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THE TECHNIC.

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NOTICE TO SUBSCRIBERS.

Hereafter we shall follow the general rule regarding subscriptions, and shall continue sending THE TECHNIC to subscribers until notified to discontinue.

WITH the closing of the Institute, the mission and duties of THE TECHNIC practically cease for a time. The members of the Institute, those history makers of the day, have turned homeward to enjoy rest or work of a new character, contenting themselves with relating the incidents which in part constitute the history with which they are concerned.

In putting upon file this the last number of volume six, it is with a certain amount of mingled pleasure and regret that we lay down the work of the just completed year. Pleasure in that we may hereafter enjoy the pages of THE TECHNIC as coming from better and more efficient hands, regret in that we have not always made the best of opportunities, and have left undone a good many things that might have been done. Also a great many things occur to mind that would have been better left unsaid. It is with the greatest pleasure that we extend our most sincere thanks to both subscribers and contributors for their aid in making THE TECHNIC a possibility. We greatly appreciate the support we have received from the faculty, the alumni and the students, as well as from those who have made use of our advertising columns, and we hope that during the coming year THE TECHNIC will find in everyone the interest and sympathy which has been manifested thus far.

We now take pleasure in introducing the members of the new editorial staff who will take charge of the work next year, and we trust their efforts may be accompanied by that encouragement and assistance which has made our task the easier. From the fact that three of the present board go out with the graduating class of '97, and one other has resigned, the new board will contain almost a majority of new members when the list is completed. There still remain two vacancies which will be filled at an election early next fall. The result of the election recently held is as follows:

A. C. EASTWOOD . . . . . Editor-in-Chief
T. D. WITHERSPOON, JR . . . . . Assistant Editor
W. D. CREBS . . . . . Alumni
H. B. STILZ . . . . . Athletics
T. D. WITHERSPOON, JR, J. J. McLELLAN . . . . . Local
E. CALVERT . . . . . Exchange
J. M. LANSDEN, JR . . . . . Artist
H. C. SCHWABLE . . . . . Business Manager
———— . . . . . Assistant

It is unnecessary to say here that Mr. Eastwood is fully capable of filling in every way his position as editor. To the students at least his literary and business abilities are well known, and from the very satisfactory way in which he conducted the '98 Modulus work the future prosperity of THE TECHNIC is assured. We wish him and his associates the greatest success.

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THE TECHNIC again enjoys the opportunity of joining his many friends in extending congratulations to Col. Richard W. Thompson, pres-

ident of the Board of Managers, on having safely passed another year of comparative good health and prosperity. On the 9th inst. he celebrated his eighty-eighth anniversary by receiving his friends at his home in this city. Those who were fortunate enough on the morning of commencement to hear his address to the young men who had just graduated, were able to see what great interest he takes in the success of the Institute and of those who go out from it. As he proceeded in his talk, his voice gradually assumed its old time ring, and the words he spoke together with the expression and emotion he put into them proclaim him still the "old man eloquent." It is the wish of the TECHNIC that he may yet enjoy many pleasant birthdays.

* * *

THE MODULUS, the annual issued by the the class of '98, is the greatest success in the line of college annuals that has ever been sent out. The book is a work of art throughout and the men who were foremost in seeing it through deserve the greatest credit. As compared with the '96 Modulus it is not so much a literary production, but what literary work it contains is the very best. As far as the illustrations are concerned they are the finest collection that any college annual has dared venture. It becomes at times severe in the remarks concerning both faculty and students, but they are always of such a nature as to be harmless, and to cause no feeling of offense. Many are the scenes chronicled and illustrated which bring to mind those remembrances which are dear to every college man, and which would slip from him if not related as they happened, and if not bound up between covers to which he can often refer. The Modulus is a souvenir of the school which may be appreciated almost as much by friends of the Institute as by the students themselves. That an annual is possible in such an institution as Rose Polytechnic has been proven more than once, and although it has come out not oftener than once in two years thus far, it is hoped that every Junior class may have the confidence in themselves to tackle the work. If the class of '99 make such an effort, we wish them success in every way.

* * *

THROUGH the kindness of Dr. Gray we are able to give the following report:

The American Society of Mechanical Engineers held its spring meeting from May 25th to 28th at Hartford, Conn., and was presided over by Mr. Worcester R. Warner of Cleveland, Ohio. There was a large attendance of members and the meeting proved highly successful. Hartford contains several manufacturing establishments of world-wide reputation, and the invitation to visit these was very generally taken advantage of by the visitors. Among these establishments may be mentioned the Pope Manufacturing Co.'s bicycle works, the Motor Carriage Works, Hartford Rubber Works, the Pope Tube Works, the Pratt & Whitney Machine Co.'s Works, the armory and works of the Colt Fire Arms Co., the Billings & Spencer Drop Forging Co., etc. Besides visits to these and other manufacturing establishments, an excursion by boat down the Connecticut River was provided by Mr. John H. Hall, of the Colt Fire Arms Co., to the quarries at Portland, and returning from there by train to visit among other things the power station at New Britain of the New York, New Haven & Hartford third rail electric road from New Britain to Hartford, and to complete the trip by a ride to Hartford on this road. As an illustration of the speed attainable on this road, one of the excursion cars made the trip of ten miles in as many minutes.

A general reception was tendered the Society by Trinity College and was a very enjoyable entertainment.

The programme of professional papers for the meeting was as follows:

JONES, FORREST R.: Diagrams for Relative Strength of Gear Teeth.

COLE, F. J.: Experiments in Boiler Bracing.

WOOD, DE VOLSON: Adiabatics.

BEDELL, FRED'K A.: New Form of Transmission Dynamometer.

HALE, R. S.: Fuel Gas Analysis in Boiler Tests.

BENJAMIN, CHAS. H.: Electricity versus Shafting in the Machine Shop.

JACKSON, D. C.: Electrical Power Equipment for General Factory Purposes.

SCHUMANN, FRANCIS: Volumnar Contraction of Cast-Iron.

ALDRICH, W. S.: On Rating Electrical Power Plants upon the Heat-Unit Standard.

RICE, A. L.: The Laws of Cylinder Condensation.

HILL, H. A.: Tests of Sulzer Engines.

LANE, H. M.: Method of Accounting to Determine Shop Cost and Selling Price.

BARR, JOHN H.: Current Practice in Engine Proportions.

GRAY, THOS.: A Continuous Steam Engine Indicator.

MANSFIELD, A. K.: The Best Load for Compound Steam Engine.

HENNINGS, GUS C.: A Pocket Recorder for Tests of Materials.

HENNING, GUS C.: A Mirror Extensimeter.

GRAY, THOMAS: The Effect of Alternate Positive and Negative Stresses in Iron and Steel.

GRAY, THOMAS: The Yield Point in Iron and Steel.

JACOBUS, D. S.: An Apparatus for Accurately Measuring Pressures of Ten Thousand Pounds per Square Inch and over.

JACOBUS, D. S.: Tests to Show the Influence of Moisture in Steam on the Economy of a Steam Turbine.

TOPICAL DISCUSSIONS.

Armstrong, Mack, Hutton, Hunt, Sweet, Henning.

A lecture illustrated by lantern slides was delivered before the Society by Dr. Waldo Leonard on the History and Devopment of the Bicycle in which many interesting features of the growth of this industry were brought out.

THESIS ABSTRACTS.

AS READ BEFORE COMMENCEMENT.

STUDY OF THE FRICTION OF JOURNAL BEARINGS OF VARIOUS MATERIALS UNDER DIFFERENT CONDITIONS.

HERMAN S. HEICHERT AND EDMUND FRANK.

The purpose of machinery is to transform the natural energies at our disposal into special forms of work. This conversion of energy may be accomplished by quite a number of methods but in any case during the transformation some of the energy is wasted, at least as far as the special form of energy required is concerned. A desire for the most economical transformation of energy leads us to enquire where and why these leaks occur and to devise some means of preventing them entirely or reducing them to a minimum. One of the most common of these losses is that due to friction, which is found in every machine from the simplest to the most complex, and requiring power varying from almost nothing to fifty or sixty per cent. of the power supplied to the machine supposing it to be working most advantageously. In almost every case this waste is a complete loss and represents just so many dollars paid out for which no return is obtained.

This energy lost by friction appears at the rubbing surfaces in the form of heat and is radiated directly into the air or transmitted to other parts of the machine or near by objects from which it is finally given to the air. We can trace back this energy appearing here in the form of heat from the machine to the engine then to the boilers and finally to the fuel used in the furnaces. Therefore a reduction in the total amount of friction in any machine reduces the heat radiated by that machine and consequently wasted, thus reducing the quantity of fuel used and therefore the expense of operating the machine. In some cases, however, this loss of heat through friction is not to be reckoned a total loss since it helps to keep the air in the room occupied by the ma-

chines and those who operate them at a comfortable temperature. Other items to be considered are cost of oil for lubricating those parts of the machine where friction occurs and the deterioration of the machine on account of excessive wearing of the bearings.

Early scientists were aware of the loss due to friction and set about to discover some of the laws pertaining to it and they ascertained that the amount of friction varied almost directly as the pressure between the rubbing surfaces up to a certain limit, also that the amount of friction depends upon the condition of the surfaces in contact and upon the materials composing the rubbing bodies. A verification of these few facts would require but a limited number of experiments, but the ascertaining of what combination of metals would be most economical to use under various conditions of speed and load would require quite a series of experiments upon a number of different metals. Lubrication was, of course, known to affect the amount of friction, and since the introduction of the numerous products of petroleum for this purpose, the number of experiments required to determine conclusively the most economical combination of metals and oil to use in any particular case has been multiplied indefinitely. With a solution of a few of these problems as an end in view the Gray Journal Testing Machine was designed by Dr. Gray, and constructed in the Polytechnic shops, and constituted the apparatus used in working up our thesis.

The theory of the machine is quite simple. A cylindrical shaft is made to rotate between two bearings which just fit it. A huge pair of pinchers grips these bearings, pressing them tightly against the shaft. Now when the shaft is rotating, friction between the journal and bearings causes the bearings and pinchers to have a tendency to rotate together with the shaft around one common axis, the center line of the shaft.

The series of pressure levers is supported on two knife-edges in line with the center line of the shaft, so that they offer no resistance to turning. This tendency to rotate is counterbalanced by suitable weights hung on the ends of arms perpendicular to the direction of the shaft and its moment measured. This quantity, together with the known pressure on the journal, furnishes sufficient data for the calculation of the coefficient of friction or the ratio between the tangential and normal forces acting at any part of the rubbing surfaces.

The number of metals and oils upon which tests were made by us, was of necessity quite limited, since each was taken through quite a variety of tests. However, we succeeded in verifying a few of the laws already established, and obtained results, which taken together with those which will be obtained by the machine in the future, may prove to be of some value.

DAMS: THEIR CONSTRUCTION AND FAILURE.

J. DAVID INGLE, JR.

As everybody knows fairly well what a dam is it would seem rather useless to attempt a definition of one, but we will try it to see how nearly our ideas may agree.

In the broadest sense a dam is any structure that has been raised to store up water, or to raise the level of water so that its sudden drop when it goes over the dam, may be utilized for power.

At first glance it might seem that to build a dam would be the simplest of all engineering feats, and as far as heaping up a pile of earth to hold back a millpond is concerned, there really is nothing of any especial difficulty about it if care is taken as to where the earth is placed and if the right kind of earth is used, properly spread out and rammed down. If a few simple precautions

like these are observed a very respectable mill dam should be the result, and yet more lives have been lost, and more property has been destroyed through failure to observe these same precautions than probably through any other kind of carelessness and ignorance.

As an example may be taken the terrible flood that overwhelmed Johnstown, Penn., in June 1889, when so many hundreds of people lost their lives, and such fearful disaster was wrought. This all occurred through failure of one of these earth dams, built of clay and gravel, nothing else. This one was a very large dam, being 80 feet high and something like 800 feet long, but the construction was, and should have been, similar to that of a small mill dam.

It was well built, and really was perfectly capable of standing much more than all the pressure than the reservoir full of water could possibly have created. As long as the water did not rise above the top of the dam, it was perfectly safe, but the water rose higher than that and began to overflow. Now, a little reflection shows plainly that if water were allowed to fall from a height of 80 feet, and should strike clay and gravel, or anything of that kind, it would most certainly wash it out. It would have the same effect as would turning the fire hose on a bed of gravel and clay. Further reflection would show that at some time, when a great rainstorm came, this reservoir would fill clear to the brim, and would then overflow the top of the dam; then would come this fall of 80 feet, and the foot of the dam, composed of clay and gravel, would most certainly be washed out. The way to prevent this almost certain result is to have some other way of escape for the water, by cutting a trench or wasteway, with its bottom about eight or ten feet lower than the top of the dam, in some other part of the reservoir, so that the falling water should not wash the lower side of the dam.

In the case of the Johnstown dam this trench had been cut, and the water would have gone out that way, but through some one's carelessness, the wasteway had been obstructed by fish traps and logs, etc., and the water could not get out as fast as it flowed into the pond. Therefore it rose and began to pour over the top of the dam, more and more, till it washed out the foot of the dam, which, becoming thus weakened, gave way, and a torrent of water tore down the valley toward Johnstown. Hundreds of lives were lost, all probably due to the fault of the man who did not take care of the escape way of the dam. Of course this was no fault of the man who originally built the dam, but that is a fair sample of the way a large percentage of dams fail, by having an inadequate escape way for waste and flood water. High dams, built of stone or masonry, are very generally built so that the water may flow over the top. These dams are unusually massive in construction, and their down stream side is curved in such a manner that the water hasn't a sheer fall of the height of the dam but rather flows down the surface and drops in a cushion of water instead of on the foundation of the dam. In fact, most dams that were built for power, are built as overflow dams, so that the force of fall of the water may be utilized to the fullest extent. A splendid example of this style of dam, is one over the Colorado river at Austin, Texas. It is 66 feet high and 1,275 feet long. The dam furnishes about 14,600 H. P. to the city and cost $465,000.

The largest dam in the world is the Tama dam, built for the Bombay water supply in India. It is built of masonry throughout and is 118 feet high. Its total length is 9,350 feet, almost two miles and it cost about $2,500,000.

The highest dam I found any record of is the New Croton dam near New York, it is 248 feet at its highest point, and is 2,180 feet long.

The materials of which dams are built, varies widely; the surroundings, the proposed height, the material available in the neighborhood, the bank account of the projectors, the kind of foundation that will have to be used; all these go to determine the composition.

If there is a solid rock foundation that can be used, then it is the proper thing to put in a masonry dam, especially if it is a very high one. If this would cost too much, then a dam built of loose rock, and having some material on the water

side that is water tight, would be the proper thing to build. The kind that never should be built on a rock foundation is an earth dam, and on the other hand, a stone dam should never be built on earth, or on any substance but solid rock. The idea is to build the dam of the same material as the foundation, so that the joint at the foundation shall be as near like the material as possible.

But earth and stone are not the only materials we can use. A great many dams are built of timber, and they are excellent dams. Most of them are built of a framework of heavy timber, and this framework is filled in everywhere with broken stone and loose rock. Dams built this way are only good as long as the timber remains good, when it rots a new dam must be built. Most of the small mill dams in running streams are built that way. Some of the most primitive dams for this purpose were built by throwing a lot of brush and logs into a stream and piling sand against it, the water gradually washes the sand into the cracks and crannies and it makes a very fair dam.

Earth dams are usually built of the materials I mentioned before, that is, clay and gravel, sand is also added, and a proper mixture of the three makes the ideal embankment, although there have been many dams built of clay alone, that stood well enough and some are even built of sand alone, and serve their purpose admirably.

When they are built of clay and gravel, they are generally built in more or less horizontal layers. About 8 inches of clay is put down, then the same thickness of gravel which is worked into the clay by spading and rolling, then another layer of clay is put down and so on alternately. As a matter of fact very few earth dams have ever failed through the faults of construction or material in the embankment itself, the trouble generally comes from an insufficient escape way or through pipes which have been laid through the embankment improperly, or because the water leaks between the dam itself and its foundation.

Water likes to creep along a smooth surface, and when it strikes anything as nice as the smooth outside of a tile or an iron pipe, it continues to do this, getting a larger and larger space around the pipe, this soon becomes a torrent becoming larger and larger and another dam failure is recorded.

These pipes are generally laid in the first place for a water supply to some town, and are put near the bottom of the dam so that they will never be above water. The proper way to guard against this form of break is easily seen. The pipes should not be put through the dam at all, all engineers regard it as very poor practice. If they cannot be put anywhere else, however, they should be put through a tunnel of brick or masonry, and this tunnel should be very rough and jagged around its outside so that that the water cannot creep along it. The only way to guard against failure by water creeping through the foundation is to put in a wall of masonry or some impervious material and run this down into the valley till it strikes rock or something equally as good. Masonry dams generally fail from much the same troubles that earth dams, like other earthly things, seem heir to, but masonry dams also fail very often from lack of good construction. Sometimes they are not built thick enough, sometimes the mortar used is not good and sometimes somebody tries to build them on some other foundation than solid rock, with a usually fatal result. Occasionally an earthquake tries its hand at laying out a masonry dam, and it invariably succeeds.

Of the various kinds of dams that failed one of the greatest of American engineers has said that for every one earth dam that has failed in the last fifty years, there have collapsed four masonry dams and ten wooden dams washed away, so that in spite of the Johnstown failure, and numerous others of the same kind, it would seem that the safest dam is the one that is properly constructed out of good substantial clay and gravel. Of late years the use of electric machinery and the electric transmission of power has come to be so important. Many dams have been built for purpose of obtaining the water power, and more are being built every year. In this part of the country where there are no steep mountain streams, dams for that purpose are not possible, but in the mountain regions people are beginning to appre-

ciate that the water is quite willing to do their work for them if they simply cage it with a dam, and for that reason it would seem that there is quite a future for the builder of dams.

ELECTRICITY DIRECT FROM CARBON.

JOHN H. HELLWEG, JR., AND JAY H. HALL.

Over 95 per cent. of the power used in the varied industries of the United States is obtained from coal. Even the immense power which might be obtained from the whole of Niagara Falls would be but a small fraction of the total amount used. The sources of power other than coal and water are almost too insignificant to be considered. Primary batteries are only used to the small extent of ringing electric bells, working telegraph sounders, exploding mines, etc. Secondary batteries or storage cells are merely conveniences to store electricity until needed. They are not true sources of power. Thermo piles have been constructed to furnish a considerable quantity of electricity. The cost of their construction, however, is so great, their durability so questionable, and their efficiency so small, that they have been thrown aside as practically worthless. Gas and oil engines, while apparently common, do not furnish enough power to effect the entire amount.

The great source of power then is coal, and as the energy of coal must be transformed to be available, we can say that the steam engine may be considered the real prime mover in the manufacturing and commercial industries of to-day. The steam engine in itself, however, is very inefficient. The best engine constructed gives but little over one-third of the maximum theoretical efficiency of 32 per cent., there being a waste in transformation of nearly 90 per cent. of the original energy of the coal.

The problem of the production of electricity directly from carbon is, therefore, as interesting and fascinating as the prospective rewards for a successful solution and commercial application of the same are many and varied.

Considering this, it may appear surprising to the ordinary observer that so little is being done in this direction at the present time. It is true, however, that the experimental difficulties which are encountered in preliminary investigation are of such a nature as to discourage all but the most interested and painstaking experimenters, and to this is undoubtedly due the fact that there are at present but few men investigating the problem.

The history of efforts in this direction is an interesting one. As early as 1855 Becquerel made several experiments in which he proved to his own satisfaction that electricity could be obtained directly from coal. Since that time the correctness of his proof has been disputed, and it now appears that the results he obtained were thermo-electric. This in fact has been the point of contention with every form of cell up to the present time that has been constructed for the purpose of generating electricity directly from coal.

It was not until 1822 that air was used in the electrolyte and then it was for the purpose of depolarization, and not for furnishing oxygen for the combustion of the carbon.

Dr. Borchers and Dr. Coehn, two eminent German chemists, have devoted considerable time to the study of this problem. The results obtained by the latter are particularly interesting in that he seems to have proven beyond a doubt that it is possible by electrolysis to produce a solution of carbon, and that a battery may be formed of which the carbon is the soluble electrode. I have never heard or seen these points disputed and they may safely be taken as actual truths.

It was not until recently that any progress was made toward a successful commercial cell. Dr. Jacques, electrician for the Bell Telephone Company at Boston, Mass., has made an extended

series of experiments on cells of various designs, and has approximated nearer to commercial success than any of his predecessors. His success, however, may be more apparent than real, as his experiments were made on such a large scale that the results were much more impressive than those of any other investigator. He constructed a two-horse power apparatus and with the electricity obtained, drove the air pump used to supply oxygen to the carbon, lighted a series of incondescent lamps and drove a motor of considerable size. He acknowledges, however, that the plant was not a commercial success.

The action of the Jacques' cell is, as Dr. Jacques himself states, the chemical combination of the oxygen of the air with the carbon by impregnating a molten basic electrolyte with the carbon with which it is in contact, and collecting the electricity by means of an electrode not acted upon by this electrolyte when the circuit is closed. A small amount of magnesium oxide is added to serve to convey the carbonic acid formed through the electrolyte so that renewal is not so frequent. The description of the Jacques' cell is as follows: A pure iron pot, 12 inches high by $1\frac{1}{2}$ in diameter, is filled $\frac{2}{3}$ with molton caustic soda or potash and a little magnesium oxide is added for the purpose above mentioned. By means of an air pump outside of the cell and a rose blower inside, a plentiful supply of air is forced into and through the liquid and around the central electrode of carbon suspended and insulated from a cover at the top of the cell. One terminal of the external circuit is connected to the carbon rod, the other to the pot itself. An exhaust and a supply tube for the withdrawal and renewal of the liquid enter into the walls of the pot. There is also an exhaust pipe for the waste gases.

Considering, from a careful study of available data, that the process invented and patented by Dr. Jacques, was the nearest approach to the successful solution of the problem up to the present time, Mr. Hall and I commenced our investigations on a cell closely resembling the one invented by the gentleman named as shown by the accompanying sketch, in which the various parts are shown and their uses indicated.

In attacking this problem it was our purpose to set at rest some of the many points of contention in regard to the true source of energy in the Jacques cell. Prof. Elihu Thomson, Mr. C. J. Reed and others, contend that either the action is thermo-electric or that it is secondary, not primary. Mr. Reed has performed several superficial experments which have been so widely published that general opinion has been molded by them. For instance, he states that the forcing of the air into the lye and around the carbon, has but little effect, and that the illuminating gas has the same effect as air. He believes that the air increases the difference of temperature between the junctions and hence increases the electromotive force.

To settle these points, Mr. Hall and I made several exhaustive tests, obtaining results which appear to us conclusive. We have shown; 1st, that the oxygen of the air is absolutely essential to the maintainance of a steady e. m. f.; 2nd, that the illuminating gas or nitrogen gas, substituted for air, are destructive to the life of the cell and lower the e. m. f. to nearly zero, etc.; 3rd, that the oxygen is taken from the air to burn the carbon. This last was proven by accurate quantitative analyses of several samples of air collected after having passed through the cell.

This is a resume of the most important results we obtained. We had arrived at a most interesting stage of the investigation, that of obtaining the efficiency of the cell, when the time allotted us, came to an end.

As it stands now, the problem is to construct a commercially successful cell. Once this is done, the effect on the consumption of the coal supply will be considerable and many and important changes will take place in all branches of manufacturing and commerce.

SURFACE TENSION.

ROBERT A. PHILIP.

Among those properties of matter known to us, inertia and attraction may be regarded as perhaps the most fundamental. While inertia is the characteristic property by which matter is distinguished from everything else, attraction is probably the property on which depends the distinction between the different kinds and conditions of matter.

We recognize several varieties of attraction, but of these I will only mention the molecular attraction on which the different physical conditions of matter depends. In the case of gases the influence of this attraction is a minimum. A perfect gas according to the kinetic theory is a collection of elastic particles moving in paths influenced by their inertia and by impact on other particles only. But we do not find any gases in nature that exactly agree in their behavior with that of the ideal perfect gas. All of them exhibit a tendency to contract as they approach the point of liquefaction, and when this is reached there is a sudden diminution of volume, which in water under ordinary conditions amounts to a decrease to the 1700th part. This points to a powerful mutual attraction among the molecules of a gas, which in the case just cited is sufficient to produce a reduction of volume equal to that due to an external pressure of 25,000 pounds on the square inch.

When we see the evidence of such great molecular action in gases we expect to find the effects of the same forces in liquids, and we are not disappointed, for we can trace the important phenomenon of surface tension to the same cause. We find by observation that the surface of liquids exhibits a marked tendency to contract in area whenever it is given an opportunity to do so. This is readily shown to be the case in drops and bubbles, where the easily recognized tendency to assume the spherical form is to be explained by the fact that the surface of the sphere is less than that of any other solid of the same volume. If there is an open passage between the interior of a bubble and the outside air, the bubble will contract until all the air in the interior has been expelled and nothing remains but a plane film. So we conclude that the tendency of the surface to contract is balanced by an increase of pressure of the air in the interior. This general tendency of liquid films to assume a form of minimum surface produces many beautiful results when frames of wire are dipped in soapy water, the surfaces thus easily obtained being the solutions of many interesting geometrical problems.

Another interesting but little known property of liquids which is illustrated by these films is that of liquid tenacity. When we consider the extreme thinness of these films it is evident that the stress in the liquid is not inconsiderable and indeed, from other considerations we may conclude with considerable certainty that many liquids, including water, are able to bear tensile stresses that are not incomparable with those of the metals.

The same molecular attractions that give the surface tension and internal cohesion of liquids comes into play whenever a liquid comes into contact with a solid giving the phenomenon of the wetting of solids by liquids. Here we have a tendency of a liquid to adhere to a solid, which is so great that the liquid will spread over the surface of the solid even when opposed by the force of gravity. The result is even more marked if the solid is a fine tube dipping into the liquid, then, if the liquid wets the solid, the attraction of the walls of the tube causes the fluid to form a thin layer over them and this necessitates that the surface of the liquid in the tube should be concave. As we found in the case of a soap bubble the pressure is less on the convex than on the concave side of a liquid surface, so here the pressure is reduced just beneath the surface and the fluid must flow up into the tube until the surface rises to such a height that the weight of water raised exactly balances the deficiency of pressure. This is the theory of what is known as Capillary

Action, which takes place not only in fine tubes, but also in porous and fibrous bodies, such as brick or cloth. On first seeing the spontaneous ascent of water in a capillary tube, one might imagine that the essential principle of the "perpetual motion" had at last been discovered. But that this is a mistake must be evident from the fact that the rise of water in a capillary tube takes place at the expense of the potential energy of the dry surface of the solid which is reduced by the contact with water. So that while we may some day use a free solid surface as a means of storing energy, yet we can never use such a surface as the source of an inexhaustible supply.

It is to surface tension that we must also turn for the explanation of the fact that small bodies, such as sewing needles, will float on the surface of water even though they are many times more dense. If you examine a needle floating on the surface of water you will find that it rests at the bottom of a small dimple, now remembering that the effect of a surface tension is to increase the pressure of the concave side, you readily see that this is the force which keeps it afloat. Nature uses precisely the same sustaining power of the surface to enable a multitude of insects to live and move upon the surface without being wet.

Whenever a number of small bodies, some of which are wet and others not wet by the fluid, are floating on the surface of water, a remarkable appearance of attraction and repulsion is observed. All the wetted bodies attract one another but repel the non-wetted bodies which likewise attract one another. Here, strange to say, we find the laws that like bodies attract and unlike bodies repel, which are exactly the opposite of the laws we find in the cases of electricity and magnetism.

As the explanations of these effects is somewhat complex, it will be sufficient to say that the theory of surface tension renders the reasons for the actions perfectly clear, giving a case where action at a distance is explained by the influence of the intervening medium.

In conclusion I will say with regard to the mathematical investigation of the whole subject of surface tension that the mode of treatment depends on whether a molecular or continuous structure of matter is assumed. While the former is more in accordance with modern views; yet the latter furnishes not unsatisfactory explanations of the phenomena, so that in my thesis I have adopted this latter hypothesis and from it have shown that a surface tension is the necessary result of the attractive forces I have mentioned.

DESIGN OF AN AUTOMATIC SOAP WRAPPING MACHINE.

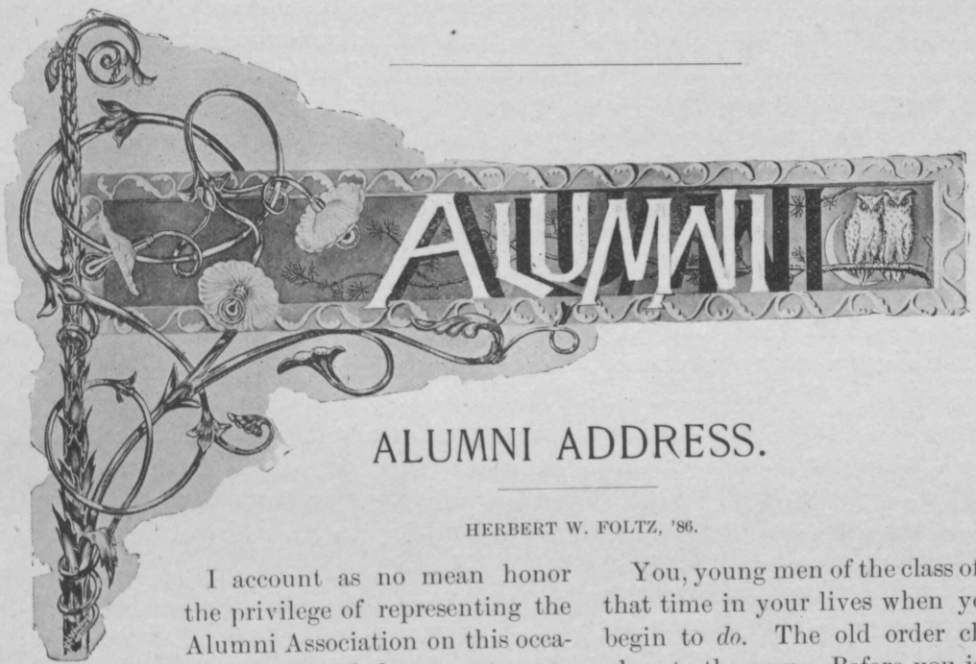
THEODORE L. CAMP.

Cleanliness is next to godliness. There are probably few among us to-day who have not at sometime in their lives in some form or other used soap. I am not here to dwell at length upon the merits of using soap or to advertise any particular brand of soap. If any of you have ever visited a soap manufacturing plant you will probably have seen that the soap comes into the printing, packing, cutting and stamping room in the form of an immense cake about five feet square by two and one-half feet in thickness. This cake is cut into slices the thickness of a bar of soap; these pass into cutters which cut them into the form of the copyrighted cake. The soap is then taken into the drying room and from there fed into the press, where the form and stamp of the cake is made by a plunger which descends upon a stamped plate. The soap comes from this press at about the rate of sixty cakes per minute. You will also have noticed that at a table near this press there will be a number of girls or boys who perform the operation of wrapping the soap and packing it into boxes. I noticed this fact in a neighboring soap manufactory which I visited sometime ago, and I

asked the proprietor why he did not have a machine for doing that work, and he said that there was no such machine built. I told him there ought to be such a machine and he said that if I would design one I would not have to work for a year. I do not like to work and so I have tried to get up the machine, and I have here a rude affair made of wood and metal, a working model, which I will explain. The complete machine consists of a roller printing press which prints the labels and feeds the paper into the machine at the proper time. It also consists of a reciprocating trough and a device at a distance of five or six feet from the machine which packs it in boxes and makes it ready for shipment. These parts are not shown in this model, which is simply the wrapping device. This consists of a chute, which is formed by four planes connected by springs to keep the pressure constant on the soap, of slides that do the top folding, of fingers underneath which do the side folding, of a plunger which pushes the soap into position, and a top slide which does the remainder of the folding at the ends.

[Description of model as it works.]

From an economical standpoint this machine would be a success provided it would work, and it would probably take the place of from five to seven boys or girls, thus making a saving of from $25 to $30 per week, or about $1,300 to $1,500 per year. I don't know how it will come out.



ALUMNI ADDRESS.

HERBERT W. FOLTZ, '86.

I account as no mean honor the privilege of representing the Alumni Association on this occasion. In one of those unguarded moments common no doubt to all mankind when we appear to be not accountable for our actions I consented to act as spokesman for the graduate body. The realization of the task imposed by this consent has since been brought home to me in many ways, and it is with a full sense of my inability to perform that which I have so rashly undertaken that I attempt this address here to-day.

You, young men of the class of '97, have reached that time in your lives when you cease to *be* and begin to *do*. The old order changeth, yielding place to the new. Before you is life in earnest, a problematical but vital and essential affair; behind is life's playground full of happy associations and varying experiences, growing dearer and sweeter as the years go by. Each has doubtless mapped out for himself that career which he deems best suited to his powers or inclinations.

It is given to but few to start on life's journey equipped with genius or talent. Genius is that

central, finer essence of the mind, the self-lighted fire, the intuitional gift, born with the man, for a definite purpose, in which it surpasses. Talent gathers and shapes, and applies what genius forges. Genius is of the soul, emotional and productive; talent of the understanding, intellectual and accumulative. These are radical gifts given to but few men, through which they are intended by nature to be operative and fruitful among their fellows. To such, prosperity and contentment are assured. The great majority, however, are destined to drift into the way of the commonplace, the path of routine. But because this is to be our lot, it does not follow that we must drift aimlessly and blindly along with the multitude, yielding to no movement of individual purpose, nor stirred by inspirations other than those of material gain and self-aggrandizement. The very fact of one's lot being cast with the masses should of itself furnish the opportunity and incentive for putting forth his every endeavor to triumph over his environments and become a leader, not a follower, of men. In our voyage of life let us not drift, but steer.

Every youth should form at the outset of his career the solemn purpose to make the most and the best of the powers which have been given him, and to turn to the best possible account every outward advantage within his reach. The purpose must carry with it the assent of the reason, the approval of the conscience, the sober judgment of the intellect. It should then embody within itself whatever is vehement in desire, inspiring in hope, thrilling in enthusiasm and intense in desperate resolve. There can be no question among philosophic observers of men and events that fixedness of purpose is a grand element of human success. Weather-cock men are Nature's failures—they are good for nothing. It requires purpose, will and oneness of aim and invincible determination to succeed. I would not have fixedness of purpose confounded with ambition. Lexicographers define ambition to be an earnest desire of power, honor, preferment and pride. The honor awarded to power that is acquired by ambition is held by a slender tenure, a mere rope of sand. Its hero often receives the applause of the multitude one day and its execrations the next. If you desire peace of mind, shun ambition and the ambitious man. The road ambition travels is too narrow for friendship, too crooked for love, too rugged for honesty, too dark for science, too hilly for happiness. The ambitious man is often seen going across lots to fortune; and a poor business he often makes of it.

The man with a purpose first thinks out his work and then works out his thought. It is in the manner of working out this thought—the means to the end—that most men blunder. There prevails to-day in all communities an almost irresistible tendency to pass by the little things which make life happier and better in the endeavor to grasp some coveted success. Very few men, properly speaking live at present, but seem to be providing to live another time. While oneness of aim is therefore a prime factor in the realization of success, its practice should be tempered with moderation. The danger arises in making all things else subservient to any one great motive in life. Take it to be a principal rule not to be too much addicted to any one thing. The truly happy man is the man of parts. Business or professional success is not to be despised, but it is by no means all to strive for or attain. The man who permits himself to be ruled by this single purpose robs himself and those about him of the sweets of life, makes of his friends enemies and lives always in the "to-morrow." On the map of life the land of desire borders that of regret.

> "But since of life we have but one small share—
> A pittance scant, which daily toils impair—
> Why should we waste it in pursuit of care?
> Why do we labor to enhance our store,
> The more we gain, still coveting the more?"

I would therefore make more of a business with all the pursuit of happiness. There is not anything in this world, perhaps, that is more talked of and less understood. And yet how simply and easily within the reach of everybody who will but stop and look for it.

To be happy does not mean the gratification of

our every whim, nor is the man with few desires happier than the man with many. "The stoical scheme of supplying our wants by lopping off our desires is like cutting off our feet when we want shoes," says Swift.

Happiness is found in different ways and degrees by different natures, depending largely upon the manner in which it is sought. "Every man has his chain and his clog, only it is looser to one man than another; he is more at ease who takes it up and carries it, than he who drags it." "Too many men spend much of their lives in making the rest miserable." "With more of thanks and less of thought,

> Let's strive to make our matters meet,
> To seek what ancient sages sought,
> Physic and food in sour and sweet;
> To take what passes in good part,
> And keep the hiccups from the heart."

There seem to be certain rare temperaments to which a sort of happiness is attached as a gift of nature—people who are happy without trying to be and sometimes in spite of themselves and their environments. We see and meet these people today and resolve to become more like them; tomorrow we forget and fall back into the routine of our hurly-burly, work-a-day life.

What I would like to emphasize as of primary importance to the happiness of the individual and the community in general is a due appreciation of the value of time and so-called trifles. When we have learned to attach to these the importance due them in our every-day affairs, then happiness will follow as day the night. This reform (for reform it is) must come mainly through individual effort and example. It is the too predominant spirit of impatience and push which prevents our American people as a class halting in their mad pursuit of individual success to look about them and enjoy those things which continually invite their attention and are so easily within the reach of all.

I never witness the commencement of a class of young men or women without thinking of the opportunity afforded each one, be he or she of but the most ordinary ability, of making some part of the world better for having lived in it. You, young men, have this opportunity now offered you. Begin right. "Well begun is half ended," says the proverb and a good beginning is half the battle. Begin with your habits. Man, it has been said, is a bundle of habits; and habit is second nature, becoming his best friend or worst enemy. Form the habit early of reserving from each day some time for the little things. The majority of men disdain the little things—too many fractions are "vulgar" in more senses than the rule implies. Set a high price on your leisure moments. Properly expended they will procure for you a stock of great thoughts—thoughts that will fill, stir and invigorate your being. "There are hours which are taken from us, some of which are stolen from us, and some which slip from us." But however we may lose them, we can never get them back. Every day is a little life; and our whole life is but a day repeated; those, therefore, that dare lose a day are dangerously prodigal; those that dare misspend it, desperate. We can generally make time for what we choose to do; it is not really the time but the will that is wanting: and the advantage of leisure is mainly that we may have the power of choosing our own work, not certainly that it confers the privilege of idleness. As Milton so beautifully says; "Hours have wings, fly up to the author of time and carry news of usage. All our prayers cannot entreat one of them either to return or slacken its pace. The misspents of every minute are a new record against us in heaven. Sure if we thought thus, we should dismiss them with better reports, and not suffer them to fly away empty, or laden with dangerous intelligence. How happy is it when they carry up not only the message, but the fruits of good, and stay with the Ancient of Days and speak for us before his glorious throne."

"Time travels in divers paces with divers persons," says Shakespeare. "I'll tell you who time ambles withal, who time trots withal, who time gallops withal, and who he stands still withal." It is not so much the hours that tell, as the way we use them. It is the minutes wasted that wound the hours and mar the day.

"Circles are praised, not that excel
In largeness, but th' exactly framed;
So life we praise, that does excel
Not in much time but in acting well."

When you have learned, then, to set aside each day some time to do with as you please, study how best to keep the moments from becoming idle ones. Goethe says we should form the habit of hearing a little song, reading a good poem, seeing an excellent picture, or uttering a sensible observation every day. Use the spare moments for what are commonly accepted as "trifles." They are necessary to fill in and round out the perfect life. "Great without small makes a bad wall," says a quaint Greek proverb. Little acts are the elements of true greatness—the exponents denoting the power to which life's value is to be raised. It is the close observation of the little things which is the secret of success in business, in art, in science, and in every pursuit in life. Human knowledge is but an accumulation of small facts made by successive generations of men. Though many of these facts and observations seemed in the first instance to have but slight significance, they are all found to have their eventful uses and to fit into their proper places. Even many speculations seemingly remote turn out to be the basis of results the most obviously practical. So with the "side issues" in life. They may appear at first glance unimportant, but they have a definite, fixed mission—they break in upon the monotony of living merely and make it living well. And what are these side issues so requisite to human happiness? Nature provides them without stint. "To watch the corn grow or the blossoms set; to draw hard breath over plow share or spade; to read, to think, to love to pray," these, says Ruskin, "are the things that make men happy." Throw aside the utilitarian idea occasionally long enough to seek rest in the purely sensuous emotion that finds its sense and aim in the act; as in the odor of a flower, or its color, or the passing of a bar of music, or the look at a picture or a great work of architecture. What do they do? Nothing. What are they for? Just that. They begin and end there as to utility; but if cultivated by the individual, what an uplifting power it would develop among the masses! Too many feel only in nature that which we share "with the weed and the worm;" they love birds as boys do—that is, they love throwing stones at them; or wonder if they are good to eat, as the Esquimaux asked about the watch. They see in a shallow pool of clear water only the mud lying at the bottom, not the image of the heavens above, or walk through the world like ghosts, as if they were in it and not of it. They have "eyes and see not, ears and hear not." Such men are indeed pitiable and, unfortunately, are more the rule than the exception. The love of nature is a great gift, and if it is frozen or crushed out, the character can hardly fail to suffer from the loss. Surely one cannot read Jeffries' "Pagent of Summer" without responding with some degree of feeling and enthusiasm. "I linger," he says, "in the midst of the long grass, the luxury of the leaves, and the song in the very air. * * * In the blackbird's melody one note is mine, in the dance of the leaf shadows the formed maze is for me though the motion is theirs. The flowers with a thousand faces have collected the kisses of the morning. Feeling with them I receive some, at least, of their fullness of life. * * * These are the only hours that are not wasted—these hours that absorb the soul and fill it with beauty." We cannot too often lock up our cares and go into the country where Nature's beauties most abound, for of a truth this guest is that which "Finds tongues in trees, books in the running brooks, sermons in stones, and good in everything."

Good music also is healthful. Every song soothes and uplifts. There is no better cure for bad humors and no medicine more pleasant to take. Music is to the ear and to the intellect what strawberries, peaches and other luscious fruits are to the taste. The world needs and the masses cry aloud for music in the spare moments; they are tired of the inharmonious din of toil and a few sweet notes break in upon life's monotony and bring with them hours of pleasure to the weary breadwinners.

"He that loveth a book," says Isaac Barrow, "will never want a faithful friend, a wholesome counsellor, a cheerful companion, an effectual comforter. By study, by reading, by thinking, one may innocently divert and pleasantly entertain himself, as in all weathers so in all fortunes." Too many men abandon the study of a profession when they begin its practice. Reading is, however, by no means necessarily study. Far from it. "I put," says Frederick Harrison in his excellent article on "Choice of Books," "I put the poetic and emotional side of literature as the most needed for daily use." Someone has described a home without books as a body without a soul. A library is a true fairy-land, a very palace of delight, a haven of repose from the storms and cares of the world. Rich and poor can enjoy it equally, for here, at least, wealth gives no advantage.

Art is unquestionably one of the purest and highest elements in human happiness. It trains the mind through the eye, and the eye through the mind. As the sun colors flowers, so does art color life. Art has the advantage of nature, insofar as it introduces a human element, which is in some respects superior even to nature. "If," says Plato, "you take a man as he is made by nature and compare him with another who is the effect of art, the work of nature will always appear the less beautiful, because art is more accurate than nature." Imitation is, however, the means and not the end of art. It is not necessary that one should be able to draw or paint in order to give the mind an artistic training. There are many people who can draw and paint who are not artists. One may be an artist in heart and mind without manual dexterity in the arts. It is through artistic cultivation of and by the people that we may expect progress in art. Good taste is not inherent. It comes by association with things artistic. The intelligent sympathy and support which the people may give the artist will do quite as much to remove the present unsatisfactory condition as anything which can be suggested at this time. The artist and the people must pull together in the creation of that atmosphere which is necessary to stimulate artistic production and keep alive the glow of artistic sympathy. No artist is strong enough to prevail against a crude public. What we need most is guidance and we will get along best when we learn to guide ourselves. Use *some* of your spare moments in learning to appreciate the good in art and the benefits to yourself and the community will be more than you guess.

As with art, so with architecture. Architecture expresses us whether we will or not. Witness the heterogeneous architecture of our time: witness the mass of individual expression in those who build. A prominent American architect, asked for a definition, replied that "American architecture is the art of covering one thing with another, to imitate a third thing, which, if genuine, would not be desirable." Yet there is apparent, withal, a desire, a yearning for better things. If there is any future to architecture in America, it lies in the education of the people. We have a few architects who are serious enough and well enough equipped, but they must have an audience. It takes a giant to work long and sustain his ideals without someone to understand him. If the architect is to do his best work, there must be those about him who love and appreciate it, those who are stimulated, and who, in turn, stimulate the architect. The relation between the architect and the people should be close and reciprocal. There is no reason why the people should not know so simple a thing as the history and general principles of architecture, which is only complicated through methods of approaching it. When considered in its relation to things, as a part of the world's development, as the expression of the life and thought of the people, it becomes at once fascinating and instructive to even the casual reader—to him who pursues it only as a pastime and not as a study. As engineers you should have a large and personal interest in the development of American architecture, which has recently been described to be ornamental and ornamented engineering. But whether engineers or laymen, it is a subject which should interest all alike and is valuable, if but

universally recognized, in determining the destiny of our architecture.

To sum up, then, let us use our leisure moments in becoming better acquainted with the beauties with which Nature surrounds us, in listening to sweet music, in the reading of good books, in the cultivation of art for art's sake and in learning to know and appreciate the good and the beautiful in architecture. These are to me the more important of many "side-issues" worthy of our thoughts and time. "Be it ours to feel that 'the life in the living it savors of worth;' that there is a value in a ray of sunshine; that the vista of a dusty road may hold a glimpse of Elysium; that a sweet sound may dispel the cares of a day; that there is an inspiration in a noble edifice; that in hurried call "get," "get," "do," "do," we may overrun the rare worth of life, lose the end in the means, be driven aside from the real living into a feverish existence. Let it be for us to woo that leisure in which fair serenity ushers in the company of the true and the beautiful, and makes us a little acquainted here with that which paints for us the hereafter."

PROCEEDINGS OF ELEVENTH ANNUAL BUSINESS MEETING OF R. P. I. ALUMNI ASSOCIATION AT TERRE HAUTE HOUSE, JUNE 17th, 1897.

In the absence of the president, Geo. H. Chapman '88, the meeting was called to order by the vice-president, Howard M. Stanton of '94. At his request Mr. Ben McKeen, '85, took charge and presided throughout the session.

About 20 members were present. The minutes of the meeting one year previous were read and approved, also the treasurer's report.

The committee appointed to investigate the subject of Alumni representation on the Board of Managers reported through the chairman, Howard M. Stanton. With slight changes in the wording of unimportant portions the report was adopted unanimously.

The executive committee to whom had been intrusted the revision of the Constitution and By-laws, reported. Before the chairman, Mr. Ben KcKeen, commenced to read the Constitution it was decided by the Association that he should read the Constitution and By-laws article by article, which was done. After it was read, it was adopted as a whole with a few changes that had been made during the reading.

By resolution it was decided to request THE TECHNIC to print in full the Alumni address delivered by H. W. Foltz, '86.

Also by resolution the secretary was instructed to ask the members of the Alumni to please be more particular about keeping him supplied with correct information as to their location.

The election of officers for the ensuing year resulted as follows: Sam'l D. Collett, '90, president; W. Offut Mundy, '95, vice-president; John B. Aikman, '87, secretary and treasurer.

Executive committee: Ben McKeen, '85, chairman, H. W. Foltz, '86, F. F. Hildreth, '94.

THE ALUMNI BANQUET.

The eleventh annual banquet of the Rose Polytechnic Alumni Association occurred at The Terre Haute House on Thursday night, June 17. It was the most successful meeting ever held, and great credit is due to the executive committee, Ben McKeen, '85, Herbert W. Foltz, '86, and Fred F. Hildreth, '94, for the pleasant evening enjoyed by all. Around one long table extending the whole length of the dining-room, were seated the jolly group of alumni, numbering between forty and fifty. They were seated in order by classes, every class having one or more representatives, which is something remarkable, remembering that the men are scattered over all parts of the Union.

In the absence of President Chapman, Vice-President Stanton presided, and filled the position as toast-master with evident satisfaction to all. It was after nine o'clock when the company marched into the banquet-hall, and after having seated them, Mr. Stanton gave the word for the following excellent menu:

MATH.

"Some are to be tasted, others to be swallowed, and some to be chewed and digested."

Little Neck Clams (Chablis)
Olives Salted Almonds Radishes
Bouillon Clear
Planked White Fish Parsley Butter
(Amontillado)
Dressed Cucumbers Saratogo Chips
Lamb Chops Saute, Breaded
(Cruse et Fils Claret)
French Peas
Patties of Fresh Mushrooms
Punch Benedictine (Cigarettes)
Breast of Young Chicken, Supreme,
Asparagus, Cream Sauce
(Champagne)
Tomato and Lettuce Salad
Nesselrode Pudding
Small Cakes
Toasted Wafers Cheese
Coffee (Cigars)

"What an excellent thing did God bestow upon man when He gave him a good stomach."

AFTERMATH.

"Discourse, the sweeter banquet of the mind."

TOWARDS UTOPIA . . . . . Dr. Mees

"There's a good time coming, boys,
A good time coming;
We may not live to see the day,
But earth shall glisten in the ray
Of the good time coming.
Cannon balls may aid the truth,
But thought's a weapon stronger;
We'll win our battle by its aid—
Wait a little longer."

CLASS OF '97 . . . . . Theo. L. Camp, '97

"May they meet with no impediment in the pathway of life more difficult to overcome than their own modesty."

EDUCATION . . . . . O. E. McMeans, 96

"What we want is not learning but knowledge; that is the power to make learning answer its true end as a quickener of intelligence and a widener of our intellectual sympathies."

THE PRESS . . . . . W, C. Ball

"I would derive the name editor not so much from edo, to publish, as from edo, to eat, that being the peculiar profession to which he esteems himself called."

PICTURES IN RETROSPECT . Walter M. Blinks,'94

"But, after all, it is the pictures one carries in one's mind which are best worth while."

SOLO—"Ho! Fill me a Flagon"—John B. Aikman,' 87

"Swans sing before they die; 'twere no bad thing
Should certain persons die before they sing."

[For an encore Mr. Aikman sang "All in a Garden Fair,]

OPPORTUNITY . . . . . Arthur Kendrick

"Opportunity has hair in front; behind she is bald; if you seize her by the forelock you may hold her, but if suffered to escape, not Jupiter himself could catch her again."

GREASE, GRIT AND GUMPTION . . C. M. Sames, '86

"Gumption you hev got to hev,
Th' aint no gittin' on without it,
No use talkin'; en ez to grit,
Grit's ever'thing, I tell ye;
En grease—grease means a lot of things—
Ef ye've got that, ye'r fixed, b'jings."

"To all, to each, a fair good-night.
And pleasing dreams, and slumbers light."

Three of those who were down for toasts were not present, but substitutes were found who treated the subjects well. Professor Wickersham responded to "Education" in the absence of Mr. McMeans, and Buckner Speed filled Mr. Blink's place on the program with such efficiency as to call forth enthusiastic and repeated applause. Sames, who was not able to attend, wrote out his toast and mailed it to his classmate, Foltz, to read. Otherwise the program was given in full, followed by a number of speeches by members of the faculty, board of managers and alumni. An excellent orchestra furnished music throughout the evening. At the close of the "aftermath" all grouped around the piano, and sang or danced, and the meeting finally ended with goodbyes and goodwishes, with many expressions of desire that each would meet all, and more, next year. Those present were:

Board of Managers—Judge William Mack, Mr. W. C. Ball.

Faculty—Dr. C. L. Mees, President; Professor Thomas Gray, Professor W. A. Noyes, Professor John B. Peddle, Professor A. S. Hathaway, Professor F. C. Wagner, Professor Arthur Kendrick, Professor J. A. Wickersham.

Class of '85—Ben McKeen, city.

Class of '86—Herbert W. Foltz, Indianapolis; Charles E. Scott, city.

Class of '87—John B. Aikman, city.

Class of '88—John B. Peddle, city.

Class of '89—V. K. Hendricks, city; A. J. Hammond, Frankfort.

Class of '90—S. D. Collett, New York; Otto G. Hess, Wheeling, W. Va.

Class of '91—Abe Balsley, city; W. H. Harris, city; Omar Mewhinney, city.

Class of '92—Claude Ott, Rockville.

Class of '93—R. E. Huthsteiner, Waynesboro, Penn.

Class of '94—James Royse, city; E. D. Frohman, Pittsburgh, Pa.; F. F. Hildreth, city; Buckner Speed, Louisville, Ky.; Howard M. Stanton, Indianapolis.

Class of '95—A. V. Tuller, Carrier Mills, Ills.; W. O. Mundy, Louisville, Ky.; E. L. Shaneberger, Indianapolis, Ind.

Class of '96—James Farrington, Youngstown, Ohio.

Class of '97—R. M. Newbold, Birmingham, Ala.; T. L. Camp, Jackson, Mich.; C. H. Tucker, Washington, D. C.; J. H. Hall, Danville, Ill.; Herman S. Heichert, Marion, Ind.; J. J. Kessler, Jr., city; E. Frank, Petersburg, Ind.; J. B. Haney, Wellsburg, W. Va,; Gustav Willius, Jr., St. Paul, Mich.; Charles H. Fry, Jr., Fort Worth, Tex.; David Ingle, Jr., Oakland City, Ind.

PEDDLE–ONEY.

Another one of our professors has taken unto himself a partner for life. On Monday, June 21, Prof. John B. Peddle was happily married to Miss Alice Oney of Nashville. They go to spend the summer in Sinnickson, Va., and may the fates provide for them a pleasant trip, a happy and successful future. The TECHNIC speaks for the student bodyin offering the heartiest congratulations.

ALUMNI NOTES.

Collett, '90, came from New York to pay his respects at the commencement exercises.

Sanborn, '96, and Shaneberger, '95, were in the city May 13th to attend the Alpha Tau dance.

It was noticed that among those who came to the alumni meeting the civils were well represented.

Born to Mr. and Mrs. W. A. Layman, St. Louis, Wednesday, June 9th, a daughter. The name is Edith.

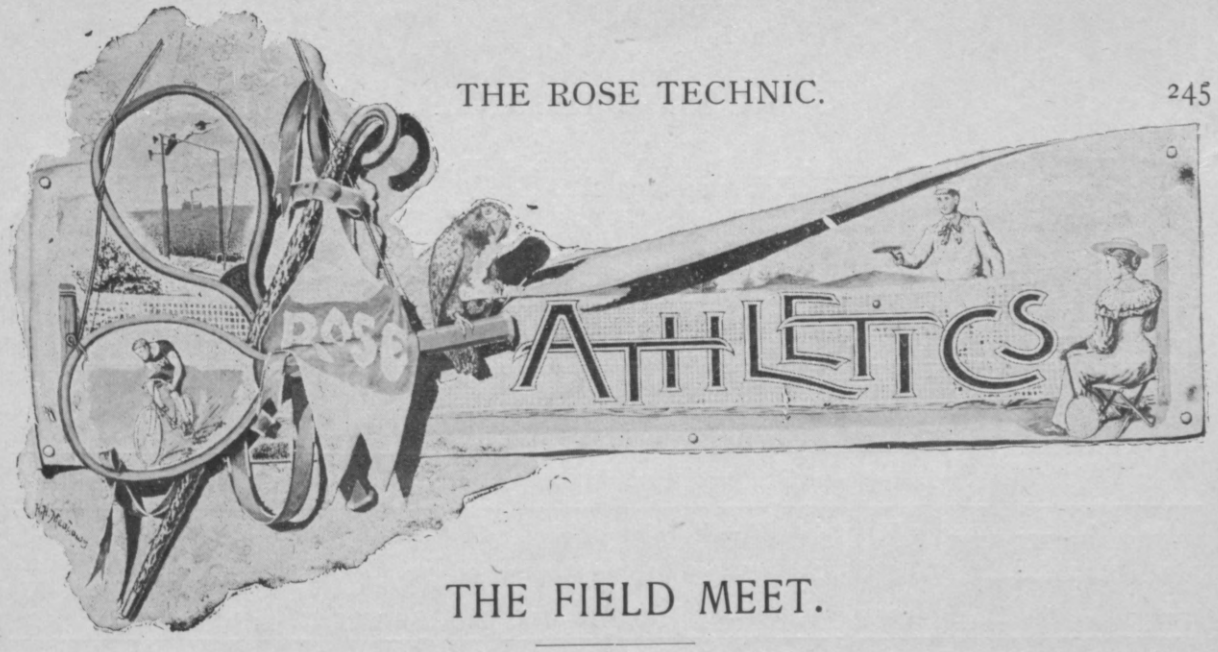
Mundy and Miller, both of '95, expect soon to have an advance in position with an increase of salary.

Hedden, '94, came over to spend several days the week of field day. Every one was glad to see him about the Institute again.

Richard Meriwether, '96, passed through the city several weeks ago on his way to Chicago where he has accepted a position with Siemens Halske. He stopped off long enough to visit the Institute and shake hands with all his old friends.

Hear the jabber of the Profs, tiresome Profs,
How like, in point of brains displayed, unto a gang of
Sophs;
How they jabber, jabber, jabber,
In that hellish Physical Lab,
Till they almost drive one crazy
With their everlasting gab.
Not a word, word, word, but what's more or less absurd,
In the gabble, gabble, gabble of the Profs, Profs, Profs,
Of the everlasting, flabbergasting Profs.
[With deepest apologies to Mr. Poe.]

J. D. I., '97.



THE FIELD MEET.

The average Rose man was not very much disappointed when it became a sure thing that the Earlham men were the pennant winners. Perhaps this was because we won more points than did Purdue. Perhaps it was because a more gentlemanly and worthy team than Earlham's never contested against us on field, track and tennis courts; and because to be defeated by them did not argue inability in athletics. We lost out on the dashes and weight events. We missed the Klinger boys in the bicycle races, though not quite so much as we had anticipated. The hurdles were not for us, nor were the jumps. In the other events we did well, though not quite well enough.

The day was cold and dark and dreary. It was all that could not have been desired. Rose men woke with shivers and dire forebodings as to what the day might bring forth. The threatening aspect of wind and weather sent our hopes below the zero point. Was it likely that anybody could do anything worth recording on a day like this? we asked ourselves and each other. However, the weather did not interfere with the progress of events. Tennis was picked up languidly but was dropped by our men as if it were a hot brick. DePauw and Earlham could play a little better than we and so the doubles and singles went to them respectively. Mr. Cain, of Earlham, sprained his ankle early in the morning and was obliged to give up before the doubles were played out. That is how DePauw came to win. The weather brightened up at noon, but not until it had succeeded in convincing a good many people that they would be more comfortable beside a cozy fire than out in the wind-swept grandstand. Still, we can't complain of the crowd. It was a good sized crowd, an intelligent crowd, a crowd that appreciated every event, a crowd that even cheered Tilly for setting the pace during the first four miles of the long bicycle race. Moveover, it was a paying crowd. While the treasury of the athletic association does not exactly suffer from a plethora of wealth, it has now enough to pay all debts, and current expenses for some time to come. That is the best result of the field meet.

The first event was called off at 1:30, and, according to the referee, the following is a truthful record of events, winners and records:

100 Yards Dash. 1st heat, Binford, E. C., :10$\frac{2}{5}$; 2nd heat, Castleman, D. P. U., :10$\frac{3}{5}$; 3rd heat, Huthsteiner, Rose, :10$\frac{4}{5}$. Final heat: 1st, Binford, E. C.; 2nd, Jones, E. C.; 3rd, Huthsteiner, Rose. Time, :10$\frac{2}{5}$.

Running High Jump. 1st, Robertson, P. U.; 2nd, Haworth, E. C.; 3rd, Hellweg, Rose. Height, 5′ 6″.

Running Broad Jump. 1st, Thornburgh, E. C.; 2nd, Crebs, Rose; 3rd, Ristine, W. C. Distance, 20′ 1″.

Mile Walk. 1st, Shaver, Rose; 2nd, Fomald, P. U.; 3rd, Pierson, Rose. Time, 7:48⅗.

One-Half Mile Bicycle. 1st, Hill, E. C.; 2nd, Pfleging, Rose; 3rd, Anderson, P. U. Time, 1:10⅖.

120 Yards Hurdles. 1st heat, Batten, P. U., Ferris, P. U.; 3rd, Anderson, P. U. Time, 14:38⅘.

440 Yards Dash. 1st, Cassady, P. U.; 2nd, Jones, E. C.; 3rd, O'Brien, P. U. Time, :52⅗.

One Mile Run. 1st, Green, P.U.; 2nd, Froehlich, Rose; 3rd, Smyth, Rose. Time, 4:53⅗.

The pentathlon score was as follows:

Contestant	100 Yards		Pole Vault		Shot Put		Stand'g Broad		Mile Run		Total Points.
	Record	Points	Record	Points	Record	Points	Record	Points	Record	Points	
Bateson, P. U.	:11⅖	50	8′—6″	64	30′–10″	67	9′— ½″	73	:05:19⅗	80⅗	334⅗
Stabler, E. C.	:12⅕	20	8′—0″	52	25′—6″	46	9′—1½″	75	.....	.....	193
Huthsteiner, Rose	:10½	95	8′—4″	60	32′—0″	72	9′— 0″	72	:05:41⅗	58⅖	357⅖

time, :17⅖; 2nd heat, Brachmann, Rose, time, :20. Final heat: 1st, Ristine, W. C.; 2nd, Batten, P. U.; 3rd, Brachmann, Rose. Time, :17.

Putting 16 Lb. Shot. 1st, Roller, D. P. U.; 2nd, Williamson, D. P. U.; 3rd, Lister, U. of I. Distance, 37′ 10″.

Standing Broad Jump. 1st, Malone, W. C.; 2nd, Roberts, U. of I.; 3rd, Murray, I. S. N. Distance, 9′ 9″.

50 Yards Dash. 1st heat, Goben, P. U., time, :5⅗; 2nd heat, Binford, E. C., time, :5⅘. Final heat, 1st, Ristine, W. C.; 2nd, Binford, E. C.; 3rd, Castleman, D. P. U. Time, :5⅘.

Pole Vault. 1st, Crebs, Rose; 2nd, Hester, U. of I.; 3rd, Haworth, E. C. Height, 9′ 3″.

Throwing 16 Lb. Hammer. 1st, Robertson, P. U.; 2nd, Alward, P. U.; 3rd, Hubbell, Rose. Distance, 109′ 2″.

220 Yards Hurdles. 1st heat, Goben, P. U., time, :29; 2nd heat, Cold, D. P. U., :29; 3rd heat, Jumper, Rose, :28⅖. Final heat: 1st, Ristine, W. C.; 2nd, Goben, P. U.; 3rd, Cole, D. P. U. Time, :27⅘.

Hop, Step and Jump. 1st, Thornburgh, E. C.; 2nd, Haworth, E. C.; 3rd, Graves, I. S. N. Distance, 42′ 3½″.

One Mile Bicycle. 1st, Stone, Rose; 2nd, Hill, E. C.; 3rd, Kimmel, E. C. Time, 3:10⅗.

220 Yards Dash. 1st, Jones, E. C.; 2nd, Binford, E. C.; 3rd, Cassady, P. U. Time, :23⅕.

Five Mile Bicycle. 1st, Stone, Rose; 2nd,

The following is a summary of the points won by the various colleges:

College	Firsts	Seconds	Thirds	Total Points
Earlham	6	7	2	53
Rose	5	3	6	40
Purdue	4	5	4	39
Wabash	4	0	1	21
DePauw	2	1	2	15
U. of I.	0	2	1	7
I. S. N.	0	0	2	2
Franklin	0	0	0	0

ATHLETIC DIRECTORS MEET.

The athletic directors met in regular session on the afternoon of Friday, June 4th, in Dr. Mees' office, Hellweg, '97, presiding. All directors present excepting Edwards, '99. Appleton, '00, was chosen secretary pro tem. General Manager Shaver presented his report on field day finances. He said that there was about $170 cleared on field day. His report was accepted and he was ordered to transfer all funds over to Treasurer Lansden. He was given permission to draw on the treasury for any amount not exceeding $15 to pay the deficiency on the reception account. Manager Pfleging presented his report on basketball for the past season. His receipts just bal-

anced with the expenditures. The report was accepted. Managers for the various school teams were then elected for the year '97–'98, as follows:— Manager of baseball team, Howell, '99; manager of track team, Hubbell, '98; manager of basketball team, Freudenreich, '98. The meeting then adjourned *sine die*.

ROSE, 4; I. S. N., 6.

The last game of the season witnessed the second defeat of the school team at the hands of the doughty tillers of the soil, our friends the Normalites. It was not a beautiful game by any means, though at intervals there was a little first class playing. Oats and Hay started out to demonstrate that they could handle a baseball bat as well as a pitchfork, and before Jakey Trumbo had decided to pitch a good game, the first two farmers to bat had crossed the home plate after making the entire circuit of bases. Then Jakey got mad, and not until the sixth inning did a Normalite have a chance to stir up the dust by sliding to bases. But in the sixth, what horible disaster! Our men collapsed, and the farmers plowed furrows in the sand as one after another leisurely trotted from base to base and crossed the home plate amid the vociferous and heart rending applause of their mighty crowd of supporters in the grand stand. But it stopped at last with the score 6 to 0. The history of the Rose score was different. Meek and lowly was the beginning, and inning after inning passed by without a score being put to our credit. But in the eighth inning our men discovered that Compton had merely been bluffing them with his twisters and then they proceeded to pound him all over the campus. It was a glorious sight when "Highpocket," crossed the plate and gave Rose her first score, and three more followed in rapid succession before the fellows concluded that they had better rest until the next inning. Fatal mistake! for the pedagogs decided that there wouldn't be any next inning. We must fain accept their excuse that the captain of their band was obliged to leave to catch a train and as they didn't know what a substitute was, the game had to come to an end. But the umpire thought that the Normals had no right to stop, so he cooly gave the game to us by a score of 9 to 0. Easily won! The men played in this order:—

ROSE.	NORMAL.
Voorhes, m.	Compton, r. and p.
Trumbo, p.	Capt. Porter, c.
Capt. Austin, c.	McCarty, 3.
Meriwether, 3.	Early, S.
Martin, 2.	Lankford, p. and r.
A. Kidder, l.	Hill, l.
Hegarty, s.	Squires, 2.
Freudenreich, 1.	Christen, 1.
Likert, r.	Hedley, m.

Umpire, Dan Miller. Time of game 2 hours 20 minutes. Attendance, 225. Score by innings:

	1	2	3	4	5	6	7	8	
Rose	0	0	0	0	0	0	0	4	
Normal	2	0	0	0	0	4	0	*	

I called her a peach,
And the truth was shown
When I found that her heart
Was indeed a stone. —*Ex.*

SENIOR CLASS DAY.

About four weeks before the close of school the members of the Senior Class surprised every one, themselves more than anyone else, by deciding to give a show of some sort in the way of Class Day exercises. That was all that was done for a week, when the building of a stage in the gymnasium gave a better foundation for the executive committee to work upon. Things began to buzz along then, and the after-supper rehearsals, together with the fitting up of draperies, footlights, etc. on the stage, gave indications to the curious ones on the outside that something was surely going to happen. The way in which the class kept the whole thing under lock and key made it all the more mysterious. The under-class men occasionally dared to put their heads into the gymnasium, but were promptly ejected, so that no one could fine out definitely what was going to be done or who was to do it.

The evening of Class Day finally arrived on the 15th of June, and the class of '97 appeared to a large audience, chiefly in evening dress, in a two-act burlesque with comedy and operatic features, entitled "Jack and the Beanstalk." The stage was decorated with a profusion of color, and the costumes of the players were original, unique and attractive. Every man in the cast seemed to have his mind made up to get a good deal of fun out of the piece himself as well as to exert all his talent to please the people across the footlights.

It was a good show, everybody said so. Super-sensitive critics might have seen some minor violations of art, but institutions like Rose do not teach the drama in any of its branches. The class of '97 never pretended to be especially strong in lines of finished acting. It can safely claim, however, that it amused its friends very highly and has no reason to be ashamed of its first and last appearance on the burlesque stage. As a rule the Senior Class does not attempt histrionics during commencement week or at any other time. But few previous classes have made any sort of demonstration, so that this year's venture was exceedingly new.

The show was made up of singing, dancing, joking, indeed a little of almost everything in the farce comedy line, including roasts on the faculty and an occasional general "rough house." Several striking features were introduced. The clown appeared to possess the faculty of enjoying any degree of climate he desired. He would at one moment produce an incandescent lamp, light it at will and use it for heat or light. The next move, he would bring out of the depths of his pocket a motor fan which ran at a lively rate and blew gentle zephyrs across his chalky brow. The king was able to drink a monstrous "bowl" by means of a straw only through the expert manipulation of stage settings. A number of comical situations occurred which were not down on the program. One of the most pronounced hits of the performance was the inability of the stage hands to close the curtains after the first act. This unheralded feature elicited enthusiastic applause.

The leading character was the esteemed King Cole, the merry old soul and his fiddlers three.

He was gorgeously costumed and looked a good deal like Thomas Q. Seabrooke in the "Isle of Champagne." The role was in the hands of Kessler. Lufkin played the part of Jack, the lover, and Ingle the part of Mary, the beloved. "They loved each other well." The part of Sinbad, "formerly a sailor," was taken by Camp, who did the clown act to perfection. The Astrologer, in the person of Hall, was not backward in looking for lucky and shining stars among the audience. The "Coon from Alabama," represented by Newbold, was, it is said, equal to any of the efforts made in the Elks' minstrels. Meyer, the "Dutchman," was naturally original and furnished fun without effort. In fact they were all good. Here is the full

DRAMATIS PERSONÆ.

Jack, an adventurer, in love with Mary . J. E. Lufkin, Jr.
King Cole, monarch of all he can lay his hands on . . . . . J. J. Kessler, Jr.
Mary, his daughter, very much smitten with Jack . . . . . J. David Ingle, Jr.
The Fiddlers Three . . . . . W. H. Martin, G. Willius, Jr., J. Briggs Haney
Pasqueno, Astrologer, private secretary to the king . . . . . Jay H. Hall
Sinbad, formerly a sailor, somewhat of a knave himself . . . . . Theodore L. Camp
Miss Muffett, chaperon to Mary . . . . . Chauncey H. Holderman
Mr. Giant . . . . . Maurice C. Rypinski
Mrs. Giant . . . . . Clarence H. Tucker
Mrs. Hubbard, mother of Jack . . Herman S. Heichert
Ducky . . . . . Edmund Frank
Jack, another Jack . . . . . John H. Hellweg, Jr.
Jill, runs with Jack . . . . . Temple Guy Pierson
Coon, from Alabama . . . . . Roger M. Newbold
Chinaman, from Frisco . . . . . Robert A. Philip
Dago . . . . . J. Henry Lendi
Monk . . . . . Arthur F. Gordon
Dutchman, Milwaukee . . . . . August H. Meyer
Normalite . . . . . Benjamin F. Chandler
The Yellow Kid . . . . . Herbert C. Westfall
The Daisy . . . . . Odus B. Moore
Mother Goose . . . . . Charles H. Fry, Jr.
Stage Committee . . . . . William G. Arn, Archie G. Shaver
Pianist . . . . . Fritz Reiman
Violinist . . . . . Harry Richardson
Executive Committee . . . . . J. H. Hall, J. J. Kessler, Jr., J. E. Lufkin, Jr.

SYNOPSIS.

(Act 1.)

"'Tis the Dawn."—The awakening of the Robber band.—Arrival of King Cole with a song to sing.—Sinbad and Pasqueno expose themselves.—Jack strays in and explains himself.—King Cole is due for another song.—Jack and Mary tell of their mutual affection while the King bowls up.—Jack gets ambitious and asks for Mary's hand.—Climbs the bean stalk to spite himself.—"'Tis with love."—Curtain.

(Act 2.)

Jack in Fairyland.—Meets a Daisy.—King Cole out looking for a job.—Sinbad has the floor (a la Doc Mees).—Jack and Jill.—Ducky.—Junior Class Song.—Dutch gets mixed up with Gussie.—The terrible Giant and Mrs. Giant.—Miss Muffett sings.—Cole has a remedy for sleeplessness.—Slumber song.—Jack steals Giant's treasure.—Terrible rage of his Giantship.—Sudden transformation scene.—Safe on earth.—Sinbad congratulates Jack with a song.—Cole relents.—Jack gets Mary for keeps.—"Mistress Mary quite contrary."—"'Tis with love."—Curtain.

At the close of the play, the chairs were carried out and an informal dance was held, which was heartily enjoyed by all who remained.

The members of the Senior Class are greatly indebted to Messrs. Fritz Reiman and Harry Richardson for the services they rendered and take this opportuity of extending to them their most sincere thanks.

COMMENCEMENT.

The exercises of the thirteenth annual commencement took place in the main hall of the gymnasium on the morning of June 17th. The large stage used for the class day exercises had been left standing and upon it were seated the members of the graduating class together with a number of the Board of Managers, the president of the Institute and the alumnus who gave the alumni address. The room of the handsome gymnasium was filled to overflowing with the parents, relatives and friends from the city and from a distance, besides visiting alumni and others interested in the Institute. About the platform were tastefully arranged potted plants and the school colors old rose and white, which added to the gay colors of summer hats and gowns made the occasion one to be long and pleasantly remembered. Music was furnished by Ringgold's

orchestra from their position in visitor's gallery. Following is the

PROGRAMME.

MUSIC.

PRAYER.

MUSIC.

THESES.

Study of the Friction of Journal Bearings of Various Materials under Different Conditions.
HERMAN S. HEICHERT.

Dams: Their Construction and Failure.
J. DAVID INGLE, JR.

Electricity Direct from Carbon.
JOHN H. HELLWEG, JR.

MUSIC.

Surface Tension.
ROBERT A. PHILIP.

Design for an Automatic Soap Wrapping Machine.
THEODORE L. CAMP.

MUSIC.

ALUMNI ADDRESS.
MR. HERBERT W. FOLTZ, '86.

PRESENTATION OF DIPLOMAS.

AWARDING OF PRIZES.

BENEDICTION.

MUSIC.

After the presentation of diplomas Colonel Richard W. Thompson addressed the graduates in the old time eloquence so characteristic of him. His earnest words of advice and encouragement were made very impressive by the emotion he put into them.

The candidates for degrees and the subjects of their theses were as follows:

FOR DEGREE OF MECHANICAL ENGINEER.

WILLIAM L. AMES, B. S.

Re-designing a Locomotive.
WILLIAM R. MCKEEN, JR., M. S.

FOR DEGREE OF MASTER OF SCIENCE.

Studies on Variable Stars.
JOHN A. PARKHURST.

Power consumed in Tanning and Leather Machinery.
BARCLAY G. MERING, B. S.

Specifications for Wooden Railway Bridges.
JOSEPH D. HARPER, B. S.

Design for Direct-Acting Steam Shears.*
WILLIAM J. FOGARTY, B. S.

Measurements on the Viscosity of Water.
EDWIN S. JOHONNOTT, B. S.

Practical Electrical Tests for Street Railways.
W. OFFUTT MUNDY, B. S.

The Return Current of Electric Street Railways.
FRANCIS H. MILLER, B. S.

Tests on Cement Grinding Machinery.
WILLIAM S. SPEED, B. S.

FOR DEGREE OF BACHELOR OF SCIENCE.

Study of the Friction of Journal Bearings of Various Materials under Different Conditions.
HERMAN S. HEICHERT AND EDMUND FRANK.

Design of an Automatic Soap Wrapping Machine.
THEODORE L. CAMP.

A Test and Study of a Worthington Fire Pump.
CLARENCE H. TUCKER, J. BRIGGS HANEY AND HERBERT C. WESTFALL.

Comparative Tests of Certain Alabama Coals Used in the Locomotives on the N. A. Division of the L & N. R. R.
ROGER M. NEWBOLD AND ARTHUR F. GORDON.

Design, Specifications and Estimates of Cost of a Municipal Electric Lighting Plant for the City of St. Paul, Minnesota.
GUSTAV WILLIUS, JR. AND CHARLES H. FRY, JR.

Plans, Specifications and Estimates for an Electric Street Railway System for Jefferson City, Mo.
ODUS B. MOORE AND JOHN E. LUFKIN, JR.

Electricity Direct from Carbon.
JAY H. HALL AND JOHN H. HELLWEG, JR.

Efficiency and Breaking down Point of Commercial Insulating Materials.
AUGUST H. MEYER AND MAURICE C. RYPINSKI.

The Influence of Magnetic Fields on the Electrical Resistance of Copper and Iron Wires.
BENJAMIN F. CHANDLER.

Magnetic Hysteresis.
ARCHIE G. SHAVER.

Dams: Their Construction and Failure.
J. DAVID INGLE, JR.

Experiments on the Shearing Strength of Timber.
WALTER H. MARTIN AND CHAUNCEY H. HOLDERMAN.

Design for Water Works System for Spencer Indiana.
WILLIAM G. ARN AND T. GUY PIERSON.

Surface Tension.
ROBERT A. PHILIP.

The Theory of the Imaginary Quantities with Applications to the Solution of Dynamical Problems.
J. HENRY LENDI.

An Attempt to Prepare Camphoric Acid Synthetically from the Hydrobromide of cis-campholytic Acid.
JOHN J. KESSLER, JR.

The Heminway gold medal for highest standing during the four years' course was awarded by vote of the faculty to Herman S. Heichert, Marion, Indiana.

The bronze medal, a *fac simile* of the same for highest standing in the Freshman class was awarded to Jesse I. Brewer, Terre Haute.

Those receiving honorable mention were:

SENIOR CLASS—Herman S. Heichert, Marion, Ind. Robert A. Philip, Sacramento, Cal.

JUNIOR CLASS—Harry B. Stilz, Louisville, Ky.; John B. Hubbell, Altona, Ill.; Wm. F. Freudenreich, Terre Haute.

SOPHOMORE CLASS — Arthur D. Kidder, Terre Haute; Edward Calvert, Bowling Green, Ky.; J. J. McLellan, Louisville, Ky.

FRESHMAN CLASS—Sidney J. Kidder, Terre Haute; Henry Leser, Indianapolis; Walter F. Huthsteiner, Tell City, Ind.

THE RECEPTION.

The most enjoyable part of the commencement week program was the reception given by the faculty to the graduates, their relatives and friends on the evening of June 16th. The reception was held in the gymnasium, which had been tastefully decorated with potted plants and the school colors. After an hour's pleasant conversation, hand-shaking, meeting of old friends, and making of new ones, the floor was cleared and the young people were allowed to enjoy the music by dancing. Chairs were placed in groups upon the campus which together with the walks afforded an opportunity of keeping cool, if such were possible. Dainty refreshments were served in the rooms upstairs.

THE SENIOR TRIP.

[The following is an accurate account of how the Seniors, under the direction of Dr. Mees, spent the time very profitably on the Senior excursion.]

PROFESSOR HATHAWAY ENTERTAINS THE SENIORS.

The members of the Senior Class received a very cordial invitation on the evening of Class Day, to spend a part of the afternoon of the following day with Prof. Hathaway. The invitation read "upon his lawn from four until six," and was received with "nine rahs" for Prof. Hathaway. Nearly every member of the class was present and to say they enjoyed the afternoon is putting it mildly. Stories, jokes and songs were indulged in and the professor kindly told the fortunes of many of the class. Little Miss Hathaway distributed the favors, and the refreshments which followed were well suited to the capacity of the Rose man on a warm day. The members of the class were a unit in saying, it was due to Professor Hathaway's ability in differentiating the character of the Senior that he was able to entertain them so successfully.

WHERE THE FACULTY WILL SUMMER.

Dr. Mees and Dr. Noyes will be in Terre Haute most of the summer and will attend the National Educational Society at Milwaukee, Wis.

Dr. Gray will attend meetings of the British Society of Mechanical Engineers at Toronto, and the American Society of Mechanical Engineers at Detroit.

Prof. Howe and family go to Vermont.

Prof. Hathaway and family will visit near the professor's old home in Van Buren Co., Michigan.

Prof. Wickersham and family will be at different times in Kansas City, Mo., and Bay View, Mich.

Profs. Wagner and Kendrick left for Ann Arbor, Prof. Wagner's old home, on June 18. After visiting a few days Prof. Kendrick goes to his home near Boston. Prof. Wagner will bring his family here next year.

Prof. Peddle, who was married on June 21st, will make an extended visit at Sinnickson, Va.

Prof. Place will be off for a trip the last of the summer.

Instructor McCormick will take a special course in mathematics at the University of Chicago.

Instructor Harper is doing field work with the civils near Forest Park.

Instructor McMeans will take a ten weeks' art course at the Art School of Cincinnati, O.

Instructor Burk enters upon his new duties with a Mining Co. near Sacramento, Cal.

Prof. Faurot will read in the private library of Dr. Karsten to make a study of German Philology.

Supt. Harris will attend summer school at Cornell after July 10.

Supt. Smith expects to arrive in England on July 19 to accept a position as woodshop instructor in a technical school in London.

Engineer Grosvenor and Mr. Logan will remain at the shop doing repair work.

Instructors Dickinson and Nicholas will go fishing.

Shaver [to lady clerk]—"Let me see your hose, please."

Avery has just discovered a matchless cigarette lighter, a lens.

Madison—"Aqua Regia, yes, Queen of Waters, I would like to taste it."

Likert, '99, will have his old place in the Vandalia shops this summer.

Wiley, '98, and Ford, '98, spent a few days in Paris, Illinois, before commencing their three weeks of shop work.

The '98 class men are at present working hard on the ten hour schedule.

Pfleging will attend the summer conference of the Y. M. C. A. at Lake Geneva.

Phillips, '99, will work in the chemical laboratory for a month or so this summer.

Prof. Noyes has finished reading the proof for his new book on "Organic Preparation."

The Normal School trustees are arranging to provide military drill for the men. They need some instruction in soldiering.

Brewer—[Lecture in foundry practice] "Say, Professor, how would you cast a pipe line?"

Several of the students residing in the city are putting in their time in the Vandalia shops.

The "Modulus '98, was issued June 12th, and is now on sale at Baur's and Buntin's drug stores.

Prof. Howe's new book on "Arches" has just appeared. It contains cuts of some of the largest Arch bridges in the world.

It was a notable incident that this year a very large number of the parents of the Seniors came to enjoy the exercises of the week.

The Sophomore Sketch-book for the years '95, '96 and '97 is out and contains some handsome and original designs as well as true reproductions.

Witherspoon, '00, expects to go to Nashville this summer to accept the position of assistant instructor in the Wood Shop at Vanderbilt University.

(In Physical Laboratory)—"You have to do a part of that experiment in a hurry, don't you, Ben?" Chandler—"Yes, but it is against my principles."

The Freshman and Sophomore Civils will camp for two weeks at Forest Park, where they are making a Railroad Survey under the direction of Instructor J. D. Harper.

Appleton was taking a nap in algebra when he grumbled out—"Why did old Mr. Rose build this institution so near the railroad? The trains make so much noise a fellow can't sleep at all."

For the next season's football sport, we shall undoubtedly have the best team that Rose has ever put forth and if the students show some interest, we may well expect the most successful season.

The negatives of the flash lights taken of the Class Day exercises have been left at Holloway's photograph gallery. Any one desiring pictures made from them can get them by addressing Mr. Holloway.

The Seniors have found it hard work to leave town. Their attachment to their many friends, and especially to young lady friends, has been so strong that in many cases leave takings have been very protracted.

Lendi was showing some ladies through the shops during thesis time. When someone remarked that he ought to be studying on his thesis Dr. Gray looked up and replied, "Um, very complex imaginary quantities."

The many friends of Fred Ellis, a former Rose man, will be pleased to hear of his marriage with Miss Edith Fuhr of this city. The wedding occurred on Tuesday evening, June 15th. The TECHNIC joins in extending congratulations.

All the Juniors, with few exceptions, are still in the city. They are working ten hours a day in the shops and will continue until about July 10th. This will allow them to use their practice time during the Senior year to better advantage.

Electric connection was made with the tower clock about four weeks ago, and the members of the telegraph line have been getting Institute time in their rooms every hour of the day. It will not pull them out of bed in the morning, however.

Grant was paying close attention as one of the Junior Civils explained to a fellow-student a problem in stereotomy. When the explanation was finished, he said, "Well, if you fellows understand that as well as I do it would be a mere nothing to you."

The Modulus '98, although two or three weeks later than promised, was received from the printers on the day before the examinations. Instead of issuing them at once the committee decided to put them away until the examinations were over. Their careful forethought no doubt prevented a majority of the students from flunking.

A number of the Seniors have already secured positions, some of which are permanent and desirable.

Martin goes to Kankakee, Ill., to accept a position as assistant engineer at the State Insane Asylum.

Rypinski intends to locate in New York, and Hellweg in Chicago.

Newbold has an engineering position with a mining company near his home in Birmingham, Alabama.

Meyer will edit his father's paper (German), in Appleton, Wis., while his parents go to Europe for the summer.

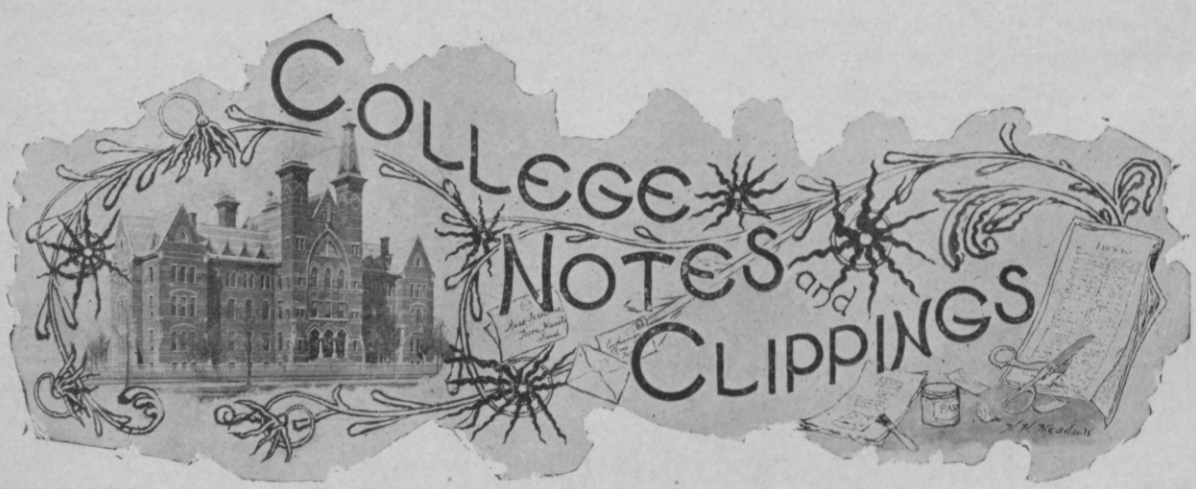
Hall has an office position with the C. & E. I. R. R. Co., at his home in Danville, Ill.

Pierson will act as consulting engineer upon plans and specifications of a bridge to be built near Spencer, Ind.

Lufkin goes with his family to the southern part of Texas. From there he will go to the City of Mexico.

Philip has secured a position with the General Electric Co., at Schenectady, N. Y.

Frank expects to take a post graduate course in Germany next year.



The College of Mexico is fifty years older than Harvard, being the oldest in America.

The colleges of California hold their field days about Christmas time.—*Amateur Athlete.*

Many a self-made man would have done better had he let out the contract to some one else.

There were last year 13,544 students enrolled in the technical schools of the United States.

Wefers, the crack Georgetown sprinter, has broken down, and, it is said, will never run again.

Since going into training the Columbia crew has averaged an increase in weight of eight pounds per man.

The Oxford and Cambridge crews each contained an American among their number in their recent boat race.

College fraternities have fourteen representative newspapers with a combined circulation of 6,380 copies per issue.

Miss Emma Wakefield is the first and only colored woman in the United States to receive the degree of doctor of medicine.

By a bill passed in the last legislature, the preparatory department of the West Virginia University will be abolished in three years.

The regents of the University of California are considering a petition asking that a chair in Norse language and literature be established in that university.

Cambridge has passed a statute by which a graduate, in case of misconduct, shall be deprived of his degrees and university privileges.

Students at Lafayette are obliged to procure written permits from their parents before being allowed to take part in athletic contests.

A gallant young chemistry tough
Who was mixing a compound of stough,
Dropped a match in the vial,
And in a brief whial
They found a front tooth and a cough. —*Ex.*

It is reported that the University of Chicago intends to publish the Lakeside Magazine, which is to be Similar to the Century and is to be a rival of it.—*Ex.*

Vassar college has recently received a gift of some exceedingly rare and valuable books. There are only nine of them altogether, but they are worth at least $2,000.

Another American professor has been honored in Europe. This time it is J. W. Gibbs, professor of mathematical physics at Yale. He has been elected a member of the Royal Society of London, an honor hitherto conferred on only six Americans.

A professor of systematic theology, being unable to hear his class, the following notice was given: "The professor being ill, requests me to say that the seniors may keep on thro' purgatory, and the middle class continue the descent into hell until further notice from the professor.—*Ex.*

Professor (stuck by question)—Mr. Torts, fools can ask questions that wise men can not answer. Torts—Is that the reason so many of us flunk?—*Salmagundi Ex.*

There are forty state colleges in the United States, some states having more than one, and the number of students in 1896 was 32,000, which is about one-fifth of the total number of students in all the colleges in the country.—*The Integral.*

A maid with a duster
Once made a great bluster,
In dusting a bust on the wall,
But when she had dusted,
The bust was all busted,
The bust is now dust, that is all. —*Ex.*

Upon the new gateway at the entrance to the Cornell campus will be placed this inscription: "To enter, that daily thou mayest become more learned and thoughtful; to depart, that daily thou mayest become more useful to thy country and to mankind."

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