Rose-Hulman Institute of Technology

Rose-Hulman Scholar

The Rose Thorn Archive

Student Newspaper

Spring 3-1895

Volume 4- Issue 6- March, 1895

Rose Thorn Staff
Rose-Hulman Institute of Technology, library@rose-hulman.edu

Follow this and additional works at: https://scholar.rose-hulman.edu/rosethorn

Recommended Citation

Rose Thorn Staff, "Volume 4- Issue 6- March, 1895" (1895). *The Rose Thorn Archive*. 1075.
https://scholar.rose-hulman.edu/rosethorn/1075

THE MATERIAL POSTED ON THIS ROSE-HULMAN REPOSITORY IS TO BE USED FOR PRIVATE STUDY, SCHOLARSHIP, OR RESEARCH AND MAY NOT BE USED FOR ANY OTHER PURPOSE. SOME CONTENT IN THE MATERIAL POSTED ON THIS REPOSITORY MAY BE PROTECTED BY COPYRIGHT. ANYONE HAVING ACCESS TO THE MATERIAL SHOULD NOT REPRODUCE OR DISTRIBUTE BY ANY MEANS COPIES OF ANY OF THE MATERIAL OR USE THE MATERIAL FOR DIRECT OR INDIRECT COMMERCIAL ADVANTAGE WITHOUT DETERMINING THAT SUCH ACT OR ACTS WILL NOT INFRINGE THE COPYRIGHT RIGHTS OF ANY PERSON OR ENTITY. ANY REPRODUCTION OR DISTRIBUTION OF ANY MATERIAL POSTED ON THIS REPOSITORY IS AT THE SOLE RISK OF THE PARTY THAT DOES SO.

This Book is brought to you for free and open access by the Student Newspaper at Rose-Hulman Scholar. It has been accepted for inclusion in The Rose Thorn Archive by an authorized administrator of Rose-Hulman Scholar. For more information, please contact ligget@rose-hulman.edu.

THE ROSE TECHNIC.

VOL. IV. Terre Haute, Ind., March, 1895. No. 6.

THE ROSE TECHNIC.

BOARD OF EDITORS:

Editor in Chief.
H. H. MEADOWS.

Associate Editors.

A. V. TULLER . . . . . Alumni
C. H. FRY, JR. . . . . Athletics
H. T. LIGGETT, J. J. KESSLER, H. D. GERWIG . . . . . Local
J. D. INGLE . . . . . Exchange

E. L. SHANEBERGER . . . . . Business Manager
W. R. SANBORN . . . . . Assistant

TERMS.

One year, $1.00. Single Copies, 15 Cents.

Issued Monthly at Rose Polytechnic Institute.

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

THE STUDENT of engineering will read with interest the article in our Alumni department by Mr. H. W. Foltz entitled "The Engineer in Architecture." No doubt the majority of architects do not agree with the ideas therein set forth else the architecture of to-day would not call forth such an argument for its change. As Mr. Foltz remarks, it is not the fault of the public that we have no distinctively American architecture, for as one well knows the people generally rely upon their professional men to guide them and educate them in matters pertaining to the professions. The artist or the photographer, for instance, informs the sitter of the most approved methods of the art school or the latest fad in finishing the photograph, and usually their advice is taken. Likewise could the architects set their standards and educate the people to them if they so choose.

At first glance one is astonished that with all the acknowledged independent spirit of Americans they should not have been independent in their architecture as well. But the trait of hurrying through everything and taking the shortest cut predominates. To copy is more rapid than to evolve original designs and hence the result of copying whenever possible. True, the American has shown his ingenuity in many ways in architecture but rather in the matter of cheapening the cost than in the manner of adorning his edifices with thoughts of his own, or portraying the life of the present time.

* * *

AT THE MEETING of the officers and delegates of the Indiana Inter-Collegiate Athletic Association on the 8th inst. at Indianapolis, our representatives, Messrs. Burk and Fry, captured the Field Day for Terre Haute. The meet this year will be held May 24th, and Rose will again enjoy the pleasure of entertaining the people of Terre Haute with these athletic contests, which have been so popular in previous years.

The delusion under which the other Indiana colleges have been laboring—that Rose could not carry off the Field Day honors if the meet be held elsewhere than at Terre Haute—was utterly dispelled last year by our unprecedented success at Indianapolis. Nor did the joint managing committee make a favorable impression with their failure to arrange the details of the meet successfully. In consequence the Rose delegation found the task of obtaining the Field Day much less difficult than they expected.

Our position may not enable us to judge impartially in the matter, but to us the admission of the State Normal is rather a surprise, as we have hitherto believed the association was intended to be composed of the colleges only of the state.

It seems the controversy over the foot ball game which Butler arranged and played on Thanksgiving Day and which acted as a counter-attraction to the championship game played by Purdue and DePauw on the same day was not amicably settled. The penalty which DePauw demanded for this misdemeanor against the implied though not the literal sense of the constitution, was that Butler be suspended from the association for one year.

Undoubtedly such penalty was too severe, and of course was not complied with.

The action of the delegates in then presenting the resignation of DePauw was pettish and unworthy of that institution, which should of course abide by the decision of the majority. Though the resignation was not accepted it is hoped they will reconsider their action and enter into the State athletics with the friendly rivalry which has always made our meetings pleasant while exciting.

* * *

OUR INDIANA college presidents are continuing their chase after fame and athletics. At their last meeting on March 1st they made preparations for the approaching base ball season by putting numerous restrictions on the relation of our teams to professionalists. The ruling that the college team shall not practice with a professional nine has caused a howl to arise from some corners of Rome. Wabash, we believe, has its plans slightly disarranged by this decision.

The good work of banishing professionalism from our college games should go on, but it is hoped that the reform will not be forced upon us so rapidly as to cause disintegration of our Indiana Association, and compel the colleges to join other leagues.

* * *

OUR ATHLETIC ASSOCIATION, already having charge of the Western Field Day for this year, caused some surprise by bidding for the Indiana Inter-Collegiate meet. The matter stands as follows: The association of Rose Polytechnic took the Field Day of the Western Inter-Collegeate with the expectation of obtaining the support and encouragement of the various colleges constituting that association. Until recently the prospects of the meet being a success have been favorable, but within the past month the officers of the Western have been informed of the temporary withdrawal of several of the stronger colleges for financial reasons particularly, while other institutions seem unable to give their usual support owing to the present unsettled condition of their athletic affairs. At a recent meeting of the directors of our Athletic Association it was decided that since the expected support had been almost completely withdrawn they felt the association was no longer bound to hold the meet and would respectfully suggest that the meet for this year be declared off in the hope that by next season the prospects for Western athleiics may be more favorable. Everything has been done to make a success of this meet but to no purpose. By presenting the matter in the most favorable light and by personal efforts several colleges have been induced to file applications for entrance to the association, but the management here does not intend that the good name of Rose shall be damaged by bringing these colleges to a meet which will not by any means be up to the expectation of a Western Inter-Collegiate Field Day.

* * *

THE FRIENDS of Dr. Mees will be pleased to learn of the recent action of our board of managers appointing him president of the Institute. It is a move which has been looked forward to with great interest and comes as no surprise. Dr. Mees has admirably filled the position of acting president, and gives us every reason to believe that with the reins entirely within his own hands he may be even more successful in the management of Rose.

* * *

WE REGRET that our representative to the Indiana College Press Association meeting at Indianapolis on the 8th inst. could find only one fellow-scribe with whom to hold the morning session, and owing to the necessity of attending the athletic meeting was unable to appear at the afternoon session if one convened.

* * *

SOME PUMP PARADOXES.

BY INSTRUCTOR JOHN B. PEDDLE.

The following are notes on some rather peculiar facts which have come under my observation while testing steam pumps:

The pumps were all of the duplex pattern, *i. e.* each machine consisted really of two pumps placed side by side, and the two water cylinders were cast in one piece.

The first pump I wish to speak of is a small one, a 2x1$\frac{1}{8}$x2$\frac{3}{4}$, I think; its working water pressure being 250 lbs. per sq. in. with 100 lbs. steam.

The pumps before leaving the shop are put through a variety of tests designed to bring out any defects in material or workmanship. One of these tests is for "lost action." The delivery valve is tightly closed and steam is turned on until the water pressure is up to the normal. It is of course impossible to make the water piston absolutely tight without an expensive construction and the leakage therefore permits the pump to move slowly.

The number of strokes per minute is counted and if it is too great the pump is returned to the maker to be fixed.

While making this test on the pump in question I noticed that at certain parts of the stroke the water pressure jumped up to 500 lbs., just double what it should be, and much more than theory would indicate as possible with the given steam pressure and proportions of steam and water cylinders, even supposing friction to be entirely eliminated.

Perhaps I should explain here that in the duplex pumps the pistons on the two sides do not move together. The piston of No. 1 side begins to move and at half stroke throws the steam valve on No. 2 side, whose piston then starts and at mid stroke throws No. 1 steam valve. No. 1 piston then makes its return stroke, throwing No. 2 valve again on its way, and so completes the cycle.

The two pistons are thus traveling in the same direction part of the time and part of the time in opposite directions.

The increase in pressure noted was while they were traveling in opposite directions, as shown in the accompanying sketch of the water cylinders.

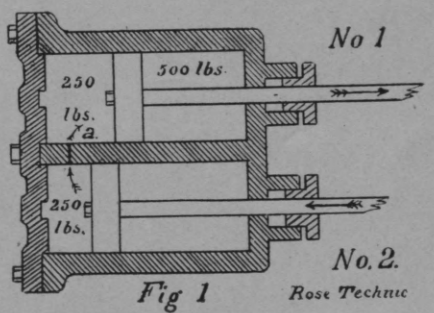


Fig 1

The only way in which I could account for the abnormally large pressure was by supposing that there was a small hole between the two water cylinders at some such place as *a*.

This hole, when the pistons were moving in opposite directions would allow the water ahead of No. 2 piston to leak over into No. 1 cylinder and on the suction side of its piston. If the pistons were moving slowly enough almost the entire water pressure ahead of No. 2 piston would be transmitted to No. 1 piston and thus double the pressure ahead of it.

This, in fact, proved to be the case, for upon opening No. 1 cylinder and putting a water pressure upon No. 2 side, a fine pin hole was discovered in the wall between them.

It was so small that it did not affect the ordinary running of the pump and only became a source of trouble when the pump was moving very slowly.

The next case was a larger low service pump with no air chamber and with metal valves. Metal valves are preferred by some to rubber valves, on account of their longer life, but they cannot be made so tight.

This pump was also going through its "lost action" test and it was noticed that the pressure increased greatly on the outboard stroke of No. 1 side, so much so that the pump (which was, as I have said, low service, and therefore lightly built) was finally cracked.

The stroke in which this increased pressure was noted was rapidly made. Investigation showed that the plunger casting was very spongy in the web which separates the suction from the delivery side, and that when the pressure was put on it held water about as effectually as a sieve.

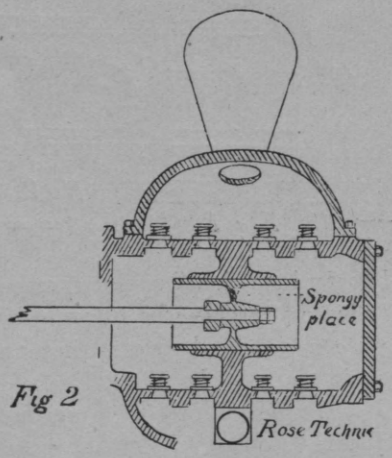


Fig 2

The effect of this large leak when the pump was moving very slowly was to virtually reduce the plunger area to that of the plunger rod, and therefore make possible an enormous increase in the water pressure. This increase was not markedly shown when the delivery valve was open and the pump running under normal conditions, the only effect of the whole being an increase of speed on the faulty side.

With the delivery closed the only escape for the water was under the leaky valves and in this case it proved insufficient to protect the pump.

The question will naturally suggest itself as to why this increased pressure is not always shown when a pump is being tested for lost action, for although the motion is much slower we have the same condition of a greater displacement in one direction than in the other. A number of explanations can be given. An air chamber such as pumps are usually provided with will take care of a great deal of this extra pressure.

Metal valves are rarely tight and when the pump is moving slowly will usually allow a sufficient amount of water to leak backwards to prevent any great increase in pressure.

Soft rubber valves while tighter are elastic and are deformed more or less by the water pressure, and, when there are a large number of them, probably yield enough to take up the plunger rod displacement.

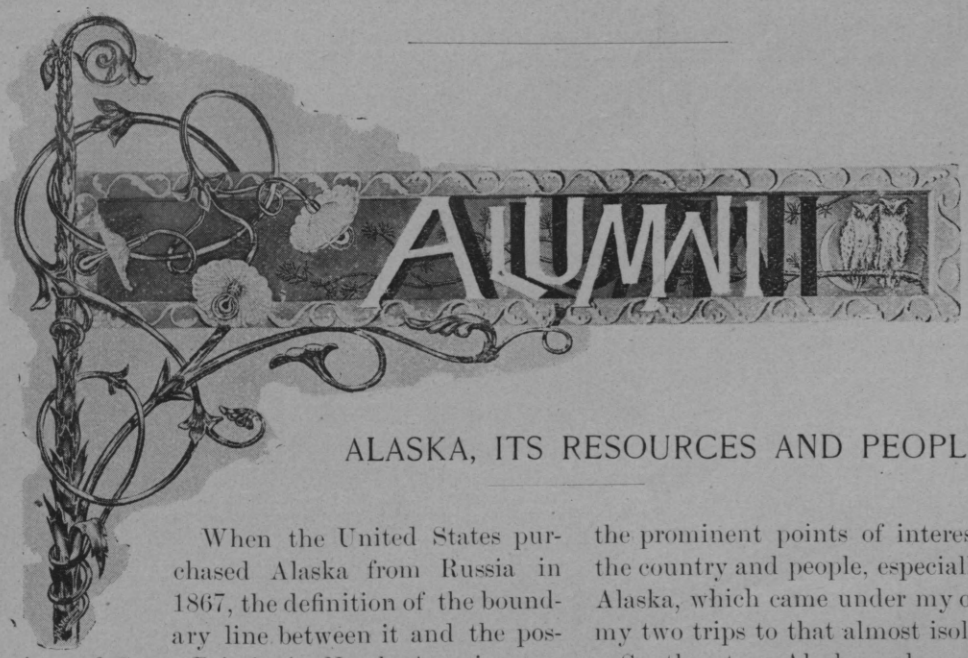
The next two cases are probably familiar to some of my readers, but at the risk of repeating an old story I will give a brief statement of them. The first is in regard to the possibility of getting a greater pressure in the air end of an air compresser than the ratio of area of steam to air cylinder multiplied by the steam pressure would seem to indicate as possible. That is, suppose we have a pump with air and steam cylinders of the same area and that the steam pressure is 50 lbs. It is possible with the right conditions to get an air pressure in excess of 50 lbs. I am referring of course to a direct acting pump, one in which there is no cut-off in the steam cylinder and which therefore gives a square steam card.

The air is taken into the air end at atmospheric pressure and delivered to the receiver at a much higher one and its card will therefore show the familiar compression line. When a stroke is commenced the resistance offered in the air cylinder is small and the velocity of the moving parts will rapidly increase and continue to increase until the resistance to motion balances the steam pressure. If the moving parts are heavy they acquire a great deal of energy in the first part of the stroke, which energy is given out later in raising the air pressure above that of the steam.

The last "paradox" which I wish to mention is the fact which has been noted a number of times of a pump delivering a greater quantity of water than the pump, considered as a meter, showed. If we take the displacement made by a pump plunger in one stroke and multiply it by the number of strokes the result should be the quantity of water which has passed through the

pump. Experience shows that owing to leakage, imperfect filling, air in the water, etc., the delivery will usually be slightly under the calculated amount, but there are cases where it is greater. This will usually be found to be the case with low service pumps which have a large valve area, light valve springs and large suction and delivery connections, offering but little resistance to the flow of the water.

The explanation is this: The plungers do not move continuously at a uniform rate of speed, as they must slow up and pause at each end of the stroke. If there is but little friction in the water way to the pump and the suction lift is not great the pump cylinders will fill promptly at the fastest part of the stroke, and when the plunger slows up the momentum of the water behind will cause it to press on and through the delivery valves (the delivery pressure being small) without waiting for the plunger to commence its return stroke. When it does, however, it finds a cylinder full of water to act upon, so that the water which got through while the plunger was slowing up and stopped was not metered at all.



ALASKA, ITS RESOURCES AND PEOPLE.

When the United States purchased Alaska from Russia in 1867, the definition of the boundary line between it and the possessions of Great Britain in North America was very unsatisfactory. Within the last few years thousands of dollars have been expended by both nations in making surveys so that the question could be settled entirely agreeable to both parties. The writer being connected with the Coast Survey at that time was detailed upon this work, and spent the summers of 1893 and 1894 in that country.

Since this controversy concerning the boundary line has brought our great northwestern territory prominently before the public, I shall endeavor to give to the readers of THE TECHNIC some of the prominent points of interest connected with the country and people, especially of southeastern Alaska, which came under my observation during my two trips to that almost isolated region.

Southeastern Alaska embraces an area of about 500 miles long and 50 miles wide, cut by thousands of miles of winding channels into thousands of islands. The steamer route from Port Townsend, Wash., to Sitka, Alaska, is through these labyrinthine waterways which are sheltered from the swells and storms of the Pacific by the outlying islands. In making this trip all the advantages of a sea voyage are obtained without coming in contact with that dreaded monster sea sickness.

No artist's pen can set forth the scenic beauty one meets with on every hand as the ship plows

her way through the tortuous windings, sometimes with, sometimes against the tide. There are places where the velocity of the current of the tide at ebb or flood renders navigation extremely dangerous. This is especially noticeable at Seymour Narrows, where the tide attains a volocity at from 12 to 14 knots per hour. Such places can be passed through only at slack water, that is just at the turning of the tide.

While many of the islands which form this delightful archipelago are mere barren rocks, a majority of them are mountains belted with splendid timber at their bases and piercing the clouds with their snow covered summits.

The first thing one admires is the narrow and almost unfathomable channels through which the steamer passes, banked on either side by mountains thousands of feet high. Some of these passages are so narrow that one could stand on the deck of the steamer and throw a pebble to either bank.

Advancing northward the scenery becomes grander and wilder. The mountains which at first were clothed with vegetation from the water's edge to their snow clad summit now show a decidedly bleak appearance and their bald rocky heads glisten in the sun. Glaciers now become numerous and on every hand small ones may be seen on the mountain sides. As the ship slowly turns to port or starboard a new stretch of waters opens up to view, and away in the distance white objects may be seen floating in the water. These are the icebergs from some "live" glacier. The most notable of the many "live" glaciers of Alaska is the Muir. As one approaches it, it has the appearance of a frozen Niagara. It has a frontage of three miles long and 250 feet above and almost double that amount below water. The average† movement of this vast river of ice is about 40 feet per day, discharging into the ocean about four hundred and forty million cubic feet of ice every twenty-four hours.

The glacier region of southeastern Alaska is however comparatively small, and is not a type of the general topography of the country. The region of perpetual snow and ice lies to the northward of Sitka. Along southeastern Alaska the winters are not nearly so severe as in the New England states. The reason for this state of things is the same as makes the northern countries of Europe inhabitable. What the Gulf stream does for those countries is done exactly in the same way by the great Japan current which dashes its warm life-giving flood against the shores of southeastern Alaska.

There are portions easily accessible where a man can make just as comfortable a living, where the sun shines just as brightly and where the wild flowers grow just as profusely as in the majority of our northern states. During the spring and summer months rainy weather is experienced, but one soon gets used to that. The thermometer ranges between 50 and 60 degrees for weeks at a time, scarcely varying 5 degrees.

Alaska has an area of something over 577,000 square miles. Its shore line exceeds in length the combined lengths of the Atlantic, Pacific and Gulf coasts, which belong to the United States by about 7,000 miles. The Arctic ocean which freezes along its northern shores is the resort of the greatest whaling fleet in the world, and thousands of dollars are taken out annually in this industry alone. The two islands the St. Paul and St. George are the breeding places of the fur seal, for hunting which the Alaska Commercial Company pays our government a royalty which up to 1889 had amounted to about five million seven hundred and fifty thousand dollars.

The industries which at present engage the attention of a majority of the inhabitants of southeastern Alaska are fishing and mining. The great Treadwell gold mine on Douglas Island has the largest stamp quartz mill in the world, and it can be fairly stated that fully $75,000 worth of the yellow metal is taken out monthly. There are other claims near by which are being rapidly developed and promise soon to be rivals of the great Treadwell. The fisheries of Alaska have long since surpassed the fur trade as an industry, and is increasing with such rapidity that it is destined

† Movement obtained by Prof. Wright, Oberlin College, which is rather larger than obtained by other scientists.

from 36,000 cases in that year to 790,000 cases in 1891, each case containg four dozen one pound tins. The constant increase in the demand for Alaska salmon means an extension of this industry to proportions hardly dreamed of.

The next important industry—or what soon will be—is that of the codfish and halibut. The fishing banks of New Foundland are nearly exhausted, and the constant troubles between the American and Canadian fishermen will soon force the former to stop fishing, and then the rich banks of western Alaska will be developed. At present the annual catch of the codfish amounts to something less than $500,000, but the fields if developed would supply the world with fish. Already the eastern markets are being supplied with Alaskan cod, and ever since its introduction there the demand has constantly increased.

Another new business has sprung up and has been a success from the start. It is the manufacture of fish oil and fertilizer. The oil is used—so the manufactures say—in the tanning of hides. This is true to some extent, but as the annual output of the single factory in Alaska is more than enough to tan the entire production of hides in the United States, the question which presents itself is what becomes of the surplus? It is refined and shipped to the states in barrels and there bottled and labeled "olive oil." Since the prices for the so-called "olive oil" is much greater than the crude fish oil, it is doubtful whether the "refining process" is confined only to the "surplus." Tha fertilizer is made from the fish after the oil has been extracted and is used quite extensively in the western states.

Coal, copper and other minerals have been found in large quantities but the demand for them has been so small that it would not pay to mine them. As soon as there is a demand for coal as fuel for local consumption, some of these fields may be developed sufficiently to furnish employment for this kind of labor.

That the timber of Alaska will ultimately come into recognition as a resource of very large importance, is not to be doubted. Thousands of acres of spruce, pine and cedar forests are now lying useless for lack of liberal legislation. Timber can now be cut only for local consumption, but when the laws for this territory are so amended as to allow the settler to locate claims the sound of the woodman's axe will be heard and a new and prosperous era will be ushered in. The soil although shallow is rich, and would of itself support the native population. Very little farming, however, is indulged in, the abund ance of fish and game furnishing the Indian with sufficient food for winter's use without taking chances on a failureof his crop. The white settlers have begun to plant gardens and have been very successful with them. Wild fruits, such as strawberries, currants, cranberries, etc., grow ingreat profusion in some parts. The most industrious of the Indians gather these berries and put them away for winter's use.

The native people of the territory are Indians, but they are wholly unlike the typical North American Indian in personal appearance, habits and customs. Taken as a whole, those of southeastern Alaska are bright and intelligent. They seem to have, however, no conception of personal cleanliness, and no exhortation however eloquent on the part of the missionary can induce them to take a bath. Some of them were the most foul beings I ever saw, and it was terrible to note the diseases under which many of them were wasting away. Their love for seal oil no doubt partly accounts for this state of things. This vile stuff, which is laid on the body from childhood to old age, causes the Indian to present an appearance which is unwelcome to the eyes and nose of the white man. It seems to be almost an Herculean task for the missionaries to attempt to wean these people from their old and accustomed ways. I was told by one of the missionaries that he had had a boy at his school for seven or eight years, and had given him every advantage; good clothes and good food, but even now he had to be watched to prevent him running off and joining his family in their filthy hovel.

The natives have never as yet caused the white men who have come among them any trouble, and the most cordial and friendly relations exist

to have a place among the great industries of the world. Since 1883 the salmon catch has increased between them. The early settlers recognized that in order to protect themselves full justice must be given to the Indian. They therefore adopted laws protecting the rights of those upon whose domains they were encroaching, and whenever these laws were overstepped the offenders were either put to death or driven from the region. Whatever the Indian does for the white man he is always paid for and usually at a high price.

We could not complain of loneliness while near an Indian village, for scarcely a day passed when some of these social people omitted calling, and they would usually remain until kicked out. They are inveterate beggars, and we soon found out that to give one the "crumbs which fell from our table" meant that the whole village would turn out and demand the same favors.

The Indian never works if he can help it. They travel mostly by water in their cedar canoes, but rarely do they ever row or paddle them. Old pieces of cotton sewed together constitute their sails, and with these set they manage to move from place to place. I have seen them lie on the banks of a river for days at a time waiting for a fair breeze to take them up to their fishing or hunting ground, even if it was only a half mile or less away. Alcohol has been their worst enemy and I believe until the white man came among them they were a happy and contented people.

No features of Alaska are more noteworthy, geographically, than its great river, the Yukon, and its lofty mountain peaks. This great river rising within twenty miles of the Pacific ocean flows for 1,000 miles northwesterly, passing inside the Arctic circle and then heading southwesterly, flows on for another 1,000 miles until it reaches the Bering sea. It is up this river and its tributaries that today are the greatest placer mining fields in the world.

Mount St. Elias, 18,010 feet high, and until a few years ago, had the distinction of being the highest peak in North America, stands as a corner stone for the boundary line between Alaska and British America. Mount Orizaba, in Mexico, whose height as determined by Dr. Scoville, of Terre Haute, is 18,300 feet, must give up the palm which she wrested from St. Elias and bow her head in submission to another of Alaska's mighty giants. Observations place the height of this hitherto unknown peak at *19,500 feet.

* Rough computations of the observations made by a C. & G. S. party last summer place the height of the mountain at the above figures. I have not learned whether the office computation has changed it materially or not.

S. B. TINSLEY, '92.

LOUISVILLE, KY., March, '95.

THE ENGINEER IN ARCHITECTURE.

The confusion of styles in the American architecture of today is certainly most discouraging to those who would have a style distinctively American—a style in which the influence of our life and its environment shall be frankly and unmistakably expressed, silently speaking of us and of our time to those who come after. The student of today reads in their buildings the feelings and aspirations of the people who erected them, and discovers deliberate and unconscious expressions of their prevailing sentiments, their social and political condition. Were it necessary, we might trace two distinctively parallel lines in history—one, the history of civilization; the other, the history of style in architecture. In each case we should find a gradual development, a rapid succession of events, a revival, perhaps almost a revolution, and the consequent reaction, always together, like cause and effect, showing that life and architecture must correspond and that architecture, treated historically, has a direct bearing on the history of the world.

Such being the case, it therefore behooves us to see that our own civilization is having a proper and fitting representation in our monuments. Our buildings are the exponents which denote the power to which we are to be raised. We must have a language if we would talk to our successors. In order to build a living architecture, we must build as we live. Assuming that we *are* building as we live, one is compelled to accept the conclusion that we must change our present ideas of life before we can hope for a better and nobler national architecture. Speaking broadly

and without local restrictions, we see reflected in our architecture of today a people practical and economical to a dangerous degree, positive and exacting, trained in habits of business, wide-awake and avaricious. A dangerous superficiality of thought and work characterizes our buildings, arising from a prevailing spirit of impatience. Possibly in no other one thing is the passion of the average American to "cut across lots" more forcibly illustrated than in the character of his buildings. The potency of estimates on cost also stares one too plainly in the face at every turn.

My quarrel is not with the American public, however. I believe that when something really good is put before them, they will not be slow to appreciate its beauties. The aim of this paper is rather to point out another obstacle to architectural progression and, if possible, suggest a remedy. The writer believes that the responsibility or the chaotic condition of our nineteenth century architecture is largely due to the architects who refuse to work in unison with our time—those from whom the question of styles at this time receives too much attention and takes too high a place in their attitude to the subject. The advancement of American architecture has possibly suffered from no other cause so much as from the abuse rather than from the judicious use of the finished architect's knowledge of architectural history. Could his study of ancient architecture be pursued as a history of people and nations, all well and good; but this study, judging from the confusion of styles with which this country has become afflicted, has evidently been acquired solely for the architect's professional advantage. The tendency seems to have been rather to create in him a spirit of imitation, and with it a mania for such absolute correctness as tends to bind him hand and foot inthe exercise of that free spirit of invention so necessary to the development of an architectural style of and for our time. He feels called upon to be correct in the archæological reproduction of the minutest details in his design and leaves little or no opportunity for the honest adaptation of his work to the new social and material conditions constantly pressed upon him in the advancement of knowledge and civilization. "Archæology is not architecture and the hope of modern architecture does not reside in the library of the antiquary," sagely says Fergusson, in his admirable History of Architecture.

Where, then, is the new architecture to come from and what manner of man is to be its exponent? Comparing the architecture of recent years with that which has gone before, we can certainly not accuse the signs of the times of pointing to a revival of any one of the so-called historic styles in architecture. There is manifest rather the existence of some influence insensibly and unconsciously working against the intention to imitate foreign styles and this influence which is gradually making itself felt I believe to be no more nor less than that of the engineer in architecture. In other words, the architect of the future is to be an engineer, trained to deal with the practical problems of a practical age.

Before the advent of our engineer, however, we must have an increased number of American architectural schools and a radical change in the course of instruction from that now generally outlined. At present the tendency of the schools seems to be the turning out of architectural pirates, rather than architectural engineers. More importance should be attached to the development and perfection of the constructional methods constantly being demanded by new materials and devices, and the proper clothing of the structure will follow in just so great a degree as the plan and its construction is made right. Instead of teaching the student to make his buildings appear structurally what they are not, thereby creating an expression of insincerity and incongruity, he should be taught that the true basis of architectural composition of the highest order is to proportion and decorate structure, which means that the architecture of the future must necessarily assume new character, at least in its outlines, supplanting to a great extent those classic ideals which custom has arbitrarily imposed upon modern practice. The question should not be how to effect a compromise between

architecture and engineering, but how to make architects of engineers—how to translate the prose of the latter into the poetry of the former. This is the problem which confronts the architectural schools of today and the sooner its importance is realized and its solution attempted by them, the sooner will the new architect make his advent.

The schools should first be freed of the foreign influences working in and about them. They should be Americanized. Our architecture, like our art, is influenced to too great an extent by the French school. Our students are taught that they should "finish" in some Parisian studio or atelier. It is a noticeable fact, however, that the artist who is most appreciated by the masses, be he painter, poet, or musician, is not necessarily the "finished" artist. What the American people want are pictures, stories and songs appealing to their native love of home and country. So with the architect and his art. A living American architecture is demanded. Its coming is already assured and the chief factor in its arrival will undoubtedly be the introduction of the engineer into the professional ranks.

I do not wish to be misunderstood as decrying foreign travel and study, which I believe to be of incalculable benefit to the architect if pursued at the right time and in the proper spirit. The mind of the student, impressionable and susceptable as it is apt to be, is sure to be more or less permanently influenced by contact with the great monuments of the past, which the mature mind of the practitioner might look upon impassionately and advantageously. To accomplish the most good, foreign travel and study should therefore be reserved for the practising architect rather than for a finish to the student's education.

Our future architect will have learned that tradition in architecture does not mean that of the Romans or of the Dark Ages but of the year 1894 as against 1895, with the possibility of changing that tradition if necessary or desirable. He will not feel compelled to make his church Gothic, his theatre Renaissance, his warehouse Romanesque in style. His church and his theatre may be built side by side in the same style, yet his church will look like a building erected for devotional exercises and his theatre like a place devoted to amusements. "Of course," says the skeptic, "that's easy enough. He will distinguish between the buildings by means of appropriate symbols and devices in the decorations and details." But our engineer will have been taught to create this difference in the character of the ensemble, and instead of looking about for some "style" in which to work up his exteriors, will be content to give his plans and construction outward simplicity and frankness, making the thing containing explain the thing contained and using ornament solely to develope the ideas of the necessary construction. He will recognize the one law for ornament, viz.: emphasis only of the facts which ought to be emphasized and we will see reflected in his work directness, simplicity, naturalness.

Some argue that the two classes with which we must contend are on the one hand, those who would break with the past and, on the other, those who would select from the past according to their own fancy. But why not break from the past altogether? Who can tell what we might have had in this country had we been compelled to build without precedent. The odd thing is that the best architecture has been largely a matter of compulsion. The architrave and frieze of the Greeks was compulsion to the Egyptian because he used a flat stone roof in his temples supported on lines of stone beams. The Romans were compelled to evolve an architectural style of their own because of conditions confronting them with which the Greeks had not to contend, viz.: scarcity of skilled workmen and the difficulty in transporting bulky building materials. They borrowed nothing but their plans from their predecessors. The style of the Gothic architecture is the expression of that feverish and morbid aspiration peculiar to mediæval life. This people could not be satisfied with the simple architectural forms of classic times but aspired to lofty monuments that would exalt and bewilder. The new conditions demanded new constructional methods and in consequence a style peculiar to themselves and

their time resulted. The opportunity for history to repeat itself is given to us and are we to proclaim to future generations our inability to shoulder the responsibility thereby imposed? It is indeed a serious question which confronts us.

The writer calls to mind an incident which came to his notice and is mentioned here to illustrate the comparative importance attached to design and construction by at least one instructor in architecture and it is safe to presume that there are others with similar views. The composition was a design for a court house to be worked up in a certain "style." A fellow student, having his plans and exterior complete, was in doubt as to a proper construction to correspond. Having the courage of his convictions, he mentioned this doubt to the instructor. "Can't learn everything at once," was the reply. "You'll have to get the construction by experience." The fact that good architecture is the decoration of construction did not seem to apply in this case, at least.

My plea, then, is for a recognition of the engineer in architecture and for his proper education. To this end I would have the technical schools in general create and maintain courses in architectural engineering, presided over by practical men, Americans if possible, free and untrammeled by any foreign traditions, which seem to so fascinate those who come under their influence. Perhaps some day the powers that be may see fit to add such a course of instruction to the engineering curriculum already at Rose and in ad dition to sending chemists, mechanical, civil and electrical engineers into the world, architectural engineers may also be started on their way rejoicing, fully impressed with the importance of their mission and capable of proving to a waiting public that the new architecture is to be ornamental and ornamented engineering.

HERBERT W. FOLTZ, '86.

INDIANAPOLIS, March, '95.

NOTES.

T. L. Condron, '90, of Chicago, made a business trip recently, visiting all of the principal mills and bridge shops in and around Pittsburg, Philadelphia, Toledo and Detroit. Combining pleasure with business he did not fail to call upon the alumni within his reach. He spent three days in Washington, visiting Hood, '93, and Putnam, '90. The former is reported as having a full beard. In Detroit hemet Mr. and Mrs. Gillett and their eight months old daughter. In Pittsburg he saw Rock, '92, Waters, '88, and Weller, '87. In Indianapolis, Foltz, '86 and Jones, '91.

The Salt Lake City Argus, of February 23, contained the following interesting item concerning a '92 man:

"The engagement has been announced of Miss Ella Druehl and Mr. Milton L. Oglesby. Both of the young people are the most popular in society."

Edward Riedel, '94, has left Point Pleasant, W.Va., and is now assistant to the chief engineer of the Louisville Railway Co. His address is 638 East Broadway street, Louisville, Ky.

S. S. Raymond, '90, has the position of president and general manager of the Madison Mining and Milling Co., near Sappington, Mont.

H. B. Jones, '91, is with H. W. Foltz, '86, architect, 50 Ingalls block, Indianapolis.

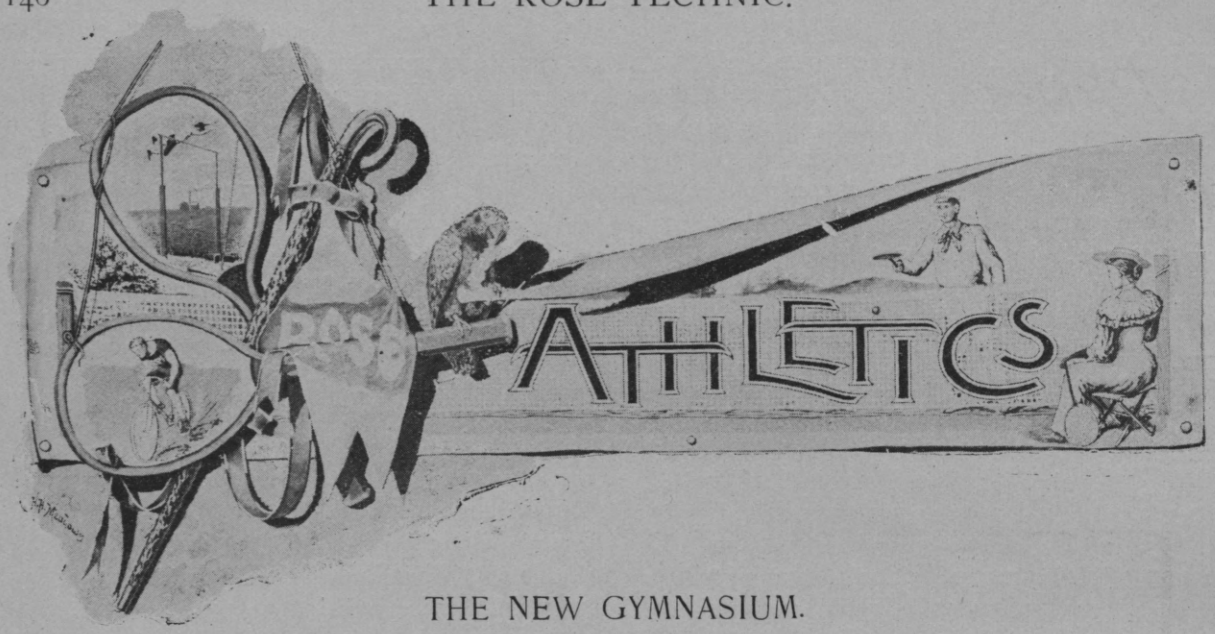
Max Fitch, '90, of Mattoon, Ill., spent Sunday, March 10, in Terre Haute.

W. H. Waite, '92, was in Terre Haute Feb. 17.

A FRUITFUL THOUGHT.

A very grave and learned judge
Is said to have declared
That when a man is once impeached
His prospects are impaired.

—*Uni. Herald.*



THE NEW GYMNASIUM.

We have lately received from several members of our Alumni various inquiries respecting the new gymnasium, and in order to answer all of them fully, it will be necessary for me to give a brief sketch of how this gymnasium scheme originated and how far it has progressed up to the present date.

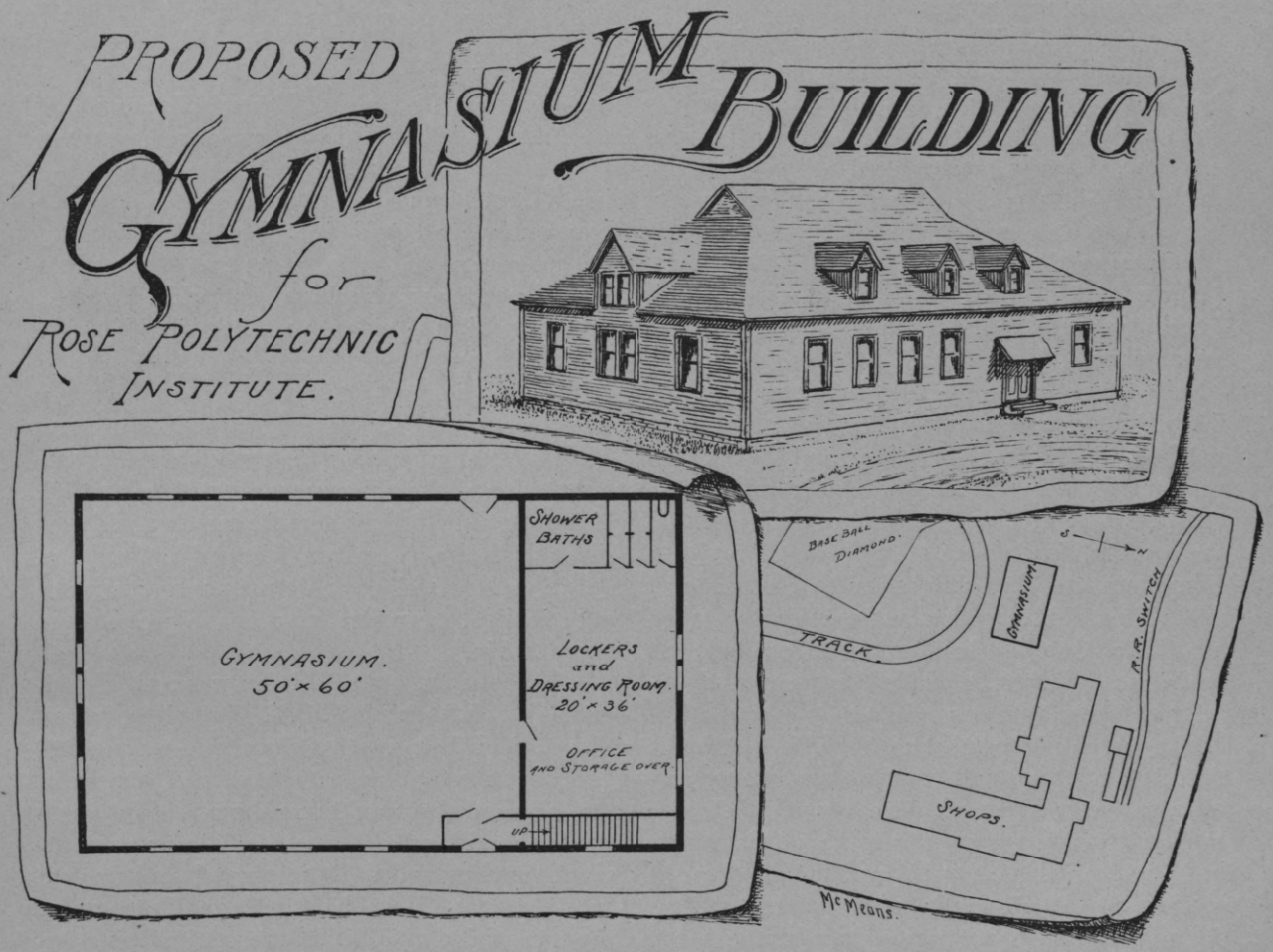
Every class which has graduated from this Institute has recognized what an immense benefit to the school this building would be, but the class of '93 was the first to take any steps toward obtaining it. They failed in the undertaking mainly from two oauses, which were: First, they wished to erect the building as a monument to their class, thus making it a class affair which prevented them from seeking aid from the other students; second, they tried to raise money by giving a series of entertainments which proved a source of loss instead of gain. In fact the movement was dropped almost as soon as begun, as the undertaking was entirely too large for one class to make a success of.

The attention of the Athletic Board was first turned toward a gymnasium last fall by the President of our Institute (Dr. Mees), who came to us with an offer from the Trustees to improve as much as possible the room in the basement, if we thought it was worth it and would give them any assurance that it would be used after such improvements had been made.

After a careful examination of the apartment it was decided by a committee that any money expended upon it would be wasted, and it was then suggested that, if the School Board could give anything toward such an object, would it not be better to put it toward a new building and try to raise something among the students and Alumni to add to it. After some discussion we came to the conclusion that the most manly, independent, and in fact the only way worthy of our students, to raise this money was for each man to bear his share of the burden, and to give from his own pocket all that he could possibly spare.

Of course our Alumni were looked upon as brothers, and it was expected that the students of the past would take as much interest as the students of the present in anything which could and would add glory to the "Old Rose and White."

Dr. Mees assured us that both the Faculty and Trustees were in hearty sympathy with the move-



ment, but made no definite statement of what financial aid they would give us. In fact he was never questioned upon that point, as it was thoughs best to show both Faculty and Trustees what we could do for ourselves before going to them for help. I may as well add here that he has since informed us that if we succeed in raising fifteen hundred dollars ($1,500) that they will guarantee that a building shall be erected which will cost between two thousand and twenty-five hundred dollars.

Several of our Alumni have sent in requests that they be informed, before sending in their subscriptions, just what the students, Faculty and Trustees were going to give.

As everyone must recognize, it is certainly necessary that some one shall take the initiative in a matter of this kind, and when the question arose as to which should be called upon first for subscriptions, the Alumni or the students, it was decided in favor of the former, as they are looked up to by every student and their opinions and example would carry much weight. As was stated in our first circular we wish every man to give what he can afford and what he thinks the cause justifies without any regard as to what others are donating.

Subscriptions will be solicited in the school this week, and I think I can assure the Alumni that every student will do all in his power to

make this thing a success.

The amounts which are obtained each month will be published in THE TECHNIC, as is suggested by one of our Alumni, but I am very sorry to state in this communication that, up to the present time, we have received only twenty answers to the one hundred and twenty-five letters sent out, although the subscriptions amount to nearly two hundred dollars ($200).

Now another one of our Alumni asks why this building cannot be put up immediately and also seems to be of the opinion that these subscription blanks are not to be filled out until January, '96. There is only one reason why this gymnasium can not be built within thirty days and that is, that the contractors of this city are not in the habit of putting up buildings without some guarantee that they will receive a part of their money at least. Now the sooner these blanks are sent in the sooner will this building go up, so I would urge upon all of our Alumni who have not filled them out to do so as soon as possible so that we can see exactly how much we can raise.

The present financial condition of our Athletic Association would not warrant our taking any money from the treasury for a gymnasium so we cannot count upon anything from this source, but I am confident that if our Alumni takes the interest in their Alma Mater that we believe they do, we shall have no trouble in raising between them and ourselves the required fifteen hundred dollars.

In closing I will say that the Athletic Board is very much in earnest about this entire matter, that they have gone over all the ground carefully, have considered each step fully, and intend to make this effort a success if such a thing is possible. We shall be delighted at all times to answer any questions our Alumni may choose to ask and hope they will not hesitate in seeking information in regard to any part of the plans about which they are in doubt. Also any suggestions which they care to make respecting plans, costs, &c., will be gladly received and considered by the Rose Polytechnic Gymnasium Committee.

A. L. ROBINSON, Sec'y.

INDIANA INTER-COLLEGIATE ATHLETIC ASSOCIATION.

The executive committee of the I. I. C. A. A. met on the afternoon of Friday, March 8th, in the Denison House, Indianapolis, for the purpose of arranging a schedule for inter-collegiate base ball for the coming season and to decide on a location for state field day, also to attend to any other business that might come up.

The meeting was presided over by Mr. Marshall, of Purdue, in the absence of both president and vice president.

The first important matter for consideration was the application of the Indiana State Normal School for admission to the association. A representative of the school was present to lay their claims for recognition before the meeting, and after listening to his statements in regard to their present condition and their future prospects in the athletic line, they were unanimously elected to membership.

The location of state field day was next considered. W. E. Burk, of R. P. I., invited the association to hold their meet at Terre Haute again this year, mentioning the fact of our past success in this line and also speaking of our splendid facilities for handling such an affair. As no other invitation was extended, Butler moved that the state field meet for '95 be held at Terre Haute under the supervision of R. P. I., the motion being carried unanimously.

By far the most interesting matter of the entire meeting was the settlement of the controversy between DePauw, Purdue and Butler, over the foot ball games played in Indianapolis on last Thanksgiving day. As is well known, on that day the regular annual game between the first and second teams of the year before, which in this case were Purdue and DePauw, was seriously interfered with in the way of attendance because of a counter attraction in the form of a game between Butler and the Light Artillery of Indianapolis.

DePauw took the initiative in the matter, stating that their rights had been disregarded and trampled upon in a manner that was not to be tolerated,

and they demanded that Butler be suspended from the association for the balance of the year, at the same time declaring their intention of withdrawing from the association in case of a failure to comply with their demand.

A very spirited discussion ensued in which considerable personal feeling was displayed. It was the opinion of the unprejudiced delegates that in consideration of the fact that Butler had not been guilty of any violation of the constitution, and that it was a first offense, that the penalty of suspension would be too severe. DePauw's demand was finally put into the form of a motion and lost. Nevertheless, the committee felt that Butler's course deserved their condemnation, and accordingly a committee of three was appointed to draw up resolutions to that effect, also to submit an amendment to the constitution covering such cases as the one under consideration, in order that nothing of the kind might occur in the future. Following is a copy of the report of the committee, including the revision of Sec. 3, Art. VII of of the constitution:

REPORT OF COMMITTEE.

Resolved, That in view of the action taken by Butler University in playing Thanksgiving Day game contrary to implied powers of the constitution, be it

Resolved, That, finding her guilty of said conduct, and upon her confession of same, that she receive the unanimous censure of the colleges represented in the I. I. C. A. A.

SECTION 3, ARTICLE VII.—REVISED.

The Thanksgiving Day game shall be played at Indianapolis, between the two teams standing highest the year before, and no other team of the Association shall play in said city on same day. The net proceeds of the gate receipts to be equally divided between the contesting teams after 1892. Purdue University shall receive the net proceeds of the gate receipts of the year 1892.

At the conclusion of this report the DePauw delegate arose, announced the withdrawal of DePauw University from the association, and left the room. The action of DePauw was very much regretted by the other members of the association, and it is to be hoped that upon a reconsideration of the matter they will decide to take their accustomed part in the field day sports and in base ball.

A resolution was passed endorsing the recent action of the college presidents in reference to professionalism in connection with base ball, and the following amendments to Art. VIII of the constitution were adopted:

AMENDMENTS TO ARTICLE VIII.

SECTION. 5. No student shall play in any game under an assumed name.

SEC. 6. All games shall be played on grounds either owned or controlled by one of the colleges participating in the contest.

The representatives of the various colleges then got together and arranged the base ball schedule for the coming season, as follows:

April 13.—Butler at Purdue.
April 20.—I. S. N. at R. P. I.
April 20.—Wabash at Butler.
April 27.—R. P. I. at Butler.
April 27.—Wabash at Purdue.
April 27.—I. S. N at Purdue.
May 3.—R. P. I. at Hanover.
May 4.—Purdue at Wabash.
May 4.—I. U. at Butler.
May 10.—Hanover at I. U.
May 11.—Purdue at R. P. I.
May 11.—Hanover at I. S. N.
May 13.—Hanover at Wabash.
May 14.—Hanover at Purdue.
May 18.—R. P. I. at I. U.
May 18.—Butler at I. S. N.
May 25.—I. U. at Purdue.
May 25.—Wabash at R. P. I.
May 30.—Butler at Hanover.
June 1.—I. S. N. at I. U.
June 8.—I. S. N. at Wabash.

NOTES AND CLIPPINGS.

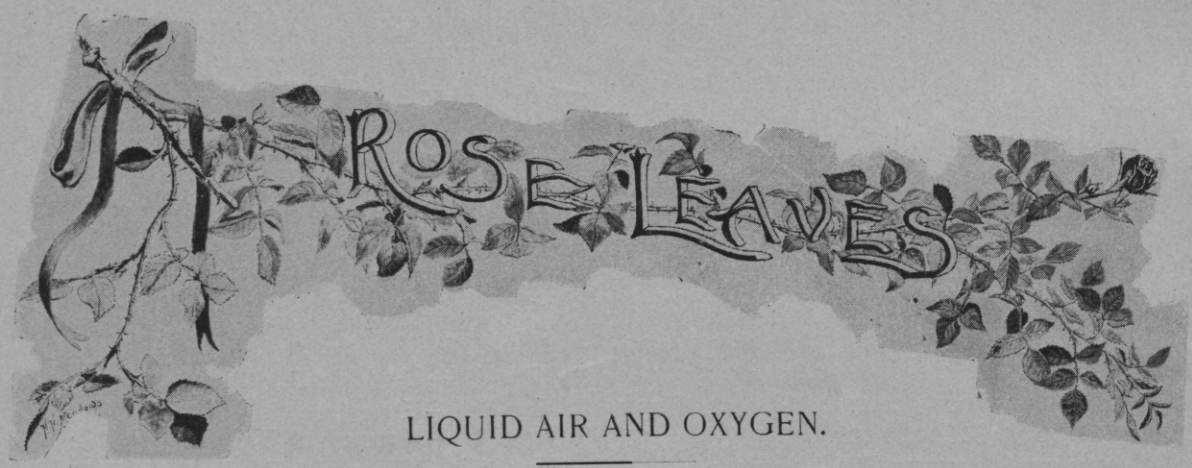
Advantage was taken of the pleasant weather last Saturday afternoon to open up out-door base ball practice. There were quite a number of the old team out, also some of the candidates for the

battery. The Freshmen also had several representatives on hand who gave evidence of having played ball before and lent encouragement to the hope that some of the vacancies in last year's team may be filled from '98.

The Poly gymnasium class is keeping up encouragingly. Some of the members have already gone into training for field day, others intend starting in immediately after vacation. Some new material is being developed in this class that promises to add several points to our score on May 24th.

The I. C. A. A. A. A. held their meeting in New York on February 23d, many interesting matters being brought up for discussion. A motion to abolish the mile walk and substitute for it a three-mile run, was lost. An attempt will be made to arrange for a meet between English and American athletic teams, the American team to be composed of firsts and seconds in inter-collegiate championship games, these to contest against a similar team from the colleges of All England.

Work on the running track was fairly started about two weeks ago, but suffered a setback from the recent snow and freeze. As soon as the weather gives evidence of an intention to remain favorable, work will be pushed as rapidly as possible.



LIQUID AIR AND OXYGEN.

Until the year 1877 such gases as oxygen, hydrogen, nitrogen, carbon monoxide, marsh gas and nitric oxide were called by physicists permanent, all previous efforts to liquefy them having been rewarded with negative results even when the volumes were reduced to $\frac{1}{300}$ of the original; but on the 24th day of December, 1877, it was announced through the French Academy that on the 22d Cailletet had succeeded in liquefying both oxygen and carbon monoxide at his works and that the former gas had also been liquefied by Pictet in Geneva. These experimenters soon succeeded in liquefying the other gases named, and thus further proof was obtained that all bodies, without exception, possess the power of cohesive attraction.

Other scientists have worked at these low temperatures since this time, and it is the aim of this paper to give, in brief, an account of the work done by Professor James Dewar, of the Royal Institution, London, as reported in the last few volumes of the Chemical News. Professor Dewar has been at work for the last few years, with oxygen and nitrogen especially, and has succeeded in obtaining valuable information concerning these gases in the form of liquids.

Many gases may be liquefied by pressure, at ordinary temperatures, but for every gas there is a critical temperature, above which liquefaction cannot be brought about by any pressure, however great. The critical temperatures of the gases previously mentioned are extremely low, and one of the great difficulties in obtaining oxygen, etc., in the form of a liquid consists in lowering its temperature below the critical point. The apparatus employed by Professor Dewar with which he overcomes this difficulty, consists of a gas engine driving two compressors, one for nitrous oxide, the other for ethylene, the compressors being connected to two concentric cylinders surrounding the vessel containing the oxygen to be liquefied. Some liquid ethylene is introduced into the chamber belonging to its circuit and there evaporated, returned to the condenser as gas, liquefied, and again passed into the chamber as before. A similar cycle of operations was carried out with the nitrous oxide, until a sufficient amount of oxygen had been liquefied.

The boiling point of ethylene is —105° C and and of the nitrous oxide —87.9 °C. The cycle of operations is about the same as that of ammonia ice machines in which the change of ammonia from the liquid to the gaseous condition is accompanied by a lowering of temperature due to the conversion of sensible heat into the latent state.

Pure liquid oxygen is a clear, transparent substance having a slightly blue tinge. At —182° the density is 1.124, and the latent heat of volatilization is about 80 units. The capillarity at the boiling point is about one-sixth that of water. The boiling point is —180 °C as determined by the specific heat method using platinum and silver. It is a nonconductor of electricity, a spark in the liquid 1 mm. long taken from an induction coil requiring a potential equal to a striking distance in air of 25 mm. As to its absorption spectrum, the lines A and B of the solar spectrum are due to oxygen and came out strongly when the liquid was interposed in the path of the rays from an electric arc. Both the liquid and the highly compressed gas show a series of five absorbtion bands, situated respectively in the orange, yellow, green and blue of the spectrum. Becquerel and Faraday both found oxygen to be strongly magnetic, and according to the former we have the following table of specific magnetism (equal weights):

Iron	+	1,000,000
Oxygen	+	377
Ferrous chloride (solution sp. g 1.4334)	+	140
Air	+	88
Water	—	3

He determined these by allowing charcoal to absorb gases and then examining the properties of the charcoal in the magnetic field.

About this property of oxygen Dewar, in a letter to Sir William Thompson, wrote:

"At 3 P. M. this afternoon, I placed a quantity of liquid oxygen, in the state of rapid ebullition in air (and therefore at a temperature of 182° C.) between the poles of the historic Faraday magnet, in a cup-shaped piece of rock salt (which I have found is not moistened by liquid oxygen, and therefore keeps it in the spheroidal state), and much to my surprise, I have witnessed the liquid oxygen, as soon as the magnet was stimulated, *suddenly leap up to the poles and remain there permanently attached until it evaporated.* To see liquid oxygen suddenly attracted by the magnet, is a very beautiful confirmation of our knowledge of the properties of gaseous oxygen." He also showed that the magnet would draw up the liquid out of a tube. The magnetic moment of liquid oxygen is about 1,000 taking that of iron as 1,000,000. Cotton wool, moistened with it is strongly attracted to the poles and a crystal of ferrous sulphate similarly treated was also similarly affected.

At 200° C. the molecules had only one-half their ordinary velocity and had lost three-fourths of their original energy. Chemical action, also, had practically ceased, for liquid oxygen had no effect on phosporus, potassum or sodium dropped into it, and when a glowing piece of wood was inserted into the vessel, just above the liquid it refused to burst into flame because of the low pressure of the vapor. Also when an electric

pile, composed of carbon and sodium, was immersed, the current ceased to flow, although on the other hand a photographic plate at 200° C. was still sensitive to light.

The gaseous oxygen coming from the liquid must be exceedingly pure and dry, since few other liquids vaporize at that temperature, and all solids can be filtered out, and since it has been alleged that two elements cannot unite without the presence of a third, the following experiment was tried: Sulphur was ignited by placing on red hot platinum and lowered to the surface of the liquid, where the combustion continued active, and combination even took place for a time even under the surface, thus suggesting that oxygen and sulphur can be made to unite in a perfectly dry condition.

To better examine the optical properties of the liquefied gases it was necessary to have some form of a vessel, in which the liquid could be placed in order to prevent the rapid evaporation at ordinary temperatures, the rising bubbles in ordinary vessels entirely preventing any optical experiments. After careful study it was concluded that the best way of attacking the problem was to conduct a series of experiments on the relative amount of heat conveyed to the boiling liquid gases; first, by connective transference and, second, by radiation from surrounding objects.

An apparatus was arranged for measuring the relative volumes of gas distilled in a given time under definite conditions, the measure of the gas distilled being proportional to the heat conveyed to the liquid. The distilling apparatus consisted of two concentric spherical vessels, the inner one open to the air and the space between the two highly exhausted by a mercury pump. The inner vessel was filled with liquid ethylene, oxygen or air and the whole immersed in water and maintained at a constant temperature. The distilled gas was collected over water in the ordinary manner and the amount collected per minute noted, the distillation being approximately proportional to the time, for short periods. Having measured the amount distilled per minute in this manner, air was allowed to enter vacuum chamber and observation again taken. The following results were obtained:

Liquid oxygen (vacuum)	170 cc per m.
Liquid oxygen (air)	840 cc per m.
Liquid ethylene (vacuum)	56 cc per m.
Liquid ethylene (vacuum)	250 cc per m.

or a high vacuum diminishes the rate of vaporization to about $\frac{1}{5}$ of what it is when the substance is surrounded by air at ordinary temperatures and under atmospheric pressure. The liquids consequently last five times as long.

The next step was to construct a set of glass vessels, surrounded by vacuous spaces, suitable for use in the various experiments as shown in the accompanying sketch.

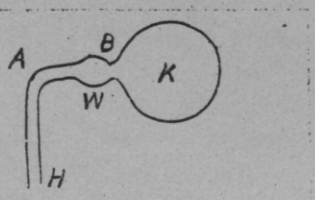


Fig. 1.

In vessels of this kind, if the vacuum is very high, no ice appears on the outer surface even though the walls be only $\frac{1}{2}$ an inch apart, and the liquid evaporates almost solely from the surface, causing very little disturbance in the main portion. So far the connective transference has been stopped to a great extent, but if the walls of the inner tube be covered with a bright deposit of silver, then the effects of radiation are also diminished and the rate of evaporation reduced to about one-half. In such vessels liquid oxygen has been kept for over thirty hours. A few experiments were made to determine the radiation at low temperatures, and the following results were obtained:

Tem.	*Gas Evolved.*
—115°C	60 cc
— 78°C	120 cc
+ 6°C	300 cc
+ 65°C	600 cc

Indicating that radiation (along with such convective transference as remains) grows approximately as the cube of the absolute temperature. These results were only obtained by preliminary

experiment, however, and much more work remains to be done before the law of radiation at low temperature can be firmly established.

Mercury was used for producing a vacuum in glass vessels by the following method, taking a globe as illustrated as an example.

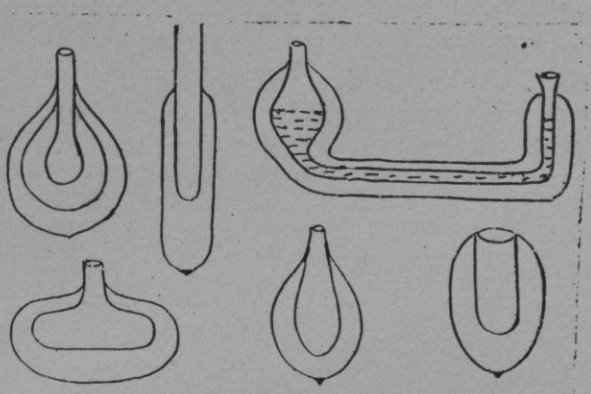


Fig. 2.

A quantity of mercury is placed in K, and H connected to a good working air pump, while K is heated in an oil or air bath above 200°C. A good quantity of the mercury is distilled off to drive out the air in K, and while the distillation is taking place the tube is sealed off at the point A, and the bulb instantly removed from the heated bath to such an extent that condensation takes place in B W. After cooling, the excess of mercury is brought into B W, care being taken to remove any small globules, which adhere to the sides of the glass with great tenacity, by heating K while B W is kept cool. In this way the vessel is filled with nothing but mercury vapor, the pressure of which depends solely upon the temperature of the mercury in the bulb B W, and as this can, if necessary, be cooled down to 190°C by immersion in liquid air, an extremely rarefied condition can be brought about within the vessel. In most cases the mercury bulb was sealed off after cooling to —80°. The vapor pressure was calculated to be for 0°C 0.00018 mm. and for —80°C 0.000,000,003 mm. or about the sixth and the four hundred thousandth of a millionth of an atmosphere respectively. A tenth of a millimetre is about the vacuum obtained by the use of a good mercury air pump. The electric discharge in such vacua produces intense phosphorescense, thereby giving a continuous spectrum which makes the detection of the mercury lines difficult.

The thermal transparency of liquid oxygen may be shown by passing the radiation of an electric arc through a spherical vacuum vessel, filled with the clear, filtered liquid, and igniting a piece of black paper held at the focus. In this experiment the oxygen lens has a temperature of —180, yet it does not prevent the concentrated radiation from reaching a red heat at the focus.

The refractive indices of the following gases were obtained with considerable difficulty, Prof. Dewar being assisted by Prof. Liveing.

	Index.	*Ref. Const.*	*Ref. Molecular*
Oxygen,	1.2236	1.989	6.364
Ethylene,	1.3632	.626	17.528
Nitrous oxide,	1.3305	.263	11.587

Law of Gladstone $\frac{\mu-1}{d}$ = Const.

These results tend to confirm the law of Gladstone as being applicable to such substances. The mean of several experiments gave the minimum deviation with a prism of 58°15′, to be 10°11′39″ and thence μ=1.2236. The density of liquid oxygen at its boiling point is 1.124 and this gives for the refraction constant 1.989 and for the refraction equivalent 3.182, while the equivalent for the gaseous oxygen is 3.0316. This is quite consistent with the supposition that the molecules of oxygen in the liquid state are the same as in the gaseous. If we take the formula $\frac{\mu^2-1}{(\mu^2+2)d}$ for the refraction constant we find the value of it for liquid oxygen to be 0.1265 and the corresponding equivalent 2.024. These are exactly the means of the values found by Mascart and Lorenz for gaseous oxygen.

Liquid air, nitrogen or carbon monoxide can be conveniently made at ordinary temperatures by being brought into a vessel cooled by liquid oxygen boiling under the pressure of about half an inch of mercury.

Air boils at–180° C, giving off substantially

pure nitrogen at first, the boiling point rising until, at 180° C, there remains pure oxygen. If air, collected in the above manner, is isolated from a rapid heat supply by immersing the vessel containing it in liquid oxygen, and then a powerful air pump be brought to act upon it, after a time it passes into the condition of a clear transparent ice. There is some doubt as to whether this ice consists of both solidified oxygen and nitrogen, or whether it be a solid of nitrogen with oxygen diffused through it. Prof. Dewar has never been able to solidify oxygen by its own evaporation, but has succeeded with nitrogen, forming a white mass of crystals.

Having these low temperatures at his command, he has succeeded in bringing forth many valuable and important facts concerning the properties of matter when so near the absolute zero. He has advanced the opinion that, at zero, the properties of matter would in all probability be entirely changed, molecular motion would cease, and what he terms "the death of matter" would ensue, as, in fact, chemical affinity, as before mentioned, has already disappeared in many cases.

By means of liquid air an admirable proof is given of the correctness of Lord Kelvin and Prof. Tait's thermo-electric diagram. If the lines of copper and platinum were produced, they would intersect at–95° C, and for copper and palladium, the intersection would be at–170° C, or if the diagram were correct, the E. M. F. would reverse at these points. A Cu–Pt junction was connected to a reflecting galvanometer and immersed in liquid oxygen. When the temperature reached–100° the spot of light stopped and reversed, and for a Cu–Pd junction a similar reversal took place at –170° C.

An investigation as to the chemical conductivity of metals and alloys was taken up and the results tabulated on section paper. The apparatus employed consisted of a resistance coil composed of notched pieces of mica, around which was wound the fine wire to be tested, connected to stout insulated copper conductors. The whole was immersed in liquid oxygen. The results obtained point to the fact that absolutely pure metals seem to have no resistance near absolute zero, but that in alloys there is little change in resistance.

Alcohol, when dropped upon liquid oxygen, rolls about for a short time in the spheroidal condition, and then suddenly solidifies into a clear, transparent ice. When dipped out with a wire and held over the flame of a Bunsen burner, it will not ignite, but soon melts and drops off the wire like syrup.

Prof. McKendrick has tried the effect of these low temperatures upon the spores of microbic organisms and found that all specimens survived a temperature of –182°C. Seeds also withstood the action of a similar amount of cold. He thought, therefore, that this experiment proved the possibility of Lord Kelvin's suggestion, that life might have been brought to the newly cooled earth upon a seed-bearing meteorite.

Many substances, especially organic bodies, are very phosphorescent at these low temperatures.

Prof. Dewar is devoting much of his time to research along these various lines, and it may be said that he has only begun, so great is the amount of work to be accomplished, for there seems to be an almost unlimited field for investigation open before him. He says: "It is not the question of the change of state in matter, however interesting, that in our day has special attraction for the chemist, but the means of studying the properties of such matter generally, under the conditions of such exceptionally low temperatures as are the concomitants of the transition in the case of substances like oxygen and nitrogen. The work of investigation in this field proceeds slowly but surely, and one need not despair (unless on account of expense) in the future of adding further data to our knowledge of the properties of matter near the zero of absolute temperature."

E. B. Harris, '96.

SOPHOMORE BANQUET.

The second annual banquet of the class of '97 was held in the Terre Haute House on February 21st. There was quite a little excitement antecedent to the occurrence, for the tragedy of the Freshmen and the police was still fresh in the minds of all, and there was quite sufficient

to warrant that something would happen or ought to happen, to preserve the dignity of a class. In view of this the Sophs took extra precautions to preserve their identity, marching to dinner in a body and back again in the afternoon. At five o'clock they also left together and did not separate at all during the evening, but went to the hotel in a body. Here their discretion left them or they had underestimated the valor of the Freshmen, for they scattered to all parts of the hotel and proceeded to enjoy themselves until the festal doors would be opened. '98 took advantage of the opportunity thus offered by boldly entering the billiard hall and seizing Camp before his comrades could come to his rescue. Camp broke both the windows of the cab into which he was thrust before he could be given the quietus, but beyond this there was no damage or injury done.

He was driven to the southern part of the city. After a hurried consultation the Sophs decided that it would be folly to attempt a rescue, and were obliged to proceed to the banquet hall without him. After the elegant menu of eight courses had disappeared President and Toastmaster Ingle invoked the Spirit of Conviviality in his salutary address, which it is needless to say was present until Washington's Birthday was well under way. How he succeeded, however, can only be appreciated by those who were fortunate in listening to the following:

TOASTS.

"The Faculty".....C. H. Fry
"Work"—Considered from a Theoretical Standpoint.....W. C. Mason
"The Freshmen".....J. B. Haney
"Ourselves".....J. J. Kessler
"Sweethearts"—"Sisters".....T. L. Camp
"Life is Not What It Seems".....S. G. Mead
Poem.....Gustav Willius, Jr
"White Elephants".....A. H. Meyers
"Athletics".....Ned M. Austin
"Everything Else".....Jay Hall

Camp was released toward midnight, and, although he was too late to partake of any of the substantials of the feast, he was given ample opportunity to deliver his toast, and incidentally to relate his thrilling adventures with the Freshmen.

THE FRESHMAN BANQUET.

The first annual banquet of the class of '98 was held at the Terre Haute on the evening of February 19th. The occasion was a most convivial one from the opening of the festivities at 8:30 until the banqueters arose from the festal board at 1 a. m., having regaled themselves with the choicest of spreads. There was but one late arrival, due to the pressure of circumstances, and his appearance in season to participate was greeted with the thunderous '98 yell.

Every one present was stocked with new and side-splitting stories, and songs were indulged in until Mr. Baur's guests threatened to seek other quarters. The toasts were rich in humor and originality and were as follows:

Salutation.....(By the President) Mr. Krebs
"The Star of '98".....Mr. Montgomery
"The Girls".....Mr Pirtle
"Arkansas Mosquitoes".....Mr. Fletcher
"Roasts".....Ned Kidder
"Quizzes".....Mr. Boudinot
"I am Bashful".....Mr. Scott
"Till We Meet Again".....Mr. Roberts

The president, in most appropriate language, welcomed the class to its first pleasureable gathering and, later in the evening, feelingly spoke for class union.

Hubbard, our most genial Freshman, officiated as toastmaster with his accustomed grace and suavity.

Montgomery, happy in his choice of subjects, dwelt most eloquently upon the brilliant future of the class of '98.

Pirtle, with his true knowledge of experience, portrayed most vividly the irresistible attractions of the fair ones, until the charm of their very presence was felt.

The discourse by Mr. Fletcher upon "Arkansas Mosquitoes" would put to blush the most accomplished of liars. At the end of fifteen minutes he held the field without a competitor.

The hit of the evening was made by Kidder on "Roasts." Each member of the class was

"roasted" in a little poem of humorous construction, and as Ned went down the line he was greeted with rounds of applause.

Could the professors have heard Boudinot on "Quizzes," the Freshmen's troubles would have been over. His appeal for mercy would have wrung tears from the sternest.

Scott, in his impersonation of the bashful man, elicited the sympathy of even the attendants.

Roberts responded last with "*Auf Wiedersehn*," wishing the class many repetitions of the enjoyable event and urging in a spirited speech the strengthening of the bond of class fellowship.

Hubbard captivated all present by the rendition, during the evening, of several of his best solos.

THE JUNIOR RECEPTION.

The Junior reception, which was held February 23d, proved an event of perfect enjoyment to all concerned. The ineffable pleasure of meeting the members of our faculty upon a plane of comparative social equality was supplemented by the enjoyment of spending an evening with so many of our Terre Haute friends.

The music, and an elegant repast, combining with the other pleasures left nothing to be desired for complete enjoyment of both mind and body, while the Junior's worry over his flunks of yesterday or the studies for the morrow was banished and he immersed himself in the amusements of the present. For this pleasant break into a busy existence the Junior class desires to extend its sincere thanks to Dr. Mees and the faculty and more than ever envies the Seniors who have a like pleasure to look forward to.

THE PHI SIGMA PHI DANCE.

The $\Phi\ \Sigma\ \Phi$ boys gave an elegant dance at the Terre Haute House on the evening of the 22d of February, and as usual, omitted nothing that would add beauty and enjoyment to the occasion. The large dining hall was profusely decorated with plants and flowers, intermingled with old rose and white, $\Phi\ \Sigma\ \Phi$ crescent in roses forming a gorgeous centre. Excellent music was furnished by the Ringgold Orchestra, and a program of twenty dances and three extras was enjoyed by sixty or seventy couples. Ices were served throughout the evening, and altogether, the occasion was the most brilliant and successful in the life of the fraternity.

THE Orchestral Club will give its sixth annual concert on the evening of the 22d at the Congregational Church. An unusual interest has been taken in the work this year and as a natural consequence a very excellent program has been arranged. The Misses Paige, of Terre Haute, Miss Winifred Hysung, of Coates College, and our own Mandolin and Glee Clubs will assist in making the evening both profitable and enjoyable.

Jones, telling of his sickly state,
"Is not himself," that's strange;
But does he realize how great
His gain is by the change? —*Ex.*

The Eddy residence is occupied at last.

The Freshmen are studying elementary calculus.

Schurman, ex-'97, was in town on Washington's birthday.

Improvements about the Institute seem to be in order this year.

Ridgley, '96, was called home recently by the death of a brother.

L. C. Anderson was called home to attend the funeral of his cousin recently.

Prof. Noyes lost his bicycle in the fire which consumed his barn a few weeks ago.

Unless some of the Freshmen change their minds, there will be no '98 chemists.

Robinson and Miller spent Sunday, March 3d, at their respective homes in Louisville.

The Sophs have almost finished Boisen's German Prose and will take up William Tell.

Bigelow, '95, was called to Toledo, March 13th, on account of the serious illness of his uncle.

It was not known until recently that Meriwether had taken up his abode on Cherry street.

Messrs. Conable, Whitten and Hovey spent the 22d of February in Brazil among the mines and rolling mills.

H. W. Craver, '95, was called to his old home, Carmi, Ill., recently on account of the death of his grandmother.

Mead says he has no kick coming about the number of pins in the prize cushion, but several of the boys at the club say he did have, and that he received it very gracefully.

It is said that although Prof. Hathaway is a profound admirer of the Quaternions method, the Sophs entertain quite different ideas of the analysis.

Anderson, '95, was favored with a visit from his sister during the last week in February. She was the guest of Miss Jessie Havens during her stay.

It is to be hoped the aspiring young gallant who tried to introduce himself by remarking that it was a smokey evening, will succeed better next time.

E. S. Hedges, of the class of '98, has withdrawn from the Institute and returned to his home at Newcastle. He expects to enter Earlham in the near future.

Allowing one foot for each man there were about twenty yards of garden hose on the scenes of action of last month, and no one knows where it came from.

Prof. Gray was detained from school a few days ago by the illness of his wife. She has rapidly recovered, and Prof. Gray resumed his work in excellent spirits.

The number of young lady visitors at the wood shop is steadily on the increase, and several Freshmen have avowed their intention of having shop costume cut in the spring styles.

An absent-minded member of the class of '96 walked into Prof. Hathaway's room recently while the Sophs were having a recitation. He had almost reached his seat when he saw his mistake, and quickly retreated vowing not to return until after the June examinations.

F. C. Fletcher, of Kansas City, and Hewitt, of Indianapolis, formerly '96 men, attended the Phi Sigma dance and the Junior reception.

The basket ball game between the Sophomores and Freshmen in the Coates College gymnasium was very close and exciting, resulting in a score of 6 to 4 in favor of the Freshmen.

A Junior was troubled about the integration of a function containing 2π. He could not decide whether to put the π outside the integral sign or not; he finally settled it by the following excellent formula: "One pie inside is better than two outside."

A Sophomore astonished his classmates recently by asking Prof. Noyes how the air was colored in the air thermometers. He next wanted to know why tea kettles were not made without covers so the water could boil easier.

The Telegraph Association has found it rather difficult to get a lineman, since the new electric light company is employing every man who can pull a wire; but, nothing daunted, they are pushing on the work themselves on Saturday afternoons.

A rumor is afloat that we have a course in theology at Rose. It says that Dr. Ballard and Mr. Bigelow, '95, constitute the pioneer class. There may be but little foundation for the rumor, but at all events we know that their first attempt at conducting an evening service was very successful.

Conservation of energy led to Eastwood's becoming the victim of an engineer's perfidy several days ago. Thinking to gain time he boarded a passing Big 4 engine, but failed to dismount at Locust street owing to the murderous acceleration of the ground. He was released just far enough north to save the company a damage suit.

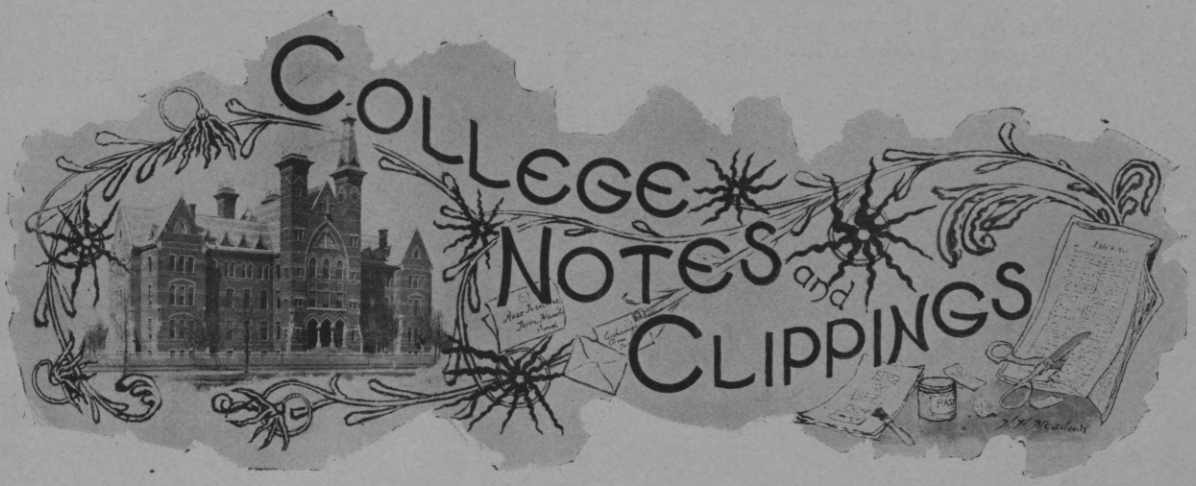
Dr. Mees says one can learn more and retain it better by keeping his mind upon a subject in walking to and from school than by putting the same amount of time on it after supper; he says that in walking to and from church he often thinks over problems that he is engaged upon. Granting this, it will only be a question of time until he begins to watch chandeliers during the sermon, then Rose can boast of a Carl Leo and a second Galileo.

A very interesting experiment was performed in the Physical Lecture room last month by the Juniors. A cigar was placed on the back of a blackboard eraser, and sunlight focussed on it from a large concave mirror. Old Sol was smoking very contentedly when Dr. Mees appeared, and the faces of the experimenters assumed the expression that Prof. Hathaway wears when he looks at his jar of harmonic curves.

'Tis not often that the students of Rose have an opportunity of testing their knowledge of German outside of the class room. However, such was the opportunity offered those who attended the German entertainment given recently at Coates College. The program consisted of short sketches from "The Magic Mirror" and "Cinderella," and several tableaux which were beautifully rendered. The young ladies acted their respective parts well, and their pronunciation was excellent.

It has just developed that among other distinguishing features of the class of '98 dramatic talent of the highest order exists. We learn from good authority that the two gentlemen from Independence, Iowa, having spent the day in Brazil and learning that the company at the opera house lacked two members for the heavy parts on account of illness, kindly consented to appear in their stead. Knowledge of the profession was evidenced as the gentlemen met with an ovation in their respective parts. Their versatility is indeed a credit to the class.

The direst misfortune that has befallen a Poly for some time was the fate of Smith, '96, on Monday evening last. He was enjoying his evening repast at the Union Depot dining counter, and after partaking of what he deemed a genteel sufficiency was about to rise, when he found himself powerless to move. Thoughts of paralysis at once flashed through his mind, and, determined to cheat the grim destroyer, he made a mighty effort and came off the chair minus his trousers' seating. The stools had been varnished by a "patent process" guaranteed to dry in fifteen minutes. Mr. Smith has sued for the value of his apparel.



There are seventy-five candidates for the Cornell nine.

Cornell will have three crews this year, the University, the Freshman, and the one to take part in the Henley regatta.

The Yale Literary Magazine is the oldest college periodical in the country, which has continued its publication up to the present time. It was founded in 1834.—*Wabash.*

"I'm on to you," the drop of ink
Unto the blotter said;
"Oh, dry up!" quoth the blotter,
And the paper weight fell dead.

—*Student.*

Mrs. Leland Stanford proposes to enlarge Stanford University to three times its present size by the addition of new buildings, new apparatus, new professors and new books.

The University of Pennsylvania has submitted the following question for the debate with Cornell to be held on March 18: "*Resolved*, That the most effective means of restricting liquor traffic is to eliminate the element of private profits."—*Ex.*

Quite a number of colleges seem to be troubled from various diseases. Amherst is suffering from scarlet fever, Earlham is being annoyed by mumps of unusual dimensions, the State Normal is as usual more or less overrun with measles, and la grippe seems to be affecting nearly all schools impartially.

Tell me not in mournful numbers,
What it was I drank last night;
I was foolish, and 'twas mixing
Drinks that caused me to get ——

—*University Courier.*

Ferguson and Utter, Indiana University's battery for the past two years, have engaged with the Lynchburg team in the Virginia league, and will play with eastern teams this year.—*Student.*

Both Yale and Princeton have refused to meet the University of Pennsylvania on the diamond this year. Both allege the intense bitterness that has attended such meetings of recent years as an excuse.

From some statistics taken from the University Courier it appears that out of 1,112 foot ball players of the principal elevens last year, only 65 were so injured as to keep them from the game for a week or longer, and of these, only nine were kept from study or general activity for a week or longer; while of the whole 1,112, only one was permanently injured.

Italian professors, says the Pall Mall Gazette, are wailing over the suppression of six universities, which, in these hard times, the government can no longer afford to support. The doomed colleges are those at Messina, Calania, Modena, Parma, Sienna and Sassari, in all of which the number of students ranged from 100 to 400. A high school at Maserata, with 150 students, is also to be closed.—*Ex.*

The dentist bores me terribly,
He's nervy in his feelings.
Because he feels down in the mouth
He's apt to hurt one's feelings. —*Ex.*

A bill has been introduced in the House of Representatives to establish the University of America, in which each state, territory and congressional district shall be entitled to an equal proportionate number of students, chosen by means of open competitive examinations. Instruction in all the branches of all departments of knowledge is to be given, and facilities furnished for scientific and literary research and investigation. The government of the University is to be vested in a board of twenty regents.

Mons. Coubertin has presented a gold medal to Stanford and the University of California, to be debated for yearly by students selected from the two Universities. The only limitation to the gift was that the subject of all the debates must be taken from current French events. Three men are selected from each college, but they are not told until the day before the event upon which side they are to speak. The first meeting will be at Palo Alto, April 5th, and the subject will be "Was Casimier-Perier justified in resigning?—*Ex.*

SATISFIED.

There was a sign upon a fence—
That sign was "Paint,"
And every mortal that went by,
Sinner and saint,
Put out a finger, touched the fence—
And onward sped,
And as they wiped their finger tips—
"It is," they said. —*Buchtelite.*

ON LYING.

When ancient Ananias and Sapphira fair, his mate,
To 'scape the wrath of heaven, lied, and thereby met their fate,
They little dreamed that modern youth would hold them up to scorn,
And jeer at their one poor attempt as shabby, cheap, forlorn.

For now to lie is quite an art. Some lie for golden greed,
Some lie in theory, some in fact, and some do lie indeed;
Some lie in-firm, some lie in state, aad some in flowery ease,
But all lie still, lie well or ill, and lie just when they please.

Then queerly falls that of all men, who dwell within my call,
One friend alone lies constantly, yet lies he none at all!
The paradox is simple for you surely all have heard,
A stutterer must ever lie, he always breaks his word.
—*Bowdoin Orient.*