed Gearing . . . . . James R. Seath, Terre Haute  
Some Experiments in Absolute Electrical Measurements . . . . .  
John A. Parkhurst, Marengo, Ill.  
Accurate Linear Measurements . . . Charles E. Scott, Terre Haute  
Calorimetric Tests of Indiana Coals . . . . .  
Herbert W. Foltz, Indianapolis.  
Co-efficient of Friction of Earth . Lucien N. Sullivan, Indianapolis  
A Recent Boiler Explosion . . . William W. Shrader, Terre Haute  
The Pratt and Plum Telephone . Harry G. Brownell, Elmhurst, Ill.  
Indiana Limestones . . . . . David P. Sanderson, Terre Haute  
Boiler Construction . . . . . Edward C. Elder, Indianapolis  
A Test of the Electric Light and Power Plant of the Davenport  
Gas Light Co . . . . . H. St. Clair Putnam, Davenport, Iowa

## CLASS OF 1887.

June 23d.

- Plans for an Establishment for Manufacturing Lathes . . . . .  
Frank Ney Hibbits, Muncie, Ind.  
Testing Machines . . . . . Barclay George Mering, Terre Haute  
A Report upon the Pumping Engines of the Terre Haute Water  
Works, together with an examination of the water . . . . .  
Oscar Baur, Terre Haute.  
A Test of the City Circuits of the Terre Haute Electric Light and  
Power Co . . . . . Frank Powell Cox, Terre Haute  
Chimney Construction . . . . . Herman Fred Goetz, Terre Haute  
A Study of the Indicator Diagram in Theory and in Practice . . . .  
John B. Aikman, Terre Haute.  
A Comparison of the Indicator Diagram, as a means of measur-  
ing work, with an absorption Dynamometer . . . . .  
John Givan Mack, Terre Haute.  
A Study of So-called "Dry" Batteries . . . . .  
William Henry Palmer, Terre Haute.

## CLASS OF 1888.

June 21st.

- On the Cyclical Variation in the Angular Velocity of the Fly Wheel  
of the Brown Engine of the Rose Polytechnic Institute Shops . .  
Geo. H. Chapman, Indianapolis; Francis T. Hord, Indianapolis.  
A Study and Comparison of Earlier and Later Railroad Rolling  
Stock Construction . . . . . George M. Davis, Terre Haute  
On a Method of Testing the Hardness of Brasses . . . . .  
Harry D. Haring, Aurora, Ind.  
A Comparison of the Friction of Cast Iron, Brass and Ball Bear-  
ings . . . . . Clinton B. Kidder, Terre Haute  
On the Construction and Experimental Study of a Shunt-Wound  
Dynamo . . . . . Allen H. Moore, Danville, Ill.  
On the Construction and Use of the Brackett Dynamometer, includ-  
ing a comparison with the Francis Bevel-gear Dynamometer . .  
John B. Peddle, Terre Haute; Edward G. Waters, Terre Haute.  
A Proposed System of Water Works for the city of Rockville, Ind . .  
Oscar Rauchfuss, Golconda, Ill.  
Design for an Automatic Machine for Nail Driving . . . . .  
Julian S. Scholl, Indianapolis.  
An Automatic Machine for Making Wire Harness Snaps . . . . .  
Edward A. Weller, Cannonsburg, Pa.

## CLASS OF 1889.

June 20th.

- A Review of the East Span of the Vandalia Bridge . . . . .  
John D. Galloway, Napa City, Cal.  
A Design, with Specifications, for an Electric Railway System on  
the Conduit plan . . . . . Elmer E. Gilbert, Gettysburg, Ohio  
A Proposed System of Sewerage for Frankfort . . . . .  
Alonzo J. Hammond, Frankfort, Ind.  
Design and Specifications for the iron work of a Train Shed for the  
proposed Union Station at Terre Haute . . . . . Victor K. Hen-  
dricks, Indianapolis; Theodore D. Jones, New Harmony, Ind.  
Steam Car Heating . . . . . W. R. McKeen, Jr., Terre Haute  
On the Determination of the Hardness of Alloys . . . . .  
Donn M. Roberts, Terre Haute.  
On the Oxidation of Para-nitro-ortho-toluene-sulphomide . . . .  
Walter B. Wiley, Terre Haute.

## CLASS OF 1890.

June 19th.

- Dynamometer Tests . . . . . John A. Austermiller, Terre Haute  
A Study of the Draw in the Highway Bridge crossing the Wabash  
River at Terre Haute . . Theodore L. Condon, Washington, D. C.  
Terre Haute Belt Railway . . William D. Elder, Kalamazoo, Mich.  
The Design and Construction of a large Electro Magnet for the  
special study of the Field of Force and the Magnetic Phenom-  
ena . . . . . Samuel D. Collet, Newport, Ind.;  
Maxwell B. Fitch, Terre Haute.  
The Effect of Elastic and Permanent Elongation on the Specific  
Resistance of Metals and Alloys . . . . .  
Mason Galloway, Chico, Cal.  
An Experimental Test of the Mount Auburn Cable Railway, Cin-  
cinnati, Ohio . . . . . Otto G. Hess, Wheeling, W. Va.;  
Stephen S. Raymond, Cincinnati.  
An Experimental Study of the Mount Auburn Electric Railway,  
Cincinnati, Ohio . . . . . George R. Putnam, Davenport, Iowa;  
Ralph F. Thompson, Bradford, Ill.  
Storage Batteries . . . . . Barton R. Shover, Indianapolis  
A Machine for Boring Chain Pump Tubing . . . . .  
Edwin C. Thurston, Terre Haute.  
Design and Specifications for a proposed Viaduct at Ohio street,  
over the E. & T. H. tracks . . . . . Harvey J. Leffer, Cincinnati;  
Taro Tsuji, Tokio, Japan.

## CLASS OF 1891.

June 18th.

- The Diaphragm Indicator for High Pressure Indicator Work . . .  
Wm. H. Boehm, Memphis, Tenn.; Alex. L. Hupe, Louisville, Ky.  
The Comparison of the Efficiency of Dynamos . . . . .  
Omar C. Mewhinney, Terre Haute; Samuel S. Wales, Terre Haute.  
The Construction and Efficiency of Storage Batteries . . . . .  
Frank W. Hurlbert, Aurora, Ind.; Horace B. Jones, Terre Haute.  
Proposed Design for the Fixed Span of a Highway Bridge across  
the Wabash River at Terre Haute, Ind . . . . .  
William H. Harris, Terre Haute; Robert L. McCormick, Sellers-  
burg; William S. Menden, Evansville.  
Experiments on the Time Constant of Magnetization and the Mag-  
netic Properties of Iron . . . . . Jos. D. Harper, Durango, Colo.  
An Experimental Test of the Terre Haute Electric Street Rail-  
way . . . . . Frederick J. Buckley, Kalamazoo, Mich.;  
Eugene F. McCabe, Renova, Pa.  
Comparative Tests of Boiler and Furnace Efficiency . . . . .  
Geo. D. Carothers, Terre Haute.  
The Determination of Curves of Electro Motive Force in Alter-  
nating Current Dynamos . . . . . Abe Balsley, Seymour, Ind.;  
John S. Cox, Terre Haute.  
Electric Welding—A Study of the Energy Required . . . . .  
Vernor J. Gillett, Eckford, Mich.; W. Robert Paige, Terre Haute.

Much other interesting historical information



could be given in this connection, but as the intention was to present mainly the collected theses programmes further development of a most excellent theme for writing a volume is avoided.

---

#### NOTES.

Mr. Max Fitch, '90, has been at home for some time.

Mr. E. E. Gilbert, '89, with the Thomson-Houston Electric Co., in New York City, sends his best wishes to *THE TECHNIC* and the Poly.

Mr. V. J. Gillett, '91, has been promoted from a draughtsman, in the Detroit Electrical Works, to the Superintendency of the Construction of Electrical Appliances.

Mr. J. D. Harper, '91, recently appointed Indiana State agent for the Thomson-Houston Electric Co., with headquarters at Cincinnati, Ohio, made a short visit at the R. P. I.

Mr. Geo. H. Chapman, '88, with the Montreal River Lumber Co., is visiting at his home in Indianapolis. In company with his class-mate, Mr. Clint. Kidder, he made the Poly a short visit.

Mr. Chas. E. Scott, '86, has left Reid Brothers, architects, San Francisco, Cal., and returned to his home in this city, on account of the death of his father. He contemplates practicing law with his brother in this city.

Mr. H. B. Jones, '91, has finished his work with the World's Fair Landscape Gardeners, and is now at his home in Indianapolis, where he will temporarily assist his uncle in the furniture business.

The entire academical department of the Missouri State University was recently burned, forcing Mr. Wm. Shrader, '86, from the professorship of Physics before he had fairly occupied it. Dr. Schrader is a graduate of the University of Strassburg, Germany, instead of Glasgow, Scotland, as stated in the preceding number of *THE TECHNIC*.

---

## ATHLETIC DEPARTMENT.

### *TRAINING FOR ATHLETICS.*

BY PROFESSOR C. A. WALDO.

The purpose with which a young man undertakes athletic training and the results accomplished must furnish the justification for the time and energy expended. The purpose should be a worthy one; the results should include increased happiness, efficiency and productiveness. If a man trains to become a prize fighter, his purpose is bad and he had better not train at all, but if he is trying to be a better *man* the case is different. If a man goes into training with no other end in view than to obtain a prize, his purpose is bad; if it is to strengthen body, mind and courage and lengthen life, the case is different. Wellington said the battle of Waterloo was fought and won on the foot ball grounds of Eton. Many a man has found eminence in his profes-

sion by drawing upon the vital energy which a sensible cultivation of athletics gave him and by practicing in life the self-denial, patience and resolution which made his opponent fear him in running, or jumping, or batting.

In a recent article in "Education," Prof. Sargent, director of the Heminway Gymnasium at Harvard, has shown conclusively that violent exercise is safe if it is preceded by the right preparation and there is no seated organic difficulty. To show a way of providing the former, is the purpose of this article, to guard against the serious and possibly fatal results of the latter, every person should subject himself to a rigid physical examination before entering the lists in contests where intense concentration of effort and prolonged endurance are essential. To be sure danger from this source in the final and most serious encounters is largely averted by preliminary

trials in which those who are physically sound and superior, are the victors, yet danger enough remains to throw a great weight of responsibility upon the administration of every institution where athletics prevail. The faculties of our institutions and the governing boards of athletic associations have here a serious duty to perform. It is scarcely too strong to say—a duty which it is criminal to neglect.

These preliminaries out of the way, how shall the student train? What is here said as the result largely of experience, rather than the consultation of authorities, may be arranged under five heads; diet, sleep, exercise, bathing, courage.

The athlete needs to chew some things and eschew others. In other words, he should not bolt the food he selects. The food itself should be strong, nourishing and easily digested. Beef steak, mutton, lamb, eggs, fish, oysters, fowl, stale bread, the common vegetables and fruits, and milk, are among the things of which a man may partake freely. Sparingly, however, of puddings, tea, coffee, sugar, butter, plain cake, highly seasoned food, and water. He better refrain entirely from pork in all its forms, all kinds of pastry, hot bread and biscuits, rich cake, pickles, tobacco, spirituous or malt liquors or wines. Especial emphasis should be placed upon tobacco and liquors. An association makes a mistake if it ever selects a representative who will not pledge himself to abstain from these. Such are the present conditions for membership upon the big foot ball teams of the East. Perfect regularity in eating should be observed and no violent exercise taken for at least a half hour before or after meals. We sum up the diet question by recommending an abundance of plain food, well prepared and well served, hearty breakfasts and dinners, light suppers all taken with perfect regularity and in a leisurely manner.

The usual time required for sleep is from eight to nine hours. Ten o'clock is not too early to retire and six o'clock about the right time for rising. This means that the man who is in training should conduct himself in this matter exactly as most successful students find they must do. They must relinquish most so-called social pleas-

ures, must seldom visit the opera house and never places of public resort of a questionable character. There are other reasons why the latter should be shunned by the loyal aspirant for athletic honors. The saloon and gambling den threaten to sap the life of athletics. To get the greatest good from sleep, each person should sleep alone, with his window partly open, but with bed so placed that drafts will not blow across it.

The time for exercise is a serious matter with the average polytechnic student. He thinks in the first place that he cannot find enough for training; secondly, that he cannot get it at the same periods every day. While these difficulties exist, persistence and determination will go far to remove them. The proper times of day for the most violent exercise are about ten in the morning and four in the afternoon. The periods need not be long but the exercise should be vigorous. At these hours of the day, fifteen minutes of rapid walking or brisk running are better than one or two hours of exercise as often taken. If the fifteen minute periods could be prolonged to a half hour or an hour, this would be ample. Half of the practice period should be used in running or rapid walking, the other half in vigorously practicing the events in which each is to take part. Care should be taken at first not to make too great exertions. Each day something should be systematically added to what was done the previous day, until hardened muscles, bright eyes, glowing cheeks and indifference to fatigue, testify to powers healthfully developed. When possible, train in squads. Emulation to the athlete is like martial music to the weary legs of the soldier. The exercise should be sufficiently vigorous to produce copious perspiration. After it, there should come the bath, a quick plunge in the tub, or if this is not available, a sponge bath. Then a vigorous rubbing and change of underclothes. A full bath oftener than once a day is not desirable, but the sponge bath with cool water, followed by a brisk use of a rough towel, is always desirable after exercise.

Lastly comes courage, steadiness of nerve, faith in one's self and the will power to put forth the requisite endeavor. If a man has conscientiously



passed through some such preliminary training as here suggested, these elements will not be wanting when the supreme moment of trial is at hand.

### THE BASE BALL TEAM.

The foot ball season having passed, the approaching spring months naturally draw the thoughts of the base ball enthusiast forward to sunny and exciting days of the national game when he may sit in the grand stand and yell himself hoarse in praise of a good play on part of one of his team, and perhaps curse the committee the next moment for putting that player on the team should he make an error. Such is the life of the college base ball player. His value as a player is a variable quantity in the minds of the base ball crank, fluctuating very often quite rapidly from infinity to zero and from zero to infinity. In the mind of the true base ball admirer, one who understands the game, this does not hold true, for by him a player's worth will not be judged from the number of errors which he has made but from the number which he has *not* made.

The good base ball player is like a successful business man; the number of chances offered him is the capital invested, the error column the expense account, and the chances successfully accepted the profits. To increase his business he must necessarily take more chances, thereby increasing the expense account but the profits will be proportionately increased. In other words a player who attempts a difficult play and makes an error is worth 50 per cent. more than one who shirks it.

It was the absence of shirkers, kind feelings between the members and general team work which led our club to success last season. Each man looked not to his individual record but to the success of the team. It is to be hoped that this season's managing committee will harmonize as successfully as last year's, for a division in the committee means a division in the team, which would result most disastrously.

The principal object of this article has not yet been touched upon. The writer, being at present the only person connected with the R. P. I. team

since its organization, has been requested to give a brief history of the club, which is a rather delicate undertaking for a person so closely connected with the organization, since it will necessitate occasional references to himself (having pitched seventeen of the eighteen games played), but with the hope of pardon from those who may think these references too frequent, your humble servant will endeavor to lay aside his claims to modesty and serve you to the best of his memory.

The first regular team was organized in 1888, most of the members being Freshmen. Chapman, '88, was selected as manager, and Kelly, who was considered one of the best amateur players ever in this city, was captain. The personnel of the team was as follows: Smith, c, Frank, p, Kelly, 1b, Austermiller and Early, 2b, Raymond, 3b, Catlin, ss, Hendricks, l, Menden, m, Failing, r. This first season was very successful. The first regular game was with the Lotus club, of this city, and the Polys won their first game 15 to 4. They were next challenged by the Eastern Stars (afterward the Crescents) and defeated them by a score of 14 to 8. Wishing to be avenged on the Poly "dudes," by which name they were then known, the Crescents demanded another game and were again defeated 11 to 2. They still hung on however and after strengthening their team were finally quieted by receiving a third defeat 8 to 5. About this time the local base ball players became envious of the success of the Poly "dudes" and the Rockets, claiming to be the champions of the city, put in their claim for a game. The result was the Polys were again victors by the score of 12 to 6. The Terre Haute players now decided that something had to be done to head off the victorious "dudes," and as there was but one more Saturday left in the term the best players in the city came together and called themselves the Vigos, and through the daily papers challenged the Polytechnics for a game for the championship of the city. There was a large crowd on the campus as there was great interest manifested in the game.

This was the one game since the organization of the team in which the writer was unable to participate. If anyone wishes to know the cause



of the disability let him calculate the momentum gained by riding on a C. & E. I. switch engine going at the rate of — miles per hour, and the heat generated by sliding on the side of your face for about ten yards on a cinder road bed. This experiment was as common for Freshmen in those days as sawing of fingers. A splendid pitcher named Morgan was however substituted and although the opponents did not bat him much the Polys lost the game 7 to 5.

Satisfied with the successful first season it was decided the next season to tackle some of the college teams. But as the first season was a success so was the second a failure. The team was materially weakened by the loss of Kelly and Catlin, two of the best players. The latter's place was well filled by Tinsley, but there was a large gap left at first. Wymond, a man of fine physique, was placed in this position, but as he had never played ball he proved a failure. The only other change in the team was Boyles on third, Raymond going to left. Wiley, '89, was made manager and black jersey uniforms were purchased. The players claimed that the uniforms were a hoodoo, but Wiley insisted that he himself was the hoodoo, but the dispute has never been settled. The first game opened here with De Pauw, which team presented Dougan, the afterward famous professional pitcher, in the box. The game was close and exciting and at the end of the ninth inning the score stood a tie, 8 to 8. The thoughts of the exultation and joy which victory would produce were perhaps revolving too rapidly in the heads of some of the R. P. I. players, for in the tenth inning they gave way with a crash and went to pieces, probably due to the tremendous centrifugal force produced by that revolution. The result was that De Pauw scored five runs, winning the game 13 to 8.

The Polytechnics played them a return game the following Saturday. A large crowd went over with the team but afterward wished they had not, for they had to stand the humiliation of a defeat of 26 to 8.

The third and last game of this season was played here with Wabash, and although they could undoubtedly have defeated us fairly, Rose

became acquainted for the first time with Wabash's methods. The score was 11 to 0. Rose was to have played a return game the following Saturday but at the last moment Wabash sent word not to come as they had disbanded, which proved to be false, as they played another team on that day.

The next season the Inter-collegiate Base Ball League was formed with R. P. I. a member. Several changes were made in the club this season. Perkins covering first base, Austermiller behind the bat, Layman on second and Smith going to middle field. The season opened up here with State University and it will long be remembered as one of the most exciting games ever witnessed here. Although the I. U. team contained mostly hired players, as they afterward acknowledged, Rose won after a hard battle of eleven innings 5 to 4. It was in this game that one of the I. U. college (?) men while coaching yelled, "Well, well, well, I never *seen* such a game," which expression has since become famous here. Another amusing incident might be mentioned in connection with this game. In the evening the I. U. boys were banqueted at Sage's and for a joke some one called on Mr. Johnson, their catcher (a barefooted tramp who they picked up on the way), for a few remarks. The poor fellow looked bewildered for a moment, but before he had a chance to expose himself one of the I. U. gentlemen jumped up and stated that Mr. Johnson was indisposed and wished to be excused.

DePauw played here next and we were defeated 18 to 12, not because DePauw had the best team by any means, but because they were fortunate enough to bunch their hits while the Polys were unfortunate enough to bunch their errors.

The third game of the season was with Wabash, at Crawfordsville. The only notable feature of this game was the shameful treatment given the Polytechnics. Even their own Crawfordsville papers spoke in the harshest terms against the disrespectful actions of the Wabash men in this game. But in spite of their bulldozing and robbing tactics, Wabash was defeated 12 to 11.

The next game was with Butler, at Indianapolis. Our defeat here was attributed by some to

overconfidence, but some of the players claimed it was due to overloaded stomachs, effected at the grand (?) restaurant where the Butler boys took them to feed. One of our team, however, played an unusually good game that day, for by a little strategy he managed to get two pieces of pie.

The season closed here on Decoration day with Purdue, which team was vanquished to the tune of 15 to 2. The Purdue boys were, however, in poor condition, having traveled all day, owing to a wreck.

The enviable record made by the team last season is well known to all.

The season opened here with Butler, with the score of 12 to 8, in Rose's favor as the result.

The next game was to have been with Wabash, but rain prevented. Lucky Wabash!

But DePauw, at Greencastle, were the next victims. It is safe to say that there has never been a game lost which caused more sore heads and turned-down mouth corners, than this one. DePauw was so confident of success that she had flaming posters all over the city with the heading: "This game settles it." It should have read: "This game settles *us*," for they were downed by the "Blacksmiths," as the dear DePauw girls called us, by the score of 7 to 5.

The game at Bloomington with I. U., followed, and R. P. I. came out easy victors, 12 to 3. This will be remembered by the team as its most pleasant trip. The Bloomington boys did all in their power to entertain the visitors and gave a dance in their honor the evening of the game. A charge, silly as it is amusing, has originated as the outcome of this game. It seems that the Bloomington boys having heard of the splendid financial condition of our athletic association, thought we could easily spare a ball or two, or perhaps they only wanted to borrow it until next season, as our team had just won the only one they had; at any rate they did not stand under any ceremonies, but very politely and with the greatest consideration for the Poly boys' rest they helped themselves to at least one ball out of Rose's bat bag.

But it seems, as they claim, they were so unfortunate as to get one of the Poly's "specially

manufactured *dead balls*, to be used only when the opposing side is at bat." It was one of Spalding's patent double seam balls. They had never seen one down there. There have been many novel and amusing excuses offered by college base ball teams for the loss of a game, but this one "takes the pudding." The originator deserves to be made president of the United States.

The last game played by the team was a beautiful exhibition, as the opposing team, Purdue, was the strongest foe met. Purdue took the lead with four scores in the first inning, but not a man of them reached first base in the following seven innings. The score stood 4 to 2 up to the last half of the eighth inning. Things looked rather blue for old rose and white, but after two hands were out the rose color began to brighten and for a while things looked red, white and blue, for there followed a great pyrotechnic display. Layman fired the first piece, in the shape of a two-bagger, against the fence, and while the third baseman was consoling the pitcher, Layman stole third. Then there followed, amid the cheers and flying hats, a rapid succession of Roman candles, loaded with two and three-baggers, and when the smoke had cleared away, the score stood 7 to 4, but Purdue got one man around the bases in the ninth, which left the score 7 to 5, giving R. P. I. a clear record for the season and the championship of the State.

S. FRANK.

#### NOTES.

The Athletic enthusiasts of the University of Illinois are able by superior facilities in the way of gymnasium and drill hall to keep the proper spirit alive throughout the whole winter. Not only the ordinary gymnasium work but indoor base-ball and other things are now receiving their attention; the base-ball teams have been organized and now arrangements are being made for matches with Chicago teams.

At Earlham College hare and hound chases seem to be one of the most interesting sports at present, and some lively rambles have been indulged in. This would be a good way for Polies to see something of Vigo county by daylight.



The application of Earlham College for admission to the I. I. A. A. reopens a question of interest to all the present members. The association is organized to provide athletics in the Indiana colleges; it is broad enough to reach all the colleges and to cover all kinds of athletic sports, and it is hoped that all the colleges will some day be members. Earlham comes with a good athletic reputation; they have a good gymnasium to start with; they have a good college athletic association already, and have for years encouraged athletics in its various forms; they have had good base-ball and foot-ball teams; have some high records in field contests, and are well prepared in tennis. With all these points in her favor, a strong attempt, at least, ought to be made to smooth over the difficulties in the way of her entering the association. These are, first that they are restricted to playing base ball and foot-ball at home, and second that they are very inconveniently situated in respect to the geography of the colleges. The first rests with them to remove, and for the second, perhaps in devising a plan for equal adjustment of traveling expenses for the season, some arrangement can be made which will get around this. Yet, in deciding upon this question, what is best for the general good must be looked to. The association can well afford to make some sacrifices in order to get in new members, but these should not go so far as to cripple the whole organization. Hanover was left out because of its out of the way location and Franklin was dropped on account of not being able to take part in anything outside her own county.

The palm surely goes to the Freshmen class for keeping up the interest in foot-ball. The practice game two weeks ago was well attended and a few more of the same kind will give that class a good team. Light understands the game and is a good organizer. Keep the ball rolling.

Not all of the Purdue team will be strangers to us. McMullen, who umpired the Purdue-Rose game last year, will be manager this year, and Olin, first base on last year's nine, will be captain. They have our best wishes in all things save winning the pennant.

The article, "Training for Athletics," comes to us in the nick of time to be of practical benefit during the coming season. The words of advice are from an old friend. Professor Waldo has often shown us that he knows whereof he speaks. We have not forgotten the active interest he always manifested in our athletic struggles. The subject of proper training is one that demands immediate attention from those who expect to figure in the coming field contests; now is the time to begin systematic training; muscles cannot be hardened in a week, nor self reliance gained in a day. Again, if only those train who feel assured of winning, probably not a man will be seen practicing until it is too late. This will not do. Those who know they cannot win prizes or break previous records are just as responsible as the leaders for winning these contests; to them belongs the duty of helping and encouraging the others to train. Let us answer the tiresome question "Why doesn't 'J——s' train?" by this other—"Why don't you get him out and help him train?"

The regular meeting of the A. A. directors occurred last Thursday night; all the members of the board were present and some important business was transacted. Messrs. Tinsley, Young and McGregor, were chosen to compose the base ball managing committee; Tinsley to be chairman. Each of the three is well acquainted with base ball itself and with the practices of base ball management in the Indiana colleges; they will undoubtedly get as much as possible out of the material in the school. Rules for the management of the team will be adopted at the next meeting of the board.

The bids of several contractors on the work of flooring the gymnasium were read, but for fear of hampering the finances of the base ball team no action was taken. A finance committee composed of Fogarty, Dale and Anderson, was appointed to make an estimate of the probable expense as well as of the probable income of the association during the remainder of the year. The board adjourned to meet on Wednesday the 10th instant, when the reports of committees and the revised constitution will be considered.



## CURRENT AFFAIRS.

### *A SEISMOGRAPH.*

A Seismograph is an instrument used for measuring the undulations of the earth's crust during an earthquake. Professor Gray of the Rose Polytechnic Institute designed such a machine in 1883 to use in connection with his work in Japan. The apparatus has been in use at the Institute for experimental purposes for some time but it has never been used in recording earthquakes, mainly on account of the trouble and expense required, in comparison with the very rare occurrence of earthquakes in this region which are of sufficient magnitude as to make their complete record of value.

The instrument consists essentially of a recording cylinder, over which is passed a continuous strip of paper, and mechanism whereby the motion of the earth's crust may be resolved into a vertical component and two horizontal components at right angles to each other. Paper is continually supplied to the recording cylinder from a supply drum and after passing the cylinder it is rewound upon another drum. A uniform motion is imparted to the paper by rotating the recording cylinder by means of clock-work. The cylinder is kept constantly at a low rate of speed by means of a governor, until a shock occurs, when the governor is thrown out of gear and a second one is connected, the second governor allowing the speed of the cylinder to be considerably increased. The disconnection of the first governor is accomplished by means of a lever, pivoted near the center, on one end of which is fastened a counterpoise and on the other end a rocking platform. On this platform is placed a free ball in such a position that, if the instrument is jarred, it will roll from the rocking platform. When this is done, the counterpoise at the other end of the lever causes that end to move downward and to throw the governor out of gear. As soon as the recording cylinder is released from the governor its speed increases rapidly to its maximum and to obtain its exact velocity during the period of transition, an arm having on one end a writing

siphon and actuated by a separate clock, is placed so as to mark seconds upon the record paper.

The horizontal components of the undulations are made by means of conical pendulums, connected by a series of levers to writing siphons. These conical pendulums consist of a heavy weight which is supported; first, by a light rod passing through the weight, provided at one end with a knife-edge and resting in a V groove on the main column of the instrument; second, by means of a light wire attached by a stirrup to the weight, and to a pulley at the top of the column. In this way a conical pendulum is made in which the time of vibration may be regulated by moving the weight upon the supporting rod, or by bringing the point of suspension more or less in front of the knife-edge on the end of the rod.

The vertical component is recorded by means of a horizontal arm having at one end a heavy weight and at the other a set of knife edges supported from the top. The arm is then held in a horizontal position by means of two flat springs, of considerable strength, attached to knife-edges placed between the two ends of the rod. Connected to this rod and placed in contact with the recording cylinder is a second arm carrying a writing siphon.

### *THE POLYTECHNIC LIBRARY.*

Any one who visits an institution of a character similar to that of the Polytechnic, is naturally desirous of knowing something with regard to the books of reference, and such literature as is kept for the use of the students. Too frequently it is the case that many of the students know comparatively little about this important feature, and when questioned concerning it are unable to give a satisfactory explanation.

The number of volumes in the library at present is, approximately, six thousand five hundred, exclusive of pamphlets, which number over one thousand. The arrangement of the books on the shelves is by subjects, according to the Dewey

Decimal System of classification. In this system the entire body of knowledge is divided into nine classes, the tenth division being used for general works like cyclopedias, general periodicals, newspapers, etc., which belong to none of the nine great classes. The initial number of any book will therefore be determined by the following summary:

- |                   |                     |
|-------------------|---------------------|
| 0. General Works. | 5. Natural Science. |
| 1. Philosophy.    | 6. Useful Arts.     |
| 2. Religion.      | 7. Fine Arts.       |
| 3. Psychology.    | 8. Literature.      |
| 4. Philology.     | 9. History.         |

Each of these classes is again divided into ten divisions, and each division into ten sections, and so on, according to the subject matter in each department. To illustrate—Mathematics being the first division in the fifth, Natural Science class, a book on that subject, would have the first figures of its number 51; a general work in Mathematics would have the figures 510; a History of Mathematics would be marked 510.9; the biography of a mathematician would be 925.1. An Algebra, 512, would be found in the second division of Mathematics, while 512.7 would represent Involution in Algebra. The advantages of this system are many. The number of each book not only tells where the book is found but also the subject of which it treats; two important points rarely found in conjunction in any other system. Books can be readily added, and entire classes can be moved from one place to another without in any way making an alteration in the index or catalogues. It applies equally well to books, pamphlets, clippings and notes. Among the very important works of the Library collection there are, *Drawings and Specifications of Patents*, almost complete, which are especially valuable for reference, being much used by lawyers in this vicinity and elsewhere. The file of the *Proceedings of the American Society of Mechanical Engineering* was completed last spring. The complete *Proceedings of the British Association for the Advancement of Science* have been recently purchased. The *Proceedings of the Royal Society of London* were placed on the shelves a short time since, the Library having had the *Transactions* presented to them a number of years ago. A number of additions have been made to the *Proceedings of the American Association for the Advancement of Science*.

The different periodicals now being received at the Library number fifty-two, of which three are French, six German, ten English and the remainder American publications. The periodicals recently added are, *The Journal of the Science of Chemical Industry*, *Engineering Magazine* and *The Forum*. The complete file of the latter was recently presented to the Library by President Eddy. In all this collection there is one essential feature lacking, viz: the daily papers. That important subject has been under discussion for some time and soon the previous order of arrangement will be changed and the students will have the privilege of getting the news of the day from four or five of our leading dailies.

#### A NEW PROJECT.

The Seniors have undertaken to issue a "souvenir," which shall be very much in the nature of "annuals" as issued in other schools. To this end a complete and thorough organization for work has been effected, and affairs are now in such shape as to permit of preliminary announcement. The "souvenir" will be as artistic as the financial resources of the class will warrant, and will contain in addition to a number of class features, fine illustrations, school athletic records, etc. No attempt will be made to publish a voluminous affair, the object being rather to issue a small, well bound book, which shall make up in quality all that it lacks in quantity. In order to start the necessary fund, arrangements are being made to give a concert on or about Friday, March 4th. This, it is intended, shall be first-class in every respect. Mrs. Allyn Adams is assisting in the arrangement of a programme, and this announcement in itself assures success. The best talent of the city will be invited to participate and a fine concert may well be anticipated. The undertaking is one which should meet with approval among all the classes, and coöperation among all the students. The "souvenir" while in some details a Senior volume, will in others be an Institute one, and will consequently have an interest for all. Full announcements of the concert programme may be looked for in the near future.

*Y. M. C. A. NOTES.*

All are cordially invited to attend our meetings. Do not wait for another invitation, but come.

What is the matter with the membership committee? We have not heard anything from them for quite a while.

Do not let outside Christian work interfere with the regular weekly meetings. We need your presence and help.

There is some talk among the members of giving a reception to the students soon. Do it by all means. Activity is the sign of life.

It is encouraging to note that the attendance at the regular Thursday evening meetings is on the increase. The last few meetings have been rare treats. Let all the members throw their whole influence into this work and the association will be wonderfully strengthened.

This month's Bible study as laid out by the committee is very interesting. The subjects and leaders for the remaining three weeks are as follows:

Feb. 11—"Christ Before Pilate," E. Riedel.

Feb. 18—"Paul," B. O. Tippy.

Feb. 25—"Christ; His Birth, Baptism and Resurrection," A. M. Hood.

The Day of Prayer for Colleges was not observed by the association as it should have been. Had it not been for the kind invitation of President Duncan, of Coates College, for us to enjoy the services with them, it is doubtful whether there would have been any special recognition of that day by us. As it was, quite a number of the members attended the evening services at the college and were very glad that they gave up their own meeting to do so. The Rev. Mr. Melburn, of Evansville, conducted the meeting in an admirable manner. He did not allow it to drag, and the briskness with which it moved along seemed to inspire the audience with the same enthusiasm. The short talks by Rev's Crum, Higgins, Schwedes and Judge Rhoads were interesting and valuable. At the close of the meeting President Duncan made a few remarks which were full of encouragement for us, and each one, no doubt, left feeling that he would strive harder to make our association what it should be.

*R. P. T. A.*

After a month of inaction the Telegraph Association is rapidly coming to the front. The inconvenience experienced when the line is not in good working order is so great that the members have decided it to be imperative that the association shall be up to the standard in every detail. At the last meeting, held February 1st, Moth, '93, was re-elected President, Rice, '93, was elected Treasurer, and C. E. Albert, '93, re-elected Secretary. The Superintendents for the present month are Fogarty and Hildreth. The work of repairing the line was divided among the members systematically, and it may, with certainty, be predicted that the instruments will all be in tune in less than a week. The association has at present a listed membership of thirteen students and has several applications under consideration. All students who are conveniently located can hardly afford to ignore the advantages which an association of this character offers, and it is desirable that as many as can be accommodated should join the circuit. Any student who wishes to become a member should confer with the Secretary at once.

*FIRE ECHOES.*

Work has been commenced on the repair of the shops and with fair weather it may be reasonably hoped that they will be in working shape by the middle of March. The losses on the building, tools of all kinds, and lumber have been adjusted as follows: Building, \$3,750; lumber, \$450, and tools damaged by fire and water, \$2,250, making a total of \$6,450. As regards the electrical apparatus there is some dispute, a difference of opinion existing as to how much of the equipment shall be called "lighting" plant and how much "experimental" apparatus. Under ordinary policies lighting plants are not insurable as part of the equipment of a building. The instruments damaged were, switch board with fittings, three converters, volt meter, ammeter, seven switches and blocks, lightning arrester, ground detector, rheostat, an arc dynamo, converters for volt meter and a 100 light converter. The Westinghouse dynamo was slightly injured. This loss is estimated at about \$1,500, making a grand total of \$7,950.



## LOCALISMS.

'Twill soon be spring fever.

Sophomores! Horse on you.

The Seniors are busy with class projects.

The Freshmen are talking "class banquet."

The old block floor in the machine shop is to be re-laid.

The Seniors banquet at the Terre Haute, February 18th.

The orchestra concert will take place near the end of March.

It is quite probable that lost shop time will have to be made up.

O'Brien, '94, after a week's illness is able to attend school once more.

Overheard in the vicinity of the "Evening Butterfly:" "Who's Kelly?"

Every tool looks like a grave stone with its coating of whitening and tallow.

Professor Brown has moved his office into the library until the shop is repaired.

The Chicago *Inter-Ocean* has Polytechnic correspondence every other Saturday.

Holding has been elected Secretary of '94, in place of C. B. McCulloch, resigned.

Rock, '92, was absent from the Institute for several days on account of sickness.

Pilcher, '95, had quite a siege with the "grippe" last month, but is all right at present.

An extra pump is to be connected with the feed water, to be used in case of necessity.

Quite a display of shop work is to be made by the Institute, at the Columbian Exposition.

Professor Hathaway is giving one lecture a week to the Juniors on the subject of "Potential."

Professor Mees says that the Juniors are good for something. They are first-class "kickers."

The Freshmen have begun the study of "Trig." Take advice, young man, and get it down "pat."

L. W. Kent, for a short time a member of the Freshman class, is with '95, of Illinois State University.

The "funny snap," which was inaugurated by Freshmen recently, found hearty support among upper classmen.

The Seniors are getting good practice in overhauling the electrical apparatus which was damaged by the fire.

Prof. Noyes has written an article on burning sulphur in oxygen, which appeared in a recent issue of the *Chemical Journal*.

When the Freshmen go to Chemistry recitation in future, it will probably be with the anticipation of hearing something drop.

R. S. Matthews, late of '92, is at present located at Lynn, Mass., in the draughting department of the Thomson-Houston Electric Co.

Professor Noyes entertained the Freshmen last week by allowing them to show on paper how much they didn't know of Chemistry.

Roll Buntin, formerly of '93, is temporarily serving as manager of his brother's hotel at Bushnell, Ill., while the latter is away on a month's rest.

The report that the Juniors are studying dentistry has no foundation, except the fact they are being instructed by Professor Ames how to draw "teeth."

Taylor, '95, who is justly entitled to the distinction of school photographer, has taken several interior views of the shop as it appeared the day after the fire.

Pres. C. K. Adams, of Cornell University, made the Institute a brief visit last month. He came here after visiting DePauw University and from here went to Chicago.

The members of Professor Howe's family are at last getting over the grip. We are glad to hear that Mrs. Howe is fast regaining her strength and will soon be able to go out.

Freshmen have the time-honored curiosity for Normal socials. One is now thoroughly convinced that he is "in the splash."

Much regret was expressed by two or three pretty mean fellows Thursday to think that they had not invited young ladies to go to the canceled Margaret Mather engagement.

Holderman, '95, had the misfortune to run a nail in his foot some time ago, and it has recently been causing him much trouble. He is now able to be about with the aid of crutches.

A well known Freshman called on a lady friend the other night. When he stepped out of the door to take his departure he found that his trunk had been brought to him by kind friends.

French is the only language studied by the Juniors this term and a final examination in this subject will be given before spring vacation. German will be substituted in the spring term.

A paper was received last week directed to "The Rose Dispensary." This suggests that very few of the students are aware that a fund for such an institution was one of the bequests of Mr. Rose.

McGregor is at a loss to understand that fatality which appears to menace the peace and good order of '93. He together with several others were mistaken for Normal students a few days since.

Folsom, '92, is evidently contemplating partnership with Jay G., Chauncey D., William K. V., or some of the other magnates. A cab conveyed him from the Institute to dinner the other day.

A Junior living on North Sixth street, was quite recently the recipient of an impromptu leap year call. He has since been wondering if brevity is to be a feature of the others which he expects to receive.

The opinion of Dr. Mendenhall is highly valued by all who are or have been connected with the Polytechnic, and what he has said with reference to some of the electrical appliances here will be of interest to many. "The most modern collection of electrical testing apparatus in the country," is the way in which he expressed his opinion.

One of the "Artists" of the Junior class has added to his other accomplishments that of eating on the reverse side of his plate.

M. E. Becker, a former student of the Polytechnic, who has recently been employed in the draughting office of the P. H. & F. M. Roots Co., Connersville, Ind., has re-entered school as a member of the Junior Class.

Andrews, '94, has been singularly unfortunate in his dealings with sickness this term. His place in class was vacant for nearly three weeks, while his attention was divided between a protracted case of mumps and the grip.

A young lady living in the vicinity of North Sixth street, has requested several of the boys to take a P. G. course of several years at the Institute, so that she may have the pleasure of entertaining them "at tea" in a home over which she will preside.

Luther L. Griffith, a former member of '93, is with the United States government surveyors at Greenville, Miss. In a letter recently received from him, his friends are informed that he is well pleased with his prospects in that distant quarter of the sunny South.

Of the "special subject papers," a feature of Sophomore chemistry, the one recently read by Dale, was pronounced by Prof. Noyes to be one of the best to which he had listened for several years. The subject was "Phosphorous, and the Manufacture of Matches."

Pen and ink drawings of appropriate nature are acceptable contributions to the THE TECHNIC. Rough sketches should be submitted first before careful drawings are made, as it would be a very unpleasant task to reject a well finished design upon which considerable time was spent.

Prof. Hathaway's article on the early history of the Potential has been published in the "Bulletin of the New York Mathematical Society." He is preparing for publication a series of articles on "Quaternions," a subject which has been invented within the life-time of some of the students.

The conditions for a student who desires to take special studies in his regular course or of another course have been definitely arranged. In order to take special work in his regular course it is necessary for him to have received an average term mark of 75 per cent. at his last semi-annual examination; if he wishes to take special work in another course, he must have received a mark of 80 per cent.

Chancellor Chaplin, of Washington University, with Professor Woods, his associate in the faculty, visited the Polytechnic on February 5th. He and Professor Howe were formerly engaged in work together at Harvard; he was also with Professor Gray in Japan. He was installed Chancellor of Washington University, January 11th of the present year, for which occasion the faculty of R. P. I. received invitations.

During the last week of January, the Freshmen finished solid geometry and took an exemption examination on that subject. The study substituted is trigonometry which they will finish this year. The text book used is by Professors Oliver, Wait and Jones, of Cornell University.

QUESTIONS OF THE DAY.

Will '93 banquet '92?

Have journal reviews been abandoned?

Will everybody attend the Senior concert?

Is the base ball pennant to be ours?

Will '95 beat '94 at base ball?

Professor—"Mr. Robinson, what instrument is used to measure quantity of heat?"

A. R.—"A Caligraph."

## INDIANA COLLEGE BULLETIN.

DE PAUW.—The oratorical association election resulted as follows: President, Mr. Teeple; Vice President, H. M. Dowling; Cor. Secretary, C. A. Cook; Rec. Secretary, E. E. Schnepf; Treasurer, J. Clow. The Barbs held the balance of power, and named their price as the presidency. This *The Record* faction conceded, being content with the remainder of the offices.

The Juniors are working on the annual edition of *The Mirage*.

A college press club is projected.

A students' Republican club has been organized.

The oratorical contest takes place on the 12th.

The second semester of eighteen weeks is on.

\* \* \*

BUTLER.—The Juniors recently gave the Seniors a reception.

A \$1,000 bank account stands to the credit of the athletic association as the result of the season's foot ball.

INDIANA UNIVERSITY.—*The Student* roundly criticises ex-President Jordan for taking so many members of the I. U. faculty with him to Stanford. His action is strongly contrasted with that of their present president, Professor Coulter, who would not cripple Wabash to fill vacancies at I. U.

President Coulter has recovered from the grip.

The seventy-second anniversary of the founding of the university was appropriately celebrated on the 20th.

\* \* \*

FRANKLIN.—The literary societies have invited the Hon. John G. Carlisle to be their commencement entertainment orator.

The fraternities have a song entitled "The Barbs are in the cold, cold ground," with which they vent their surplus enthusiasm.

The fraternities combined on the oratorical election and succeeded in downing the "Barbs," for the first time in recent years.



PURDUE.—The Y. M. C. A. shows a healthy and substantial growth this year. The yearly membership fee has been changed from 25c. to \$1.00, thus obviating the necessity of a subscription paper. The association having assumed control of the Sunday afternoon lectures, and also having instituted the lecture course, takes on a prominence in the college which it is worthy and able to sustain. The membership numbers over fifty active workers.

Work on the new athletic park will be commenced as soon as the condition of the ground permits, and hereafter all games will be played on the college campus, thus enabling visiting colleges to inspect the laboratories and college grounds.

The game of "Hare and Hounds" is to be inaugurated preparatory to spring athletic work.

The new twelve horse-power Otto gas engine is in position and in good running condition.

A camera club is being agitated.

\* \* \*

EARLHAM.—The attendance now exceeds that of any previous winter term.

A fight will be made for the State oratorical prize.

WABASH.—The event of the season, thus far, in the college world, socially speaking, was the reception tendered President and Mrs. J. F. Tuttle on the evening of January 15 by the members of the Senior class.

The Seniors appear stately in caps and gowns.

The Juniors are already arranging for a grand reception to be tendered the new president next fall, whoever he may be.

\* \* \*

Spring athletics is the talk all over the State.

Earlham boasts the finest gymnasium in the State.

Indiana sends 37 students to Leland Stanford Jr. University.

An effort is being made at Hanover to secure better athletic grounds.

"Julius Caesar" is to be presented at Notre Dame as a Washington birthday observance.

Butler and Indiana University both have new gymnasiums and instructors in physical culture.

The faculty of Butler marked the 75 per cent. a passing grade, as "passed;" 90 per cent. "*cum laude*," and 95, "*cum summa laude*."

## THE COLLEGE WORLD.

A students' congress has been formed at Leland Stanford, Jr.

It is said the girls of Smith College have formed a "Hare and Hounds" club.

Caspar W. Whitney, of *Harper's Weekly*, was recently burned in effigy at Cornell, on account of his foot-ball criticisms.

Lewis, the colored center rush and captain of the Amherst foot-ball eleven, intends to enter the Yale Law School next fall.

The Cornell *Masque* announces that six of the best dancers of the university have gone into active training for the purpose of producing a skirt dance at their minstrel performance.

The University of Illinois Athletic Association will soon give an indoor field day and athletic entertainment to raise funds.

Noah was the first pitcher on record. He pitched the ark within and without. The game was called on account of the rain.

The Edison Car Company of New York has given the electrical department of Johns Hopkins University two street car motors of 15-horse power each.

The Princeton faculty have decided that no special student will be allowed to play on any university athletic team until he has been in college at least two terms.