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VOL. XII. TERRE HAUTE, IND., FEBRAURY, 1903. No. 5

THE TECHNIC.

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TERMS:

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Issued Monthly at the Rose Polytechnic Institute.

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SINCE our last issue there have been several changes in the personnel of THE TECHNIC staff. Mr. Irving J. Cox, '03, who has been Athletic Editor for the past two years, feeling that he is not so much interested in athletics as heretofore, tendered his resignation, which he urged be accepted. The resignation was reluctantly accepted by the board, and Mr. John O. Bland, '05, was elected to fill the position of Athletic editor.

Mr. Bland is Secretary of the Athletic Association, and has always shown great interest in all athletic sports. He has very creditably represented the Institute on both base ball and foot ball teams. By virtue of his position of Secretary he is kept well informed in regard to all athletics at Rose, and from present prospects should be able to give us some very interesting reading in his department.

At the same meeting, Mr. Paul E. Turk, '06, was elected Local Editor from the Freshman class, and Mr. Ralph C. Blanchard, '05, to the position of Assistant Business Manager. Both of these gentlemen were selected because of special qualifications that fit them for their respective positions.

The board extends to all these new members a hearty welcome, and wishes each the greatest success in their several lines of work.

ABOUT once or twice a term during the past few years it has been our custom to meet together and, after having several speeches, decide that we would take a greater interest in athletics and work harder for our teams. At every meeting of this kind enthusiasm was evident, and for a week after we were wont to boast of what we were going to do, and support our teams by yelling until a defeat would throw us back into the old rut of shiftlessness.

Now we have had another meeting, and it is an open question how long our enthusiasm will last from the effects. We believe that this meeting marks a great change in athletics at Rose. The following reasons lead us to think that enthusiasm will be maintained. In the first place a "Rooters' Club" has been formed. Now, the functions of this club will give it a vast influence in doing a great part towards making athletics at Rose a success. The Rooters' Club is to be the backbone of athletics. Its support will be principally to arouse enthusiasm, for if we have great enthusiasm we will never be troubled financially. The enthusiasm shown at this meeting led the Council immediately to appropriate two hundred

dollars to the Athletic Association from the Reserve fund. The second reason for believing that the good old times are returning is the fact that the Athletic Association has shown itself to be wide awake. A sum has been set apart for each branch of athletics, a competent coach has been engaged for our base ball team, and improvements have been made in apparatus, and in keeping up the gym.

Now fellow-students, it is your duty to belong to at least one party. If you are not going to take an active part in athletic contests, then you are not loyal to Rose unless you join the Rooters' Club. Here, then, is the chance for every man to do his share. You must be either an Athlete, a Rooter, or both. In order that all may become members of the club, one man in each class will be appointed to take the names and subscriptions of new members. Then buttons, megaphones, etc., will be purchased and enough money will be left to help out athletics when the time for help arrives. Mass meetings will be held in the gym before games and speeches will be made and yells practiced. In this way the Rooters' Club will keep enthusiasm at a high pitch and do all in their power to place old Rose at the top once more.

THOSE of our athletes who are entitled to an "R" should wear it on their shirt or sweater. Since the new rule has been established in regard to insignia, the "R" is much more valuable, and is full of meaning. Wear it and show that you are proud of having had the honor to win one, and of having belonged to one of the school teams. It will not only do you a great deal of good, but the teams as well.

THE TECHNIC is in receipt of the following communication :

Rooters Club? Fine thing. Just what we need. Cheap, too ; nothing needed but practice and wind.

I will give three Rose pennants for the three best yells handed in to THE TECHNIC within the next two weeks. The decision as to merit being made by a committee appointed by THE TECHNIC. A. STUDENT.

THE TECHNIC will give the names of the winners in the next issue. Kindly hand in yells to L. A. Touzalin.

WE are very sorry to note that the bulletin announcing the "Modulus" dance, which has just been given, was taken down from the bulletin board and maliciously purloined. Such an act is unpatriotic and disloyal to the school We think that it would be well to state here that the "Modulus" is not an institution of the Class of '05 alone, but is in keeping with an established custom of the Rose Polytechnic Institute. It is a book representing the school, for the school, of the school, and by the school. It is authorized by the Faculty, and the person referred to above has, by his act, done considerable harm to the book, and also offered an affront to the whole school. In the future, please leave all such matters severely alone, and so keep out of serious trouble.

BY F. C. WAGNER

THE ordinary iron and steel pipe in commercial use are made from strips of iron or steel bent up into cylindrical form and welded. The welded joint may be made either by butting the edges of the plate together or by lapping them. The pipe are hence commonly described as butt weld pipe, or as lap weld pipe. Butt weld pipe are commonly made in the small sizes from one-eighth inch up to two inches, and lap weld pipe are made in the larger sizes, running from two and a half inches to twenty inches or more.

The process of manufacture has developed gradually, each new step diminishing the cost of production. One line of development has been in the furnaces used to heat the iron strips up to a welding temperature. The early furnaces used solid fuel, such as coke or anthracite coal. With the discovery of natural gas, this fuel was very successfully introdnced, the Siemens regenerative furnace being used. The advantages of gaseous fuel were found to be so great that when the natural gas was no longer available, producer gas was substituted. Oil has also been successfully used, giving substantially the same results as have been obtained from natural or producer gas.

Another line of development has been in reducing the number of manipulations, and especially the number of heatings, to which each plate must be submitted in the process of making it into pipe. The manufacture of butt weld pipe is particularly notable in this respect.

One of the early methods known as the "tongs process," was as follows: The plate was prepared by being rolled to an exact width slightly greater than the mean circumference of the metal of the finished pipe. It was then placed in a long narrow furnace and heated to a good red heat. When at the proper temperature it was drawn through a suitable die and bent into a trough-shaped form. The cross section of the shaped plate, commonly called a "skelp," was approximately a circle cut through and opened out a little. The mechanism used for bending was a bell-mouthed die with a concentric mandrel. The mandrel was held in place by a rigid arm extending outward on the side toward the advancing plate. The plate was pulled from the furnace by an ordinary pair of hand tongs and brought up to the mouth of the shaping die. It was then seized by a powerful pair of tongs carried by a traveling carriage or "buggy." The "buggy" ran on a suitable guide frame called a draw-bench and was propelled by a constantly moving endless chain, to which the "buggy" was connected at will.

After the plate had been bent into a skelp, a little more than half its length was introduced into the welding furnace where it was raised to a white heat. When at the proper temperature it was pulled from the furnace far enough to bring the middle of the skelp up to the tongs die. The tongs die consisted of a die made in two halves, each half being fastened to one of the jaws of a powerful pair of tongs. When the jaws of the tongs were closed, the inside surface of the die was cylindrical and of a dimension corresponding to the outside diameter of the finished pipe. After the skelp had been placed in the die the tongs were closed, pressing the edges of the plate to-

gether at that point and welding them. The far end of the skelp was seized by the buggy tongs and the remainder of the hot pipe drawn through the closed die. As each successive portion came to the die the edges were pressed together and welded.

The partially welded pipe was then introduced into the furnace, other end foremost, and the unwelded portion was brought to a welding temperature and drawn through the tongs die in like manner. It was necessary to introduce the plate into a furnace three times and to draw the piece three times in the making of one piece of pipe.

The next step in the evolution of the modern process of making butt weld pipe was the invention of "bell welding." It was found that by trimming the entering end of the flat strip and giving this end a slight initial curvature in the direction it was intended to bend the plate, the plate could be drawn through a solid bell-shaped die and welded, at a single operation. But the difficulty was encountered that the tongs used in the drawing process would not pass through the solid die. The solution first adopted was to weld a rod four or five feet long to the forward end of each plate. The free end of the rod was provided with a knob, so that a forked hook would easily grapple it. The other end of the hook was shaped so as to make connection with the links of the endless chain of the draw bench. At the end of the draw bench nearest to the furnace was a rigid projection called the bell holder so shaped as to support and hold the bell while the pipe was being drawn through it.

The plate with the rod or "tag" welded to it was introduced into the furnace, the tag being allowed to project outside of the furnace opening, and was at once raised to a welding temperature throughout its length. The tag and the front end of the plate to which it was attached were not allowed to become so hot as the balance of the strip for fear they would not have sufficient strength to pull the pipe through the bell die. The portion of the tag outside of the furnace was used as a handle for moving and withdrawing the plate. When the plate was at a proper heat a bell was thrown over the tag, and the plate was pulled up to the draw-bench with the bell dropping into the bell holder. Immediately the knob on the end of the tag was seized by one end of the hook, while the other end was dropped into the endless chain of the draw bench. The plate was thus quickly pulled through the bell and welded into pipe. The pipe was then passed on to a pair of sizing rolls, where it was reduced in diameter somewhat and the metal still more compressed. Afterward it was passed through a pair of skew rolls which straighten the pipe and are hence called straightening rolls.

The bell method with tags uses two heatings, one of the end of the pipe and the tag for welding the two together, and the other of the entire strip to a welding temperature.

The next step was evidently to get rid of the necessity of welding a tag to each plate. Attempts were made to use a removable tag, which usually consisted of some form of hook adapted to be hooked into a hole punched in the plate near its forward end. This was not successful. Finally it was found that specially designed tongs could be constructed which were strong enough to pull the strip through the bell and yet slender enough to pass through the opening of the bell. The special features of these tongs were a new construction of the jaws, by which a firm grip could be secured by narrow and slender jaws. The device used was a projection upon one jaw, registering with a corresponding recess upon the other jaw. The metal was thus given a very decided kink or series of kinks. The handles of the tongs were so constructed that when the plate was gripped the handles came close together and a ring could be slipped over them to maintain the grip. Sometimes the bell was thrown over the tongs just as with the tags, and sometimes only the jaws of the tongs were passed through the bell. This latter process necessitates a special construction of the tongs, so that the jaws may be opened wide while the bell is on the tongs.

The present method of making butt weld pipe is then as follows: One end of the strip is clipped and bent in a clipping and bending ma-

chine. The corners are clipped so that the portion first entering the bell is narrower than the remainder of the plate. The bending gives an initial curvature in the direction it is desired to curve the plate in forming the cylindrical tube. An additional sharp bend upward is given to the end of the plate, so that it may slide easily over the furnace bottom, and also to facilitate grasping the plate by the tongs. This clipping and bending is done by the machine very rapidly, requiring perhaps two seconds for each plate.

The plate thus prepared is shoved into the rear end of the furnace. In some cases the plate is introduced by a machine called a "mechanical charger." This machine consists of a frame which contains an endless chain moving toward the furnace on its upward side. The plates are placed on the moving chain and are carried along into the furnace. They are then shifted across the furnace by the workmen until they are in line with the draw bench, which is stationary. In the other cases the plates are charged into the furnace by hand, and allowed to remain in the same spot until ready to be withdrawn. In this latter case the draw bench is movable, and is brought in front of each plate when it is ready to to draw. In both cases the plates must be moved after they are in the furnace. The tool with which this is done is called a "picker," and consists of a slender iron rod twelve or fourteen feet long, with a fork on one end suited to the thickness of plate used and a tee handle on the other end. It is very interesting to watch the skill with which a workman will handle a strip of iron twenty feet long and four or five inches wide, the nearest end of which is perhaps fourteen feet distant. Notwithstanding the extreme simplicity of the "picker" as a tool, it is very effective.

After a plate reaches a proper welding temperature the draw bench is swung into line with it. The workman seizes the forward end of the plate with his trongs, throws a bell down over the tongs and drops the tongs upon the draw bench so that the bell falls into the bell holder. The "hook boy" quickly catches the knob on the handle of the tongs with the forked end of his hook and then jabs the other end down upon the chain of the draw bench. It catches in one of the links of the moving chain and pulls the strip of hot iron through the bells, welding it into pipe. The pipe is then placed on a slowly moving shifting table, where it cools somewhat before being fed to the sizing rolls. The sizing rolls reduce the diameter of the pipe, compressing the metal.

The pipe is then fed to the straightening rolls. These straightening rolls are set with their axes inclined to the direction in which the pipe passes through them. The axes of the top and bottom rolls are also inclined to each other, being shifted in opposite directions from the plane which is perpendicular to the pipe. The rolls are turned concave, so that the line of contact with the pipe is substantially a straight line. Thus the rolls are equivalent to plane surfaces rolling the pipe between them. The pipe passes through the straightening rolls with a screw-like motion due to the combined feeding and rotating motion imparted by the skew rolls.

After the pipe leaves the straightening rolls it is placed on a slowly moving shifting rack where it is allowed to cool, and finally is dropped into a set of trucks. It is then taken to the cutting-off machine where the imperfect ends are cut off. The pipe is then threaded and tested with 400 pounds water pressure. If a leak develops, the leaky portion is cut away and the balance again tested.

The manufacture of lap weld pipe has not yet been reduced to a single heating operation. Consequently lap weld pipe is much more expensive to manufacture. Its greater strength on account of the much greater contact surface of the weld, however, enables it to keep its place upon the market. It is usually specified for boiler tubes. The larger sizes of pipe are also commonly lap welded.

The modern process of making lap weld pipe is as follows: The plates are cut to a width greater than the circumference of the finished pipe by the amount it is desired to lap the edges in making the weld. A number of the plates are

laid in a pile upon the charging table of the "skelping" furnace. The skelping furnace is a long narrow furnace with wide doors at either end. The door at the charging end is lifted and the pile of plates is fed into the furnace by the charging table. The door is then closed and the plates allowed to remain in the furnace until the top plate of the pile reaches a good red heat suitable for bending. The door at the drawing end of the furnace is then opened, the top plate is seized by an ordinary pair of tongs and brought up to the skelping die. The skelping tongs then take hold of the plate, the mandrel is swung into position in the skelping die and the plate is pulled through and bent into proper form with the edges overlapping. The process is analagous to that of making skelp for the tongs process of manufacturing butt weld pipe.

The skelp is then rolled over on an inclined rack to the first welding furnace, into which it is fed while still hot. The welding furnace is adapted to contain two pipe at a time. The pipe rest in gutters formed in the furnace bottom. The gutter into which the skelp is first introduced is higher than the other, so that the pipe can be easily rolled from one to the other within the furnace. The lower gutter is in line with the welding rolls and serves as a guide for the skelp when it is being pushed into the rolls.

The welding is done in rolls which have grooves cut in them to correspond with the external diameter of the pipe. A bullet-shaped mandrel is attached to a long rod extending backward from the rolls, and somewhat longer than the pipe. The mandrel is of a size corresponding to the inside diameter of the pipe, and forms the anvil against which the grooved rolls press the metal in making the weld. The mandrel is held in exact position between the rolls by the rod to which it is attached.

When the skelp is at the right welding temperature it is pushed into the welding rolls by a long rod called a "pusher." For the smaller sizes of pipe pushing is done by hand, but with the larger sizes a mechanical pusher is used. After the pipe is through the rolls the mandrel is quickly pulled out of the pipe, and the pipe is rolled over on a suitable inclined table to the second welding furnace.

The pipe is again heated to a welding temperature and passed through a second pair of welding rolls set so as to compress the metal still further. After passing through the second pair of welding rolls the pipe is put through sizing rolls and straightening rolls exactly as in the manufacture of butt weld pipe.

Lap weld pipe is ordinarily heated three times in the process of manufacture, but it does not cool down entirely between the successive heatings. Evidently the cost, both of material and manufacture, is considerable. As much as fifteen dollars' worth of material goes into a single lap weld pipe of the larger sizes. Evidently the head welder can easily spoil an amount of material equal to more than his days' wages. Consequently the highly skilled workman commands good wages.

An interesting feature of one of the newest and best equipped lap weld mills is that most of the machinery, including the rolls, charging machines and draw benches, are driven by two-phase induction motors.

Power Plant of the Weissenger-Gaulbert Apartment Building.

By H. G. BROWNELL, '86.

AT Louisville, Ky., there is now in course of erection a large fire-proof flat building which will be known as the Weissenger-Gaulbert Apartment Building. This structure is to be eight stories high and of the now common letter H plan. The first floor will be divided up into stores, doctor's offices and trunk rooms. On the floors above the first there will be fifty-nine apartments, with from two to seven rooms each. The top floor of one wing will be used for a ball room and roof garden.

It is the purpose of the owners to furnish to their tenants everything that will be conductive to comfort that can be supplied from a central source and distributed by means of pipes and wires. To do this and pay dividends on the enormous investment will require a mechanical plant in which the ordinary wastes are utilized or avoided.

It was the writer's good fortune to be selected by McDonald & Sheblessy, the architects, as one of the two consulting engineers on this plant, and it is the purpose of this article to give to the readers of THE TECHNIC an account of the plant as it will be installed next spring.

Each tenant is to be supplied with light, heat (except for cooking), ventilation, refrigeration, ice, telephone service, private dumb waiter to the basement, and hot and cold water. Besides the dumb waiter elevators there are to be two large passenger elevators in the center of the cross portion of the building.

The power plant is located across the alley to the rear of the building and is not in anywise connected to it, except by a tunnel through which the piping and wires will be carried.

The power building is long and narrow, fronts on Third Avenue Boulevard, and is divided by cross partitions into a grocery store, boiler room, engine room, freezing room for ice plant and refrigerator for storing ice, arranged in the order named. Over the grocery will be apartments for employes in the engine room. The boiler room will be open the full height of the building, about 30 feet. Over the engine room will be a shop room and room for the various heaters and the tanks and coils used in connection with the refrigerating plant. Over the rear portion of the building is a laundry for the use of the tenants.

The boilers are three in number, with room for a fourth, 72 inches by 18 feet, tubular with

4-inch tubes, and will be build according to Hartford specifications. These specifications in general terms call for 1-16 inch heavier sheets than are ordinarily used in standard boilers, and longitudinal seams must be triple rivited, butted and strapped on both sides.

These boilers will be set over Detroit Automatic Stoking Furnaces, which will allow the use of the cheapest slack coal that comes into this city. A series of trials made by the writer on similar boilers, before and after the installation of Detroit stokers showed a decrease in the cost of evaporating 1,000 pounds of water from 11½ cents to 7 cents. These trials were not made under the so much and so justly condemned "test conditions," but were made while the plant was doing its normal work and was handled by the regular employees.

The result in the plant under consideration will be, that, with boilers costing far less than water tube boilers would, a pressure of from 120 to 150 pounds can be carried, an evaporation of about 10 pounds of water from and at 212 degrees can be had with coal costing from $1.00 to $1.20 per ton, and the smoke will be cut down at least 95 per cent. The flue temperature will vary from 500 to 600 F. and the boilers can be crowded to 175-boiler horse power each, without special effort or strain.

The stack will be self-supporting, of steel, lined half way up with fire brick, and will be about 125 feet high. In the breeching will be placed an economizer, the use of which is described below.

Weissenger-Gaulbert Apartment Building, Louisville, Ky.

From the boiler room a high pressure steam header will run to the engine room, where it will enter a transverse header. The connections with the boilers are through double swing, double valved pipes. The drainage is toward extreme end away from boilers, where a large vertical pipe about two feet long will collect whatever water is not in the form of entrained vapor, and

from which it will be tapped off to the receiver for the boiler feed. All pipes leading from the steam header will be taken upwards from the pipe, then over and down to the engines and pumps. All exhausts will be collected in a header below the floor. This will be carried up to the second floor where the steam will be used for the heating plant and for heating the feed water and water for the flats.

The buildings will be wired for about 2,500 lights. The passenger elevators and eight dumb waiters and nearly all of the pumps will be operated by 110 volt electric motors. The engines and generators for supplying current for lights and motors will consist of two direct connected sets. The larger is a 17 in. by 18 in., 225 r. p. m. engine with a 125 K. W. generator, and the other a 12 in. by 15 in., 150 r. p. m. engine with a 60 K. W. generator. The speed regulation is guaranteed to be within ½% from no load to full load. The water used by the larger engine at full load is supposed to approximate 27 pounds per horse-power hour. The lighting and power circuits are separate except as they join at the main switch-board.

The heating will be done by the forced circulation of hot water in what is known as a single pipe system. The water is carried by a single pipe to the attic where it is distributed to the risers which run from cellar to attic beside each stock of radiators. The radiators are connected at their highest and lowest points to these risers through double swing fittings. This makes the radiator a sort of shunt circuit to a portion of the pipe. All the risers for each quarter of the building are assembled in the basement into a separate header in which there is a thermometer and valve. The temperature of the rooms is regulated first by the temperature of the outflowing water and finally by that of the returns. If the whole building is at the same temperature, the four returns will show equal temperatures.

This condition can be obtained by manipulating the return valves. The difference in temperature between the outflow and the return should not exceed 15 degrees or 20 degrees F.

The water is to be heated by three different methods, which may be used independently or all together. In passing from the pump it enters a surface heater which gets its steam from the exhaust header after it has passed through an oil separator. Both the water and steam may be by-passed around this heater. The water is then carried to a high pressure or live steam heater. This is located, as are all the heaters and tanks, in the second story. The water of condensation returns to the boiler by gravity. The water for heating may be by-passed around this also, and if it is desired may be passed through a stock coil or "economizer." When, therefore, there is not sufficient exhaust steam (as will be the case during the day and middle of the night in cold weather) to heat the water to the desired point, its temperature can be further raised either by live steam or by the stock gases or by both. A careful estimate seems to indicate that the saving in coal by the use of this system over what would be used by a vacuum system of steam heating will be $900 to $1,100 a year.

From the low pressure heater the remaining exhaust, if there be any, is carried to a feed water heater of the closed, surface heating type, and whatever is left over from this escapes by an open, full-sized pipe to the exhaust head. The whole low pressure system is of the full cross section of the exhaust header and open to the air through the exhaust head. There can therefore be no back pressure on the engines and yet all of the latent heat the steam contains, or as much of it as is needed, can be used for house or feed water heating or both.

The feed water is taken from a receiver into which all drips free from oil and the condensation from the low pressure heaters, drain. It is pumped by an automatic electric pump first through a surface heater which takes the exhaust from the generator coils of the ice machine (absorption type) on the floor below. This cools the exhaust which is afterwards used for filling the freezing tanks, and heats the boiler feed water, thus accomplishing two purposes. Both the steam and feed water may be by-passed.

The feed water then goes to the exhaust heater mentioned in connection with the heating system, and from there to the economizer and may be used for either the boiler feed or for the heating water, by means of by-passes.

The manner in which these various auxiliary heaters will be used will depend upon the outside temperature, the engine load and the ice-machine load. The live steam heater will be used as little as possible. On a very cold day the exhaust will all be used for heating. The temperature of the condensation will be nearly 200 degrees F. No ice will be made and no exhaust will be available for heating the feed water the remaining 12 degrees. It will be more economical to run the heating water through the economizer than to pass the feed water through it. In the summer, when the boiler feed is taken from the hydrant and ice is being made, the cold water will serve a good purpose in condensing the exhaust from the ice machine generator. It will then be raised to 208 degrees or 210 degrees in the exhaust heater and as much higher as is possible in the economizer. The temperature of the flue gases about the latter will range from 500 degress to 600 degrees F., and the water will spend 20 to 30 minutes passing through it.

For the hot and cold water circulation, two tanks of about 1,000 gallons capacity each will be used. Into one, cold water will be forced by an automatic electric pump, against air pressure. This pressure will be maintained by the compresser used in connection with the ice machine.

The two tanks are connected by a header from which the cold water supply is taken. The second tank is supplied with brass coils through which either live or exhaust steam may be passed. The hot water is taken directly to the attic from where it is distributed to the risers for the various bath rooms and kitchens. The lower ends of these risers are assembled and the water is returned to the tank. A circulation will thus be maintained and hot water will be at each tap continuously.

The ventilation of the flats will be accomplished by exhausting the air from the kitchens by means of direct motor-driven fans located in the attic or in houses on the roof.

In each kitchen there will be a refrigerator from four to eight cubic feet in volume, which will be cooled by brine circulated at a temperature of 20 degrees F. In the upper compartment of each refrigerator will be a minature freezing tank in which 12 pounds of ice may be made daily.

Briefly the features of the plant are: The economical production of steam from a comparatively cheap boiler plant (¼ cent per boiler h. p. hour); the use of waste heat from engine and machine exhausts and stock gases for heating of all sorts; the use of electricity for all pumps (except auxiliaries and deep wells), ventilating fans and elevators, instead of wasteful steam pumps and engines, and the furnishing of what are commonly considered luxuries to nearly sixty families at a lower cost than it can be done for in any other apartment house in the country.

ALUMNI NOTES.

Herbert F. Madison, 1900, who is connected with the U. S. Steel Car Co., at Youngstown, O., was in town for a couple of days the latter part of January.

Edward G. Waters, Class of '88, was in Terre Haute during the holidays to see his family before leaving for England. He will be with the British Thompson-Houston, at Rugby. He and Mrs. Waters sailed early in January and expect to remain in England for at least two years.

William F. Freudenreich, '98, has been taken into partnership by Mr. T. Hart Anderson, attorney-at-law and solicitor of patents, of Boston, Mass. The firm's name is Anderson & Freudenreich, Tremont Building. Since his graduation from Rose, Mr. Freudenreich has been employed in the Patent Office at Washington as examiner of patents and has received the degree of LL. B. from the National University.

J. M. Van Auken, '96, is engineer of the Elkhart Bridge Co., at Elkhart, Ind.

CONTINUED ON PAGE 120.

The Manufacture of Blasting Powder.

By HUBERT PARR, '05.

IN the manufacture of blasting and gunpowder one of the most important factors is a favorable location. An ideal site is found in a small valley about half a mile long and two or three hundred yards wide, with many smaller hollows leading from each side. The powder house would be situated at the entrance of the valley, and the different mills in the smaller hollows far enough away to prevent all danger from fire. Each operation in the manufacture of powder is carried on in a different mill, and each mill is separated from the others by placing each one in a hollow by itself, or else, as is sometimes done when such a location as I have described is not available, by building high barricades around the more dangerous mills. This separation is necessary, owing to the dangerous character of the work, in order that an explosion in one mill would not extend over the entire system.

Formerly power was conveyed to the mills by shafting, but since the introduction of electricity as a motive power, it has superceded shafting in all modern mills. Besides the greatly decreased cost of installation, the use of electricity permitted the mills to be placed as far away from the boiler room as was necessary in order to prevent explosions from the sparks from the smokestack. The motor for each mill is placed in a motor-house outside of the mill, and is connected to it by a belt.

A tramway connects the mills, and the illustration shows the way the powder is handled. The wooden truck on the car is used in the mills, and is carried from mill to mill on the car. The wheels of the car are of wood and brass screws are used instead of nails in order to prevent the striking of sparks. Wooden shovels are used, and the men wear shoes without nails, for the same purpose.

Blasting powder is a mechanical mixture of sodium nitrate, sulphur and charcoal about in proportion of 70% sodium nitrate, 12% sulphur and 18% charcoal. These proportions may vary within small limits in the formulae of different manufacturers, and in most mills the exact formula used is kept a close secret. The sodium nitrate comes from Chili, by way of New York, the sulphur from Sicily and the charcoal from our own woods.

In order to obtain a good mixture, the ingredients must be in as finely divided condition as possible. The charcoal and brimstone are placed in steel cylinders containing a quantity of steel balls. The cylinders are then revolved for about twelve hours, and the balls grind the charcoal and brimstone as fine as flour. This mixture

is called composition. The nitrate is treated differently on account of its deliquescence. The nitrate is fed down a tube into a beater, which consists of a small cylinder about two by three feet, in which a shaft with steel arms on it revolves at the rate of 1400 rev. per min. These arms beat the nitrate to a powder and fan it up another tube into a closed room, where it collects on the floor and walls.

The nitrate and the composition are then taken to the wheel mills, where it is mixed in the proper quantities, with a little water, under iron wheels weighing eight tons, from an hour and a half to two hours. As this is the most dangerous operation the powder passes through, only about 350 lbs. is mixed at one time. If enough water is not added (and the amount varies with the condition of the atmosphere) the powder becomes too light and loose and allows the wheels to sink to the iron plate on which the powder is spread, and an explosion occurs. Wheel mill explosions are most frequent, and the buildings are of a rather flimsy nature. Usually the only damage that occurs is the demolishing of the structure, but sometimes an unfortunate man's powder-filled clothes are set on fire by the flash, and he is burned to death. Such accidents, happily, are not frequent, as the men do not go near these mills except when charging them.

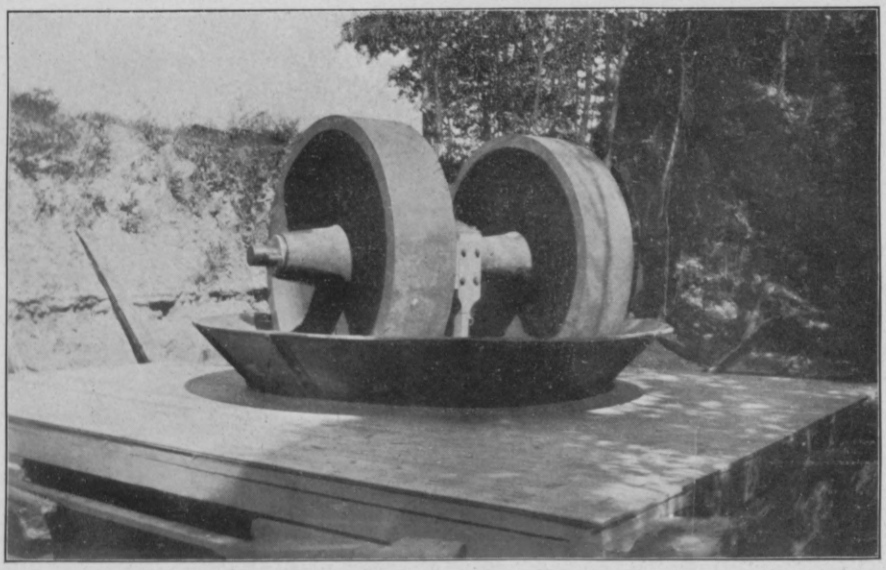
From the wheel mills the powder is taken to the press mill, where it is pressed, by means of an hydraulic press, into cakes about 18 inches square and half an inch thick. Powder to the depth of an inch is spread evenly over a steel plate, then another plate is placed over and then another layer of powder, and so on until the top of the press is reached. Five thousands pounds pressure per square inch is applied at the bottom

and the powder is pressed into cakes so hard and brittle that if dropped to the floor it flies to pieces like glass.

The cake is then taken to the corning mill where it is "corned" into grain, by passing the cakes between a pair of toothed copper rolls. This operation is also a dangerous one, and the wages paid in this mill are usually higher than for any other work. The grain varies in size from pieces the size of a grain of corn to the size of ordinary gunpowder.

The powder is now in the form in which it is used. It only needs to be dried and polished, and for this purpose a very novel method is used. The grain, as it comes from the corning mill, is dumped into wooden cylinders about five feet in diameter, and six feet long. These cylinders revolve about a shaft through the ends, and have in the sides three openings which are provided with automatic bungs that allow the steam from the powder to escape, but retain the powder. About a ton of grain is placed in each cylinder, and then it is started. The friction of the particles against one another soon generates such a heat that it is impossible to hold the grain in one's hand. The speed of the glaze barrels, as these cylinders are called, is then reduced, and the powder is kept at a certain temperature for about 18 hours, or until it is thoroughly dry. Just before the powder is taken out some plumbago is added, and a very brilliant polish is produced on the powder. This coating of plumbago also acts as a protection against the dampness of the air, which would otherwise soon ruin the powder on account of the deliquescence of the sodium nitrate.

The finished powder is then taken to the packing house, where it is separated into different sizes and then packed into kegs of 25 lbs. each.



The sizes into which the powder is separated are CC, C, F, FF, FFF and FFFF; the CC being the coarsest and FFFF the finest grade. The coarse grades are used in soft coal, where, because of its slower burning, it does not break up the coal as a more violent explosion would do. The fine grades are used in the anthracite coal and for blasting rock, where a sharp explosion is required.

As the clothes of the men who work in powder become saturated with powder dust in a very short time, it would be very dangerous for them to have such clothing around their homes, so, in

all powder plants, a building is provided in which the men wash, and change their clothing. The men do not work a certain number of hours each day, but each man has a certain amount to do, and when this is finished, he is allowed to go home. This condition is greatly enjoyed by the men, and although the work seems at a first glance to be so dangerous, yet owing to the short hours of employment, there is hardly ever a scarcity of men. Sometimes, after a fatal accident, there are a few resignations, but most of the men are fatalists, believing that a man's death occurs at a certain time, and can neither be hurried nor delayed. As a matter of fact, the rate of mortality of powder workers is not higher than that of railroad men, and very probably not so great.

The only difference in the manufacture of gunpowder from that of blasting powder, is the substitution of potassium nitrate for sodium nitrate and longer mixing under the wheels. It seems to be the general impression among writers on this subject that potassium nitrate is used exclusively for both gunpowder and blasting powder, and while this is true in England and on the continent, in this country, in all blasting powder mills, sodium nitrate is used on account of its cheapness.

MODULUS DANCE.

In spite of the many prophecies to the contrary, the "Modulus" dance was a complete success. Although they were not supported as heartily by the other classes as could be wished, they came out of it with banners flying. Ringgold's full orchestra furnished music, to which a stream of youth, beauty and fashion tripped the light fantastic. The color scheme was made in the class colors, which are red and black. Palms were plentifully supplied by willing helpers, and were decked in glorious profusion in corners and near the entrances. Many of the Alumni attended, as well as many of their friends from the city. Light refreshments were served, to which full justice was done. Dancing began about 8:30 P.M. and lasted until 12.30. Then the merry gathering broke up, and the participants wended their way home, much pleased with the evening's entertainment.

TELEGRAPH ASSOCIATION.

At a meeting of the Telegraph Association, held January 21st, the following set of rules was drawn up for the guidance of those using the line:

Any person leaving his key open when not using the line, or breaking in when some one else is telegraphing, shall be fined twenty-five cents for the first offense, and shall be cut off the line for any repetition.

For puttiug on a ground, or placing any unnecessary apparatus in the circuit, the above penalties shall apply.

In calling anyone, the call shall be given three times, and then the caller shall sign.

For cutting out an instrument the key shall never be opened, but a jumper shall be put on.

For practice, the key should be cut out of circuit so as not to interfere with the use of the line by other members.

Several of the following notes have been gleaned from the Class Letter No. 7, of the Class of '96:

Wm. E. Burk, '96, has been appointed a member of the Kentucky Mineral Commission for the St. Louis Exposition next year.

Robert W. Beebe, '96, who for a while was manager of the Motor Truck and Vehicle Co., of Columbus, O., is now with the Westinghouse Electric Manufacturing Co., of Pittsburg, Pa.

Clarence M. Ridgby, '96, has returned to the Litchfield Foundry and Machine Co., of Litchfield, Ill., as mechanical engineer.

We all wish to congratulate Mr. McMeans, '96, upon the arrival of a young lady—a very young lady—at his home. She came December 18, 1902.

R. P. I. A. A.

THE monthly meeting of the Athletic Association was held on January 14th.

The question concerning 'R's' being brought up, it was decided that the official 'R' of the school be given to any one who had, in one season, played in five (5) games of foot ball, base ball, or basket ball; or who has won the equivalent in points to one second place in the state field meet, at one meet; or the equivalent in points to one first place, one second place, and one third place, in a dual athletic meet, at one meet; or a first place in the state tennis tournament; the above being dated to go into effect from January 6th of the current year.

The motion was also voted on, and carried, that no one should be allowed to wear an R.—R. P. I.—Rose, or any symbol, or letter, awarded by the Athletic Association for honors in athletics, on caps, sweaters, gymnasium shirts, or any wearing apparel, except those who have been, or will be allowed to do so by the Athletic Association.

EMBLEMS.

If we wish Rose to occupy any better standing in athletics, we must respect the emblem given by her to all who have proven themselves worthy of it, and have won the right to wear it through being a member of one of the school teams, or representing her in some way worthy of receiving such an honor.

The practice of wearing an 'R' has become entirely too common. Any one, who chooses to do so, can wear an 'R,' whether he won it or not seeming to make no difference, by simply taking the trouble of sewing it on his cap.

There is no stronger inducement that can be offered by a school, which influences an athlete so much, as the right to wear the school monogram, and if that can be obtained without exertion, why what is the use of working for it?

MORE PRACTICE.

In looking over the old files of THE TECHNIC we happened upon the following, which, to us, seems to be the key note to about all our troubles in the athletic line:

A team to win must have practice—regular practice—systematic practice—and the man who fails to report for it, even once unexcusably, though he be the best man on the team, should be taken off. The team must have the support of the school, and to give this, the school must be kept interested in the various teams.

PURDUE, 42; I. S. N., 12.

On the night of January 24th, Purdue met our old rivals, the Normals, in a game of basket ball, and defeated them by the score of 42 to 12. Considering that this game took place in the Normal gym, on home grounds, it would seem as if Rose had a very good chance against the

Normals, for while the score of Rose against Purdue was almost the same as that of the Normals against the same team, still, the Normal team had the advantage of position, while Rose had to play away from home and in a strange gymnasium.

NEW ATHLETIC INSTRUCTOR.

The athletic directors at their last meeting elected Mr. G. A. Kelsall, '06, as athletic instructor, to take the place made vacant through the resignation of Mr. Crawford.

Mr. Kelsall has had several years training at the Louisville Y. M. C. A., and is fully qualified to properly fill the position. He has full charge of the gymnasium and its apparatus, and students are expected to follow all the rules which he may make in regard to the use and abuse of the gym. and its contents.

BASE BALL COACH.

We are glad to state that, at a recent meeting of the Athletic Association, it was formally decided to enlist the services of a coach for the base ball team. Accordingly, Mr. Walters, who played a star second base and who was also captain and manager of the Terre Haute team for the last two years, was secured for the months of February and March. Mr. Walters will instruct the base ball squad in the gymnasium during the cold weather, working out the pitchers and new material generally, besides giving the whole team the benefit of his experience and advice.

But there is no use in having a coach if strict attention is not paid to everything he advises and directs, and the quicker we realize the fact the better it will be for the team, and the better chance we will have of winning the majority of games played. Manager Regan is working hard to give us a good schedule, and we should show our appreciation of the fact by winning as many games as possible.

In former years Rose more than once held the championship of the state in base ball, and, with the prospects and advantages we have this year, there is no reason why we should not do as well now as then.

FIELD MEET.

Now that the winter term is well under way, it would be well for us to begin practicing for field day, and nothing would help us so much in that respect as an indoor field meet. It would not only point out to us our good men, but would show us where we are weakest, besides giving us plenty of time in which to correct our faults.

On May 16th, Earlham College, at Richmond, will hold a field meet in which Earlham, Wabash, Franklin, Hanover and Rose will participate. Now, there is no reason why Rose should not win this meet, as all the colleges entered are in the same class, so far as athletics are concerned, and all of them are laboring under practically the same disadvantages. The only thing necessary for us to do is to buckle down to hard work at once, and stick to it.

There are plenty of good men in the school, and also others who only require a little coaching to blossom out into first-class men. The prize ought surely to be worth the effort, and if we should win, there would be nothing too good for the team when they return.

BASE BALL OUTLOOK.

As foot ball is over, and the basket ball season of the year 1903 rapidly becoming a thing of the past, it would be wise for us to look forward to our prospects in base ball, and see just how we stand.

From last year's team we have left Daily, Kellogg, Reed, Randall, Cox, Stoddard, Braman, Bowsher, Fitzpatrick, Bland. It surely would seem that with such a foundation we ought to have a team that will be hard to beat. It is true that we lost several of our best and most valuable men, whose places it would ordinarily be hard to fill, but with a Freshmen class numbering over 80 men, these places ought to be satisfactorily filled. There are a good many Freshmen who have already signified their intention

of trying for the team, and, judging from the playing of some of them in the pipe rush game, they ought to give the old men a rush for each and every position on the team.

Among the most prominent Freshmen who have shown up so far are the following: Demmit, Milner, Freudenreich, Baylor, Thurman, Cadden, A. W. Lee. Most of these fellows have played before on some regular team, and under the instruction of a coach ought to make players hard to beat.

There are also many Upper Class men who will come out and make things lively for all those who held permanent positions on the team last year, and who are trying again for the same places. These are McBride, Tipton, Bowie, Greenleaf, Cushman, Hanley, Barbazette, Sharp, Heick, Kadel, H. Smith, Everson, Toner, Crain.

PURDUE 46, ROSE 15.

On January 17th, the Rose basket ball team went to Lafayette, Ind., to play Purdue University. The game was played in the Purdue gymnasium, and resulted in a decided victory for "Long John" Miller, assisted by the Purdue team. Rose played its best game in the first half, and at the intermission had scored 12 points against 25 for Purdue. In the second half, Purdue made a whirlwind finish, scoring 21 points, while Rose could only add 3 points more to her credit.

"Long John" Miller is not the whole Purdue team, but he is a very important factor of it. He plays center, and his ability to throw goals is little short of marvelous. He threw eleven field goals for his team during the game. Knapp and Peck also played good ball.

The *Purdue Exponent*, in commenting on the game, says: "The game was a rough and tumble affair. The Poly boys put up a fast and untiring game, and kept pegging away until the end. However, they were never in the chase. They were outweighed, and were comparatively small in stature, seeming very much like a set of boys. The game put up by our men in the first half was not of the best, frequent fouling taking place. The Rose man who threw goals from fouls was steadier than Long John.

The second half opened with a rush, and improvement was noticeable in our boys' team work.

By careful playing, the Rose men were allowed but three points during the second half, which came from a foul and a field goal. The final score of 46 to 15 tells the story itself."

TRACK TEAM MANAGER.

The Athletic Directors have appointed Mr. Chas. C. McCormick, '04, as manager of the 1903 track team. In doing this they certainly did the right thing, as Mr. McCormick is skilled in all the fine points of the game, and has had a great deal of experience along that line. Only let the school come out and support him with their best efforts, and we will have a track team to be proud of. "Mac" is a hustler and deserves to succeed.

GYM. TO BE PAINTED.

Owing to base ball practice being held indoors, it has been decided to paint the inside of the gym., either with white or gray paint, in order that the players may more easily see the base balls when they are batted or thrown around. This will also improve the appearance of the gym, besides covering over many bare spots. Good work. Keep it up.

EVANSVILLE Y. M. C. A. 11, ROSE 34.

On January 31st, the Poly basket ball team played the Y. M. C. A. team from Evansville, at the Poly gym. The game was a rough one from start to finish, with honors about even, as each side had practically the same number of fouls called. At the start of the game it looked as if we would have a hard fight to win, but the superior team work and goal throwing of our team soon made itself so evident that the result of the game was from that moment never in doubt. With such an enthusiastic crowd, and with such rooting, how could the team help but win?

The game opened with a rush. An Evansville man threw a basket, but this only seemed to stir our fellows up, and they soon equaled it and then

passed it by throwing a field goal and a foul. By that time our team had struck its gait, and from then on the ball continued to drop into our opponents' basket with pleasing monotony. At the end of the first half the score stood, Rose 14, Evansville 6. Evansville started out as if refreshed by the intermission, but our fellows soon ran them off their feet, and then we had everything our own way. Hadley Cox was the bright star of the game, throwing eight field goals from all parts of the floor. Fitzpatrick, however, held up his reputation as a sure man for fouls, (no insinuation), as he threw 12 goals out of 20 chances.

Taken as a whole, the team displayed fine team work and judgment in passing the ball, and deserve great credit for the game they put up.

The complete score follows:

EVANSVILLE Y. M. C. A.

	FIRST HALF.			SECOND HALF.		
Name	Fouls	Foul Goals	Field Goals	Fouls	Foul Goals	Field Goals
Ford, l. f.,	3	2	1	0	2	0
Fehm, r. f.,	1	0	1	3	0	1
Darby, c.,	0	0	0	5	1	0
Buttriss, l. g.,	2	0	0	0	0	0
Neidnagle, Ritz, r. g.,	2	0	0	4	0	0
Totals,	8	2	2	12	3	1

ROSE.

	FIRST HALF.			SECOND HALF.		
Name	Fouls	Foul Goals	Field Goals	Fouls	Foul Goals	Field Goals
I. J. Cox, l. f.,	0	0	0	0	0	2
N. H. Cox, r. f.,	2	0	4	3	0	4
Daily, c.,	2	0	1	3	0	0
Fitzpatrick, l. g.	0	4	0	3	8	0
Barbazette, r. g.,	4	0	0	1	0	0
Totals,	8	4	5	10	8	6

Y. M. C. A. 26; ROSE 19.

On February 6th, the Poly Basket Ball team played the team from the city Y. M. C. A. at the latter's gym., and were defeated by the rather close score of 26 to 19. This came as quite a pleasant surprise to a number of people who thought that the Poly team had become demoralized through the loss of one of their best men. This comparatively slight difference in scores was undoubtedly due, in a great measure, to the rooting, which was ably assisted and abetted by a base drum and several snare drums which sounded as if they were being played by experts.

The particular star of the game was I. J. Cox, who distinguished himself by throwing thirteen goals from the foul line, besides making two baskets from the field.

But the whole team played good ball, and the only reason that they did not win was that fate was against them, as shown by several remarkable goals made by the Y. M. C. A. men from the center of the field.

The game was characterized by rough playing on both sides, and fouls were numerous, Y. M. C. A. having 22 to their credit when the game ended, against 19 on the Poly side of the score book. But this fouling was costly, as almost every foul made was converted into a goal, either by one side or the other.

The complete score was as follows:

Y. M. C. A.

	FIRST HALF.			SECOND HALF.		
Name	Fouls	Foul Goals	Field Goals	Fouls	Foul Goals	Field Goals
Thurman, l. f.,	1	0	1	5	2	0
Shikel, r. f.,	1	0	0	1	0	0
Trueblood, c.,	3	0	1	1	0	3
Connors, l. g.,	1	4	1	2	4	2
O'Bryan, r. g.,	1	0	0	6	0	0
Totals,	7	4	3	15	6	5

ROSE.

	FIRST HALF.			SECOND HALF.		
Name	Fouls	Foul Goals	Field Goals	Fouls	Foul Goals	Field Goals
N. H. Cox, r. f.,	2	0	0	6	0	0
I. J. Cox., l. f.,	2	2	2	2	11	0
Daily, c.,	2	0	1	1	0	0
Barbazette, r. g.	2	0	0	1	0	0
Williams, l. g.,	1	0	0	0	0	0
Totals,	9	2	3	10	11	0

Referee—Chas. McCormick.
Umpires—Y. M. C. A., Ira Kisner; R. P. I., Henry Gilbert.
Time of halves—20 minutes.
Score—Y. M. C. A., 26; Rose, 19.

If you come out second best,
Don't knock.
If you fall through on the test,
Don't knock.

Do what e'er you have to do,
Do your best, and when you'r through
If some one has bested you,
Don't knock.

Start out right and go ahead, but
Don't knock.
And then they'll say of you when dead,
"He didn't knock."

A real good epitaph this will be,
And when you've crossed the Styx 'twill be
"This paradise is all for thee," because
You didn't knock.

Everyone should try at athletics. It is to a school what oil is to a machine. You can't tell what you can do until you try. It may be that there are many Wefers and Sandows and Balds behind our Poly Edisons and Eads.

Biff, boom, bah,
Biff, boom, bah,
Rose Polytechnic,
Rah, rah, rah.

He said he'd shovel off the walk, but no
He left the walk just where it was, and shoveled off the snow.

There was some comment on the verse in the last issue beginning, John Smith & Co.

If Co.=Company, then why does not tho=thump any?

The athletes of Rose should not be discouraged with such a Council behind them.

Kid, to Speaker.—Say, Poly, stoop down so I can hit you with this snow-ball.

When a student says that an instructor looks like a false face on a crutch, it is evident that the student has lost respect for said instructor.

Anarchist.—Say, Professor, will you please demonstrate the theory that you tried to demonstrate yesterday?

C. McCormick.—If this money goes on accumulating interest, why it will increase.

Dr. Gray.—Mr. Rumbly, will you please light the gas? It is not much trouble for you to get up to it.

Rumbly.—I am already up there, Professor.

A tobacco cud lay on a plank
And caught dear Daddy's eye,
And when 'twas to poor Delle traced,
It made that Freshie cry.

The grade which last term 90 was,
Next term will 30 be,
Because of that unlucky cud,
Which Daddy chanced to see.

Hath's challenge to the world: "You can never name a number that I can't name one larger."

Hopkins' idea of infinity is that it is something like heaven, very vague, hard to locate definitely, and impossible for a Poly Freshman to reach.

Wanted: Something harmonious.—Delle, '06.

Ambition and industry lead to success.—Curry, '06.

There was a crowd, and there were three,
The Girl, the parlor lamp and he;
Two is company, and no doubt,
That's why the parlor lamp went out.
—*Exchange.*

Freshman.—Have you ever noticed that a man never loses his breath on a cold day?

Soph.—No. How's that?

Freshman.—Because he can always see it.

McCormick.—You can never get farther than a quadrants distance from the equator.

Warren.—Suppose you climbed the north pole?

Rah! Rah! Rah! for the Rooter's Club!

How's your vaccination?

Naughty Six has been out painting.

One month more and then—exams.

Prospects for base ball never were better.

We want local news. If you know of any, see us.

Everybody is coming out for the track team.

Hand in some new yells or songs.

Echoes from General Assembly, January 16, 1903:

Change of hour plan.—Join Science Club.—Don't hang around halls.—Get vaccinated.—You'll get your 2 per cent next term.—Senior theses will be called for about February 15.—Walters will coach our base ball team.—Janitor for gym.—Cage for base ball practice.

During a period in calculus one day last week, Prof. Hathaway could not understand why every Junior was so anxious to shake hands with Randall. When he inquired of one of the members, the reason was whispered in his ear. One of his noted smiles then gradually broke out on his countenance, for what he heard was this: "Randall was presented with a little daughter on February 1st."

Barbazette (at Purdue game):—Stop playing, fellows; didn't you hear the bell whistle?

Again has the Class of 1904 endeavored to give Professor Hathaway the merry ha, ha, and again they have been foiled. Professor had mimeographed problems which he was distributing for five cents per bunch. McFarland held out a dime and Professor promised to give him the change soon. Oglesby gave Professor two postage stamps and a penny for his papers, and all were beginning to give "Hath" the laugh, especially McFarland, when the tables were turned by Professor walking up to McFarland and giving him the stamps and penny as change.

Overheard at the Hash House:

Waitress:—Will you have an egg this morning?

Poly:—No, I don't believe I want one very bad.

Waitress:—Well, I'll try to get you a good one.

During January four of our fellows were quarantined. Fisher, '03, Cushman, 03, and Daily, '05, were together, and Bowsher, '04, was alone.

Hedges' boarding house is closed on account of sickness in the family.

Jojo:—Is there a formula for finding this value?

Soph:—Not that I know of.

Jojo:—Well, is there one you don't know of?

Tipton:—Professor, is that fraction $\frac{9}{5}$ in the book correct?

Idaho:—You've got the book wrong side up, Tip.

I have a cinch in Chemistry,
You see I'm getting wiser.
I let my girl do all the work,
For she's my Ann Eliza.
—[*Exchange.*

Hath (opening class):—The continuous variation—

Staff:—This is a continuous performance, isn't it?

On January 22, Professor McCormick lectured before the Terre Haute Science Club on "*Roulette.*" Professor might give the lecture to the Freshmen so that they could see what they were going up against if they played it.

Prof. Earhart:—In order to perform this experiment the ice must be perfectly dry.

Staff:—What do you do—dry it in an oven?

Prof.:—In order to cool the tube we put ether in it and blow air through it.

C. McCormick:—Say, Professor, how can you help getting ether in it? I thought ether was everywhere.

Lab. news:

Several of the Seniors have started their thesis work.

I. J. Cox's subject is "Camphoric Acid."

Wiedeman's is "The Preparation of Camphor from Aminodihydrocampholytic Acid."

Arnold's is on "The Hydrolysis of Maltose," and is a continuation of the thesis work done by Jumper and Flory of the Class of 1902.

The Telegraph Association now gets the current for their instruments from the Electric Company.

Don't fail to join the Rooters' Club. We publish below what some of the Athletic Directors think of the club and its object:

"The only way to produce winning teams and to overcome this much-talked of thing, 'Poly Luck' is to come out and support your teams by yelling."—H. C. Gilbert, '03.

"Every student should join and take an active interest in the Rooters' Club, which is sure to be a success. Our Alumni with their 'what Rose *has* done in athletics,' will soon have to change their tune to 'what Rose *is* doing.' Join the Rooters' Club, join the track team, and last, but by no means least—join the base ball team."—John Regan, Jr., '04.

"I believe that we are in need of more enthusiasm, and that the Rooters' Club will do much in helping to work up this enthusiasm. If all stick we ought to put out winning teams."—H. Barbazette, '04.

"We can win as in the days of old if we can get enthusiasm up to a high pitch and keep it there. The Rooters' Club can do this if all stick."—J. O. Bland, '05.

"It looks as though the old times were going to return. Join the Rooters' Club and help all you can."—F. O. Reynolds, '05.

The Freshmen have challenged the Sophs to an indoor meet to take place Feb. 21, 1903. This ought to be interesting and at the same time show what material is in the Freshman Class. We hope the Sophs will accept.

Hand in your new yells and songs. We want lots of them.

Let no Rose man ever be guilty of hissing at any decisions at basket ball games. Remember there are just two animals that hiss: the goose and the snake. And another thing which is only fair is that we should applaud good playing on the

part of our opponents by clapping our hands. When our side makes a good play, yell; when the other side is playing a clean game and makes a good play, be a true sportsman and applaud with your hands.

Wear your colors out to all games and carry a Rose pennant. Old Rose and White ought to be seen at every game.

The following touching little poem was found on the fly leaf of one of the Junior's caculus:

This primer builds brain;
You can fell it grow.
'Tis evident and plain,
A headache will soon show
—that it's growing.

Now don't mind the grind;
It is for your good.
Just think how your mind
Is absorbing brain food
—and is growing.
Plug hard and dig deep,
But be sure don't get stuck.
If your wheels begin to squeak
Charge it up to bad luck,
—for it's growing.

If desperation takes hold
Of your weary self,
And you've worked brave and bold,
Put the primer on the shelf.
Hath'll do the knowing.

"I lead a hard life," said the emery wheel.

"So do I," said the file, "I'm up against it all the time,"

"Proverty oppresses me," said the bellows. I can never blow myself."

"Quit your growling," said the saw. "You put my teeth on edge."

"I may be the village cut up," said the kitchen knife, "but I haven't the snap the steel trap has."

"What a bore," said the gimlet.

"And the seance closed with a spirit level. It was on the square.—[*Toledo Bee.*

On Feb. 4, Randall "set 'em up" to the Junior class in honor of his newly arrived daughter. The refreshments consisted of a large box of chocolates, which the happy father brought to Physics laboratory with him.

Little Son:—Papa, our garbage man is one of the best men I ever saw.

Father:—Why, my son?

Little Son:—Cause this morning, after he put our garbage in the wagon, he tried to start the mule, but the mule stood still. He whipped and whipped it, but it would not go. Finally he got down off the wagon and told the mule about Jesus and God for a long time.—[*Ex.*

There was a fellow named Brosius,
Who was extremely precocious;
He asked of the Duke,
"Let me luke in your buke,"
And received a look most ferocious.

Suspenders for college breaches, a Junior's definition of the faculty.—[*Dartmouth.*

In a restaurant. He:—Will you have a lobster?

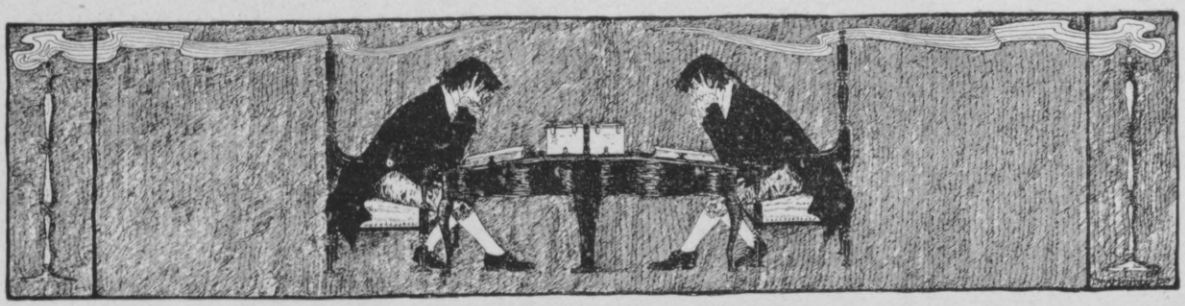
She:—Oh, John, this so sudden!

—[*Ex.*

The maiden sorrowfully milked the goat,
And pensively turned to mutter:
"I wish you would turn to milk, you brute,"
And the animal turned to butt her.

—[*Ex.*

If you can play any kind of an instrument which makes a good noise, be sure and join the Rooters' Club. The following men compose the Band Committee: Bowsher, '04; Klenck, '05; Falley, '05; and Hazard, '04. See any of these men and they will give you particulars.



REVIEWS

NOVO STEEL.

IN the new era of improvements in shop methods the central and essentially vital elements are new tool steels and electric driving machine tools. These go hand in hand, and it may be said that improved steels make motor driving necessary, and that together these factors of the present situation will revolutionize not only shop methods but design, construction and speeds of driving machine tools. As in the case of the projectile and armor plate, the projectile in this case—that is, the steel—is at present far ahead of the armor plate, represented by the machine. The new steels make new machines clatter with the heavy cuts which are now made possible. The machines must be made stronger and more rigid. The rules of the past few years in regard to motor capacity required for various machines fail, and the motors are stalled by these cuts. The motors used must be more powerful than required by the rules which were sufficient only a year or so ago. The recently developed methods of hardening steel make it necessary to begin anew in these three important directions: To increase cutting speeds, provide greater strength and rigidity in machine and supply greater power to drive them.

Blue chips are now found at the large machines in every shop pretending to be at all up to date, and in a tour of many shops recently made by a representative of this journal, "Novo" steel (Hermann Boker & Co., 101 Duane street, New York) was frequently found and praised by those who are using it. The remarks in the first paragraph on page 378 of our December number referred to this steel, and attempts will be made to secure more reliable data with regard to it. That paragraph has brought a large amount of correspondence indicating the vital interest which is taken in the subject. Additional reports of this steel indicate the possibility of speeds of 91 ft. per minute in boring Midvale tires with ⅛-in. cuts and ⅛-in. feeds. Axles are reported to have been turned at a rate of 45 ft. per minute with ⅜-in. cuts and ⅛-in. feeds. The most remarkable fact about this steel is that it may be annealed, that it machines and handles in the hoop as readily as soft annealed tool steel.

Further reports are at hand of $1\frac{1}{32}$-in. Novo steel drills running at 128 revolutions per minute and drilling 596 holes ⅝ in. deep in hard steel castings, without regrinding. Numerous other records are available and these will receive attention in these columns.

In presenting his paper upon the requirements of machine tool operation, recently read before the New York Electrical Society, Mr. Charles Day, of the engineering firm of Dodge & Day, placed Novo steel as equal if not superior to the well known Taylor White steel.—[*American Engineer.*

STARTING LARGE GAS ENGINES.

The starting of large gas engines has presented an interesting problem. A newly developed oil engine built by the Campbell Gas Engine Company, of Halifax, England, is started by high-pressure burnt gases stored in a cylinder or bottle which is charged from the gas engine cylinder through a pipe connecting the storage cylinder

with the combustion space of the engine cylinder. When an explosion takes place in the engine cylinder the pressure forces some of the burnt gases through the pipe into the storage bottle at a pressure of about 150 lbs. per square inch. A check valve holds this pressure in the bottle and its capacity is sufficient to start the engine, three or four times without recharging. The recharging, however, takes place automatically whenever the engine is running. The engine is described in *The Engineer*, of London.—[*American Engineer.*

WROUGHT-IRON ARMATURE FRAMES FOR LARGE ALTERNATORS.

According to the *Zeitschrift des Vereins Deutscher Ingenieure*, a rather interesting novelty in alternator construction has recently been put into practice by the Siemens & Halske Co., of Berlin, Germany. This consists of the use of riveted wrought-iron frames. Cast iron has been used hitherto as a material for the frames, but as alternators grew larger these narrow large ring castings gave much trouble in machining and erecting. They were heavy, and due to their shape were quite deficient in stiffness, in spite of their cored box construction. As these frames are in general purely structural elements, supporting the laminated core ring on which the armature coils are wound, the use of wrought iron or steel suggested itself as a means of reducing the weight and increasing the strength and stiffness of the frames.

As will be seen the wrought iron frame is in effect an annular box girder following closely the box-shaped section of the cast-iron frame. The frame is rivited up of plates and angles in the same manner as regular structural steel work. The method of supporting the laminated core ring should be noted. The core punchings are firmly bolted between two rings of angle and plate and the whole core ring is then hung in the main frame by bolts with double nuts, so that it can be accurately centered and adjusted.—[*American Electrician.*

THE ACTION OF IRON AND STEEL UNDER DIFFERENT DEGREES OF HEAT.

Editor American Machinist:

It appears to me that John Coffin's experiments shown at the meeting of the American Society of Mechanical Engineers held in Philadelphia in 1887, foreshadowed what causes the peculiar action which took place in the twisted bars made in the Alabama Students' experiments, published on page 1849 of last year.

What Mr. Coffin discovered was, that when a bar was heated quite hot and allowed to cool, there was a time before it reached a low red that it for a brief interval of time got perceptibly hotter and softer. Some of his experiments were as follows:

⅝-inch square bar of steel about 3 feet long was heated in the reverberatory furnace, then removed and the two ends rested on two bricks as a support, when the bar remained straight until it cooled down to a certain temperature until, of a sudden, it dropped down in the middle. Another bar was heated for a considerable distance, one end being quite hot and the other cold; this, when held in the dark, showed a bright spot, evidently hotter near the end than at a short distance below, and, as the bar cooled, this bright spot traveled down until it passed off at the end. Another experiment was with the long ⅝-inch bar. It was fitted in a screw clamp, in which the screw came against the end of the bar. When the heated bar was rested in the clamp the screw was brought up against the end, and as the bar cooled the shrinkage was followed up, when, all at once, the bar ceased to shrink, but expanded and caught the screw and doubled up by its own expansion. Keep, in his experiments with cast-iron test pieces, found the same thing occured. Coffin's experiments were with low carbon steel, and my remembrance is that he thought it was only in steel that it took place, though the indications now are that it is the same with iron in all forms.

It is likely that in the case of the bars tested at the Alabama Polytechnic Institute they began to twist the most at the two soft spots, and when once started the action of twisting increased the heat and thus increased the freedom with which the bar would twist If this is the true explanation for the twisted bars, it explains the others.

JOHN E. SWEET.

Syracuse, N. Y.—[*American Machinist.*

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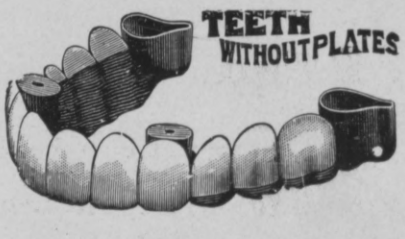

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