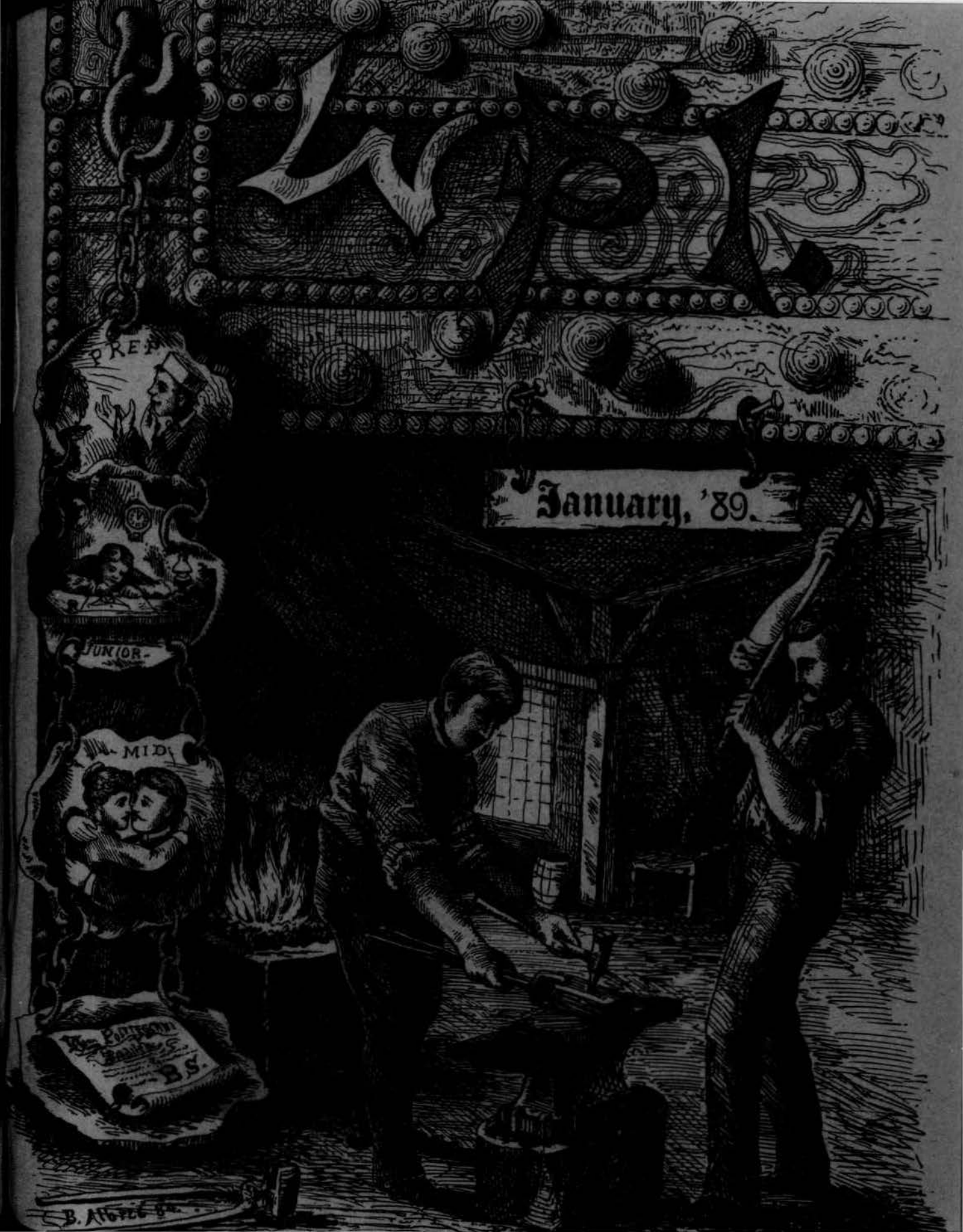
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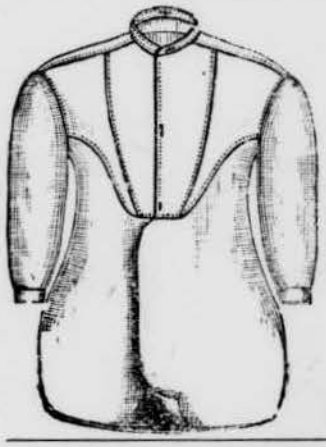

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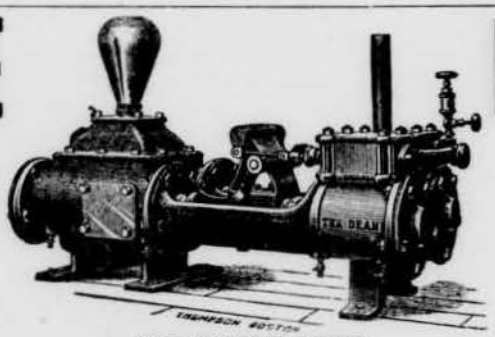

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W P I

Vol. IV. WORCESTER, JANUARY 15, 1889. No. 4.

THE W P I.

Published on the 15th of each Month, during the School Year, and devoted to the interests of the Worcester Polytechnic Institute.

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OF all the passions which possess the soul,
None so disturb vain mortals' minds
As vain ambition, which so blinds
The light of them, that nothing can control
Nor curb their thoughts who will aspire.
—*Earl of Stirling.*

WE have noticed to some extent a tendency on the part of a few professors to keep classes over the close of the recitation hour. Now we do not wish to show a disposition to shirk any of our legitimate work, but, to say the least, our time out of recitations is now considerably limited and this is especially true at noon when some have scarcely time enough to go and return from meals without hurrying. When recitations occur just before chapel we like to have at least time enough to proceed in a respectful manner, and not be obliged to rush like so many little school-boys in order to escape being late. If this matter, however small it may be in itself, is attended to we are sure that just as much actual work will be accomplished, and better feeling exist among the students.

WE have often been asked to boom our column of personals. We appreciate the desire of the graduates to hear from one another through the columns of the W P I, and we should be glad if it were possible for us to give them more of such information. It is hard for us to find out a great deal in regard to the graduates. If each one of the alumni, especially of those more recently graduated, would be kind enough to send us notes in regard to himself, it is easy to see that we could soon publish a personal column of great interest to all.

AT the Paris exposition, which will be open from the 5th of next May until the last of October, and which will surpass all previous expositions in Europe and America both in size and worth, there will be included in the American exhibit a display of the methods and details relating to the institutions for the higher education of men and women.

Professor C. Wellman Parks, of the Rensselaer Polytechnic Institute, has

undertaken the work of bringing this part of the exhibit into practical shape. One of the features will be the college publication. Prof. Parks proposes to arrange a reading-room in which will be kept the latest issues of the various college periodicals, while on the wall will be hung photographs of the editorial staffs.

The W P I has been asked to join with other college papers in carrying out this plan, and will gladly do so.

WE found, after we had sent out our December number, that some of the papers had been mixed up in being bound. We do not know how many received these mixed copies, but will say to those who did, that we had a complete number last month, and we would be glad to send correct copies to any who did not receive them, but for the fact that they have already been all used up.

A VERY important change is to be made in the method of marking at the Institute.

Hereafter, instead of being marked on the scale of 100, students will be marked by letter, the first five letters of the alphabet to be used. The reports will give the mark in each subject. If a student is marked E in any subject, he will be conditioned in that subject, and if he receive three such marks he will be dropped. More than three marks below C during the course, will prevent a student from graduating.

We are heartily glad of this change, as we consider it a step far in advance of the old method. Where the difference in rank of two men depends on the tenth-part of a unit, it comes to be a good deal like splitting hairs. The new system will do away with this. If a man is not marked A, it will be B or some other letter, and he will doubtless be able to look about him and find companions in the same boat with himself. Again, if a student aspires to gain a higher mark, he need not feel that it is like a drive whist party, where if he goes up some one else must go down; but he can feel that there is room for all at the head, and, if he has once gained that place, he will be more ready to help his fellows up with him. Yes, we have so poor an opinion of human nature as to think that a man who has strained every nerve to get into that coveted first place—that place a little ahead of what any other had reached—and got there, would be just a little reluctant to reach out his hand and help the man, who was but a step behind, up even with himself. But under the new system, as we have said, there will generally be a number of men with the same mark, and if this mark be the highest, the men will feel that the more the merrier.

The giving out of marks in each subject, is a good thing, too. It will do away with that fault-finding which has sometimes occurred when a man has received a low mark and wished to lay the blame upon some one instructor. It will tend toward a spirit of openness, and frankness between instructor and student, which is worth everything. Without this spirit, it is impossible to get the best results out of a course of study. So long as a student, who goes to an instructor to inquire as to his success in his work, is loaded down with a lot of interjections for an answer, just so long

will that student look upon his instructor as a sort of tyrant to be struggled against. In our experience, we have seen those teachers most successful who have been most free to talk with their students in regard to their work, to tell them just where they have done well or could have done better; to be, in fact, one of the boys, if we may use that term in a restricted sense. To do this, an instructor need lose none of his dignity or authority. On the contrary, we believe he will be more respected, and have more influence with his students.

If this important result can be brought about by the new method of marking, it will, of itself, make the change a grand success.

IT appears, on investigation, that, of the graduates of our Institute, from the department of Mechanical Engineering, about seventy-five per cent. fill positions for which they were directly fitted by their course; and, of these, thirty-seven per cent., or twenty-five per cent. of the whole number, are earning a living by draughting. The course in draughting is a good one, but does it give better preparation to the student than his work in other branches of the department? In other words, does the Institute graduate better draughtsmen than machinists, foremen or other shop workers; and if so does it give draughting any precedence of mechanical investigation and work in the machine room? Or, is there a greater demand for draughtsmen than for other workers? Or, do students prefer the milder labor, and let the occupation which necessitates dirty hands and the use of overalls and jumper pass unheeded?

We are inclined to think that the result is caused by all these conditions, rather than by a single one. If the course in draughting, which is designed to be a help, and is a necessity to the success of the Mechanical Engineer, receives more attention than the shop-work in proportion to its possible practical development, the best interests of the pupil are doubtless subserved; for, granted that both are necessary for the greatest progress, and that the student has only a limited time in which to prepare for his lifework, will he not advance faster and surer in his work with a good knowledge of draughting than would warrant his curtailing the amount of time given that subject, and increasing the number of his practice hours?

It seems peculiar, but is nevertheless a fact that manufacturers are and perhaps always will be a little chary about hiring school-bred workmen, for there seems to be a general impression that workmen who have recently been scholars are possibly impractical, or otherwise objectionable; that they may have an idea or theory, and this to many practical self-made men is the brand of worthlessness. This feeling in these days of enlightenment is gradually passing away and may wholly disappear somewhere this side of the Millennium. Many employers like to train their workmen under their own eyes, have them grow up in the shop, and then they are sure that nothing deleterious is in their make-up. About the draughtsman they are not in doubt, as he is naturally a product of the schoolroom, and he is not

refused work because of any additional education he chances to have.

Probably most students who are not in hot pursuit of lucre, and have not placed their mark too high, prefer draughting to shopwork. Certainly, it is nicer work and many a man has allowed himself to be caged in a draughting-room when he should have been soaring on his way to the pinnacle of success. A man may see his way to great success, from the draughting-room, but it is only occasionally, while the same man may stand in the shop and often see the open way. Ordinarily a draughtsman will receive larger remuneration at the start than the shop worker and he can make a certain progress, but soon finds himself "at the end of his rope," having the disposition but not the ability to go further. Be content with smaller pay and larger scope, for the future will soon be the present and bring with it the reward of faithful endeavor. Do not consider draughting an end but a means. It is a valuable acquirement and the most should be made of it. And so it is with the other studies, for all have their bearing on our success in more ways than we can now perceive. Many are restless and desire more of the practical work, but they should remember that it is not the object of the Institute to turn out experts (and well that it is not), but to give a general education and the foundation of a department of work in which they may excel. When looking about for the ladder you are to climb, do not mistake and take the short ladder which rests on a higher level, in preference to the long one which may rest a little lower.

MARBLE HALLS.

YOU can find them in any famous capital from London east to the banks of the Liffey, and from Washington north to the Haytien Republic. Whether it be their province to fling back in defiance the echoing accents of a New York assemblyman or to softly undulate the devotional whisperings of the pilgrim at St. Peter's or St. Paul's, these marble panels that you have in mind are everywhere equally grand and appropriate.

But those are not the halls we now desire to examine. We propose to confine ourselves rather to the mighty, rambling, subterranean corridors where the makings of those lesser edifices were born and bred;—born of nature through vast centuries of pregnancy and reared by her to mountain heights above the pleasant green valleys of rural Vermont. For in the marble quarries in and about Rutland the visitor need not be a geologist to discern in the bold archings, warpings and dippings, disclosed by the vertical section of the side of the drift, abundant evidence of tremendous uprearings. One can easily imagine that poor old Mother Earth had writhed in agony for many a weary cycle before those deep furrows were settled upon her brow. Alas, poor lady! Magnolia balm was not then known in northern latitudes.

Rutland, the Marble City, is the centre of the greatest marble industry in the United States, if not in the world. All rock hereabouts is either limestone or marble. Marble, of course, is only a particular kind of limestone, and the line of demarcation is often faint. Only

good qualities of marble are worked here, and those too closely allied to limestone are discarded.

Many a fortune has been sunk in vain attempts to find a paying substratum under a promising crust. You cannot always tell by appearances. A new quarry is a lottery, that yields more by luck than fair shooting. But people do not take chances unreasoningly. If these fallen capitalists had had recourse to the theory of probabilities, the calculated result would have justified such a disposition of their means; for there is no gainsaying the fact that in the majority of cases great profits have accrued from the marble industry.

Numerous openings have been made in adjoining towns, wherever the raw material closely approaches the surface and its location affords easy access to the railroads. But the largest and most prolific of these quarries are in West Rutland. The older ones have been worked for the last forty years, and all of them are practically inexhaustible.

They comprise a series of openings, extending north and south for a distance of two miles and all located on the westerly side of a lofty hill of solid marble. Drifts from these openings extend for varying distances easterly underneath the hill, the roof consisting of the unsound surface marble, supported at intervals, if necessary, by columns of the natural rock left standing in the position assigned it by nature. The openings themselves are sunk to depths of from 150 to 400 feet, and through them the steam derricks raise the rectangular marble blocks from their bed in the quarry and place them upon flat cars all ready for shipment. That is if the marble be up to any of the several standards of quality. Only experienced eyes can readily judge of that, and it is difficult for the novice to understand why one block of marble is marked No. 1, while another seemingly perfect specimen is consigned to the waste heap.

This waste heap, or dump, is, however, not without its uses. To the Engineer or Contractor in search of material for rubble, or even for ashlar masonry, these dumps are professional clover fields. Handsome rectangular blocks, with perfect bed, build and face, can be procured here F. O. B. cars at a nominal price. Marble men are glad to get rid of them for merely the cost of loading, as the ground space they occupy is valuable.

The blocks are cut out of the ledge in a manner similar to the process of ice-cutting; the only difference being that the marble has to be wedged up from the bottom in order to split it along its surface of stratification. The four cuts perpendicular to the bed are made by automatically-travelling channelers, carrying knives of mild steel. Notice I do not call them vertical cuts. They would be called such only when the surface of stratification is horizontal, and that is a special, but not uncommon, case. Often, however, the thick laminæ are found lying in most contorted positions; literally folded together until they have the same general outline as the graceful ribbons that the Civils frequently employ to embellish a map-title and carry the scale. It is in quarrying on these warped surfaces that the marble man's skill comes into requisition. Perhaps you think

that rock-renting is an easy and primitive business. Well, it is not child's play.

One of the most brilliant financiers of the State, a gentleman now well-known to the railroad magnates of Boston and New York, but formerly a marble producer of good repute, remarked the other day that "even in the homely process of quarrying marble there are constant opportunities for the excercise of skill and good judgment; for example, in the judicious working of warped or rolling beds. On certain parts of the warp we had only to channel the two sides and ends of a block when the latter, impelled presumably by resilience, would spring up from its bed, without any wedging whatever on the bottom. One time we tried to take out an unusually large slab, but before the cuttings were down to the requisite depth it relieved itself by cracking obliquely, and thus ten thousand dollars went like the snap of your finger."

"Yes, that shows the presence of tremendous forces. I was invited to read a paper on this little phenomenon before the Association for the Advancement of Science, but was too busy. But if those men in Worcester are scientific in their tastes they would be interested by the relation of the facts in this case." How is that for storing energy! All you have to do is to disturb the balance and you get the full weight of the natural forces on the premises. Rather prosaic employment that for the powers that be.

Connected with each quarry and within reach of the derricks is the marble mill. Here the orders for dimension marble are filled. The rough blocks, placed on the gangs, are sawed like cheese. The saws are of thin steel, without teeth, and perform their insinuating mission by virtue of a horizontal to and fro motion, and the aid of wet, gritty sand automatically dropped from a feeder. Then the slab is taken to the polishing and finishing rooms, and in these it undergoes the greatest change in appearance.

The marble business, like the railroad business, and everything else for that matter, is rapidly tending toward consolidation. It is now practically under control of two powerful rival corporations, well equipped with men, capital and brains. The two companies together run about 200 gangs (saws) and have an annual capacity of more than ten million superficial (one inch) feet of marketable marble. They have branch offices in all the principal cities of the United States, and in San Francisco there is also a marble mill.

Much of the supply for Pacific Coast trade heretofore has been shipped around the Cape to save freight. This occasions great delay in the delivery of dimension stuffs, thus suggesting the need of a Western mill.

Some of the mills and quarries here have the electric light and compressed air, and these exponents of mechanical advancement will soon be found in all the works. These quarries, by the way, are surpassed in producing capacity by the Italian quarries only; and of all the marble companies in the world the two at Rutland are said to be the largest.

And now if I have failed to impress you with the magnitude and respectabil-

ity of the marble business in Vermont, allow me to attain that end by referring briefly to a widely-known marble man.

The head, relatively and literally, of one of the marble companies above mentioned is ex-Gov. Proctor, whose name has often been coupled of late with that of Hon. James G. Blaine as a promising cabinet possibility from New England.

The "Governor" is a Dartmouth man, fifty-seven years of age and has served his native State with honor and distinction not only in the gubernatorial chair, but in the legislature and in the field, leaving his law practice during our late unpleasantness and fighting his way to the rank of Colonel. He is a man of great sagacity and astuteness. His plans are always laid far in advance of present needs and when they mature he uses them with a skill and promptness that seldom fail to attain their purpose, whether it be commercial or political. As Chairman of the Vermont delegation to the late Chicago Convention he exhibited his remarkable foresight in his steady adherence to the cause of General Harrison. It was almost grand, they say, when in answer to the roll-call of States, Gov. Proctor would arise at the name of Vermont and in deep, deliberate tones respond: "Vermont casts her eight ballots for Benjamin Harrison." Never once did the delegation led by Proctor falter in its allegiance. It was for Harrison on every ballot.

In personal appearance the Governor is not very inspiring. He is large, stoops a trifle, wears his beard in the old-fashioned style, and altogether he looks not unlike a well-to-do farmer. And that, I suppose, is what touches the grangers' hearts. At any rate they are solid for him, and he can have what he wants in this land of milk and honey.

But he evidently thinks that, in the language of the poet,

"If he wants honey he must have money,"

and apropos to that sentiment the price of marble goes up and the price of labor goes down, which latter fact accounts for the lack of esteem in which he is held by the lowly denizens of his subterranean halls.

THE CHANGE OF GAUGE OF SOUTHERN RAILROADS.

WHEN the first railroads were built in Southern States, over half a century ago, none of their projectors expected that within such a comparatively short time the iron roadways would be extended till they formed unbroken lines from ocean to ocean, from the Great Lakes to the Gulf of Mexico, and therefore, as they looked upon each line as entire within itself, they saw no necessity of making the gauge of their roads conform with that of other roads in other parts of the country. Their successors, in later years, were little wiser. Time, however, has shown that prompt and economical transportation requires that a car, once loaded, shall go to its destination without transfer, and it was for this reason, which the great increase of freight traffic had rendered so apparent, that all the great railroad systems resolved in 1886, to adopt a universal gauge of 4′ 9″. Before this it was possible to run a car from the Atlantic to the Pacific, north of the Ohio, and west of the Mississippi; but

for freight to go from Massachusetts to any of the Southern States it was necessary either to transfer it from one car to the other, or else change the trucks under the car so that they could run on the 5′ southern gauge.

In 1884 and '85 the first changes were made when the Illinois Central and Mobile & Ohio railroads adopted the 4′ 8½″, or northern gauge. But the first general movement was made in February , 1886, when a convention of the managers of all lines interested, together with the heads of their Transportation, Machinery and Maintenance of Way departments, met at Atlanta, Ga., thirty railroads being thus represented. It was decided that on June 1, 1886, all the lines should change their gauge to 4′ 9″, and committees were appointed to examine into the best methods of doing so, and report in detail Feb. 16, which was done. And it is only when we examine the details of the work that we fully appreciate its magnitude. Not only did one or both rails have to be moved in; but there were also all the locomotive, freight and passenger car wheels to be taken off, and, after the axles had been turned down 1½ inches on either end, put back again; there were the frog and switch bars to be shortened, and crossings to be relaid; and there was the necessity of building many miles of side-track on which to place the cars which had been changed beforehand. Let me copy from the report of the committee.

"1st. Supervisors should see that railroad crossings, switch tie bars, for split and stub switches, are at the places required five days before the day of change. Foundations for railroad crossings should be examined, and when necessary new foundations should be framed ready for use on the day of change.

2d. Supervisors should provide each gang foreman with two adzes and on May 1st, 1886, preparation of the roadbed for the change of gauge should be commenced, to be completed five days previous to the change. This preparation should consist of adzing the ties to a smooth and even surface with base of rail and clearing any obstructions even with the top of tie for a space of not less than five inches from the rail that is to be moved in.

3d. Five days previous to the change, the work of drawing and setting inside spikes should commence. All inside spikes on the side of track that is to be changed should be drawn, except the spikes in every third tie on tangent and every other tie on curves, and one inside spike at every joint. Spikes should be set with templates in every third tie on tangents and every other tie on curves (not in same tie where spikes are left).

4th. The gauge of main line should be changed first, and afterward the force will return to the various sidings and change them as rapidly as possible, being sure to have their entire work done by sunset.

5th. On the day of change there should be 24 men for every 8 miles of track as follows:

4 men drawing inside spikes.
8 men driving outside spikes.
4 men driving inside spikes.
4 men throwing rail.
1 man with 5′ gauge pole car.
1 man with standard gauge level car.
2 men extra."

With the exception of a few general instructions the matter of changes in the rolling stock was left entirely to the separate roads. The greatest difficulty was met with in altering the locomotives, for, with the exception of the Baldwin Locomotive Works, few builders had foreseen the possibility of the change, and as a result many engines were found that could be changed only by moving the frames in, and frequent-

ly the fire box had to be altered; this meant a new fire box and heavy expense. Many engines were thrown out of service by the fact of the great cost of changing them.

When June 1st arrived all preparations were completed and soon after 3 A. M. the gangs went to work. For five or six hours in the cool of the morning the work went on briskly, the men working with more than ordinary enthusiasm; but the day was warm, and after 9 or 10 a. m. it began to lag. All was done, however, before the day was over, and so safely that trains could run at full speed.

Perhaps the following figures, taken from the journal of the Association of Engineering Societies for October, 1887, will be of interest:—

Miles of track changed, about,	14,500
Locomotives changed, "	1,800
Cars (pass. and frt.) changed, about,	45,000
New axles used, "	9,000
New wheels " "	20,000
Axles turned back, "	75,000
Wheels pressed on without turning axles, about,	220,000
New brasses used, about,	90,000
Kegs of spikes used, "	50,000
Cost of material, "	$600,000
Cost of labor, "	$730,000
Amount expended on day of change, in labor,	$140,000

The work was done economically and so quietly that the public hardly realized that it was in progress. To the casual observer it was an every day transaction. It was, however, a work of great magnitude, requiring much thought and mechanical ability. That it was ably handled is evidenced by the uniform success attained, the prompt changing at the agreed time, and the trifling inconvenience to the public.

TRIALS OF THE EXCHANGE EDITOR.

WHILE looking through our exchanges last month we came upon the following in the *Illini*:—

It is a common opinion in the minds of the uninitiated that the exchange edtor has what is usually termed a snap. It is hard to displace such an idea by words alone; but if the public could see, in its mind's eye, the Ex. editor striving to pick out what will be most suitable from one hundred different papers; if they could imagine his attempts to get out of the beaten paths of flattery and abuse; if they knew all these things, verily would they agree that all is not gold that glitters, and that the Ex. man works as hard for his munificent (?) salary as any one on the force.

The thought was entirely new to us. Is it possible that any one can imagine the Exchange editor as having a snap? Well, if it is true, we trust that the above article will serve to correct the erroneous opinion. Should it not do so then read on while we relate the story of our sad experience which will surely complete the work which the *Illini* has commenced.

Last fall when we assumed the management of the Exchange department of the W P I, we were so young, so very young, at the business that we timidly appealed to our friends as to what should be done to make the Exchange column acceptable. The answer was invariably: "Study the columns of your exchanges and do as they do." We did so and after examining fifty individual college journals we could not persuade ourselves that we had seen more than half a dozen. So great was the similarity that we instinctively seized a pencil and wrote out the follow-

ing, labelling it, The general solution for the Exchange column problem:

(*a*)

The ——— from ——— College comes to us every { week. / fortnight. / month. } The last number contains a very good { Editorial on — / Esssay on — / Ex. column } which is well worth { clipping. / referring to. / reading. } The young { men / ladies / g'tl'm and ladies } who edit it deserve the highest praise.

(*b*)

The latest number of the ——— comes { rushing / sneaking } in upon us with its { editorial / local or ex. } column { bristling / mincing } with { abuse / scandal } *etc. ad infinitum.*

Mix three of *a* to one of *b*.

We hung the above on the wall and with its aid ground out our first Exchange notices. Hardly had the paper been printed when the same friends (?) came to tell us very confidentially that our production was "too commonplace, too general, too much like other papers, on the whole, flat."

What was to be done? We had followed their suggestions and after burning much midnight oil over a heap of exchanges had made an heroic effort. No! 'twould never do to write such a column again; we must strike something new or resign our position.

We tore our formulæ from the wall and decided to do away with all effort, all superficial show, and *to be natural*. Possibly we went to the other extreme and were too natural. Be that as it may, when the time came for the issue of our November number and the printer called for our copy, not a line was prepared. The only alternative was to break an engagement which we had been contemplating with pleasure and prepare our copy in haste. Since we had determined beforehand to be natural and to relieve our mind in the plainest words possible, the result was far from endearing to certain of our exchanges.

This time we were all right with our friends—it always pleases them to see a fellow get excited—so for several nights our dreams were pleasant: then our Exchanges took up the cry which our friends had dropped. The idea of our presuming to make such a departure from the usual line of exchange work! So impressed were certain western editors with the enormity of the crime that they must have wasted hours of precious time in composing language cruel enough to express their opinions of us. One editor from down in the good old State of Maine was charitable enough to take pity on us and say some soothing words, but the effect was more than counteracted when our worthy contemporary *The Beacon* stated that the Ex. man of the W P I must have been "under the weather" when he wrote his November review.

It is needless to say that our "General solution for the Exchange column problem" is back on the wall and will stay there until some good Samaritan comes along to help us out of our trouble.

We won't burden our readers with further details of our trouble, but if any are still of the opinion that the Exchange editor has a "snap," then all we can do is to wish him a chance to try it himself.

FOUND OUT.

WE have lately encountered a certain member of the Institute who says very little about his recent vacation. However silent he may have been about his adventures, he has unmistakably untied the bag and let loose its occupant. It happened in this wise: —

He had gone as far toward home as New York City, when the charming appearance of the store windows reminded him of the Christmas Season. On reflection the fact that he had not provided himself with a present for his best girl, introduced itself to him. Of all things, this must not be overlooked. He had plenty of time and New York is just the place for one to dispose of greenbacks. In fact he was almost convinced that his neglect was a piece of good fortune, for in that city is a greater variety than up in Worcester. Twenty-Third Street was the first scene of operations, then Broadway and Fourteenth. The article which was finally deemed most appropriate was on Twenty-Third Street, so back this youth hurried.

In the very act of purchase what was he unable to find but his pocket-book; in one of the crowded stores he had become a victim of the artful Dodger. At that moment one share of the Worcester Polytechnic Institute could have been bought at ninety-eight below par. He immediately telegraphed for means to continue his travels, but the operator did not appear to be in such a bluster as the subject of our sketch, so a night was spent upon the streets of the city.

Shop windows were the only consolers and looking in them afforded the only amusement for a large portion of the night. After a time, seemingly an epoch, the money arrived and our Tech reached home just thirty-three hours late. Many friends questioned the reason of this detention, but the conversation upon this subject was cut short with the answer, "Stopped over."

But he is back again among us, but quite changed in appearance, displaying less power in conversation. Many jokes are now cracked, and it is needless to say that he is often the recipient of them. Almost incessantly does he whistle the "Pennsylvania Tramp," the chief cause of which is the above adventure.

WE believe the following will be of sufficient interest to all our readers to justify our printing it entire.

IS THIS TO BE THE FUTURE AMERICAN UNIVERSITY?

When it was announced a few years ago that a wealthy and philanthropic gentleman of Worcester, Mass., had devoted a certain number of millions to the foundation of a new university at that place, various comment was aroused. While the generous impulses and the public spirit of Mr. Clark were everywhere recognized, there were many vigorous protests against the wisdom of the policy of planting a new institution of learning in the midst of the territory so fully covered by Harvard, Amherst, Brown, Yale, Dartmouth and Williams. It was urged that the donor's benefaction would have been more wisely expended in building up and broadening the facilities of existing colleges, rich only in the accumulated wisdom and traditions of generations, and in the heritage of a venerable name.

Since this just outburst of unfavorable criticism little has been heard of Clark University until now, when it is announced that its magnificent buildings at Worcester are approaching completion, that its trustees have selected a president and several members of its faculty, and that in October next the university will be formally opened.

It is now quite apparent that the scope and the purposes of the institution were at first popularly misunderstood, and that the great scheme of the founder was both intelligently conceived and is being carried out with princely munificence. It is beginning to be understood in educational circles that the plan of the institution will be much more comprehensive and its standard much more advanced than that of perhaps any college or university in the country.

It is intended that there shall be no academic course, but that it shall be carried on upon the university principle, pure and simple. Its students will be the graduates of other colleges who will gather there to avail themselves of the extraordinary facilities for advanced study and research which its rich endowment will provide. It will thus not be a competitor of the existing New England colleges, but will rather supplement their instruction, and will furnish to American students at home the opportunities for research in special branches, to enjoy which they now flock to the universities of Europe.

Clark may not become the great American University for which we have long waited and watched and hoped, but it promises to conform more closely to our idea of what the American University ought to be than any institution we now have. It is far from the geographical centre of the American Republic and from the political centre, at Washington, where ex-President White hopes some day to see the American University, but if it can "do the work" and perform the functions of a university, locality will prove a non-essential. The scope and purpose of the American University has never been more succinctly stated than in the works of President Hyde, at Bowdoin, in the December *Atlantic:*

"It is the province of the university to take men who have the drill of the academy and the breadth of view which the college gives and help them to carry forward self-chosen lines of special study to the limits of the world's attained knowledge and on into regions yet unexplored. Not the teaching how to walk nor yet the easy and rapid journeying along the beaten paths of knowledge, but the exploration of fields remote from the main lines of ordinary travel and the surveying of new territory is the function of the university."—*Mail and Express.*

Scientific Notes.

There are fifty-two lines of electric railway in operation in America and forty-seven under construction or contracted for.

Dr. König, of Berlin, Germany, has recently succeeded in obtaining a photograph of a cannon-ball travelling at the rate of 1,200 feet per second.

The holiday tourist, when admiring the splashing water dashing over the stones, hardly recognizes that the money loss is as if the foam were composed of flakes of silver.—*Prof. Ayrton.*

The five heaviest hammers in the world were built in the following order: Krupp at Essen, 1867, 40 tons; Temi Works, Italy, 1873, 50 tons; Crensot, France, 1877, 80 tons; Corkerill, Belgium, 1885, 100 tons; and Krupp, Essen, 1886, 150 tons.

Mr. Z. de Ferranti has designed two large dynamos for the Deptford electric lighting station of London. They have armatures 39 ft. in diameter which make sixty revolutions per minute. The current will have a period of 8,000 alternations per minute and a pressure of 10,000 volts. They will be driven by engines of 5,000 h. p. and it is expected they will supply 200,000 lamps of 10 c. p. each.

Work has begun on the new bridge over the Mississippi at Memphis, Tenn. This bridge will have a cantilever channel span of 770 ft., the longest yet built in the world, and two others of 620 ft. each. It is to be 34 ft. wide and 75 ft.

above highwater, with accommodations for a double-track railroad and a roadway for vehicles. The west approach will have an iron trestle 5,200 ft. long and a 1,800 ft. embankment; the east approach will have a 1,000 ft. trestle. The estimated cost is $2,200,000.

An interesting astronomical expedition has been fitted out at Harvard College for a twofold purpose. The first in order of time is the expedition to California for the observation of the total eclipse of the sun on Jan. 1, 1889. Immediately after the eclipse one of the corps of observers will proceed to Peru, taking with him a part of the apparatus. He will be joined later by others, and the work will then be entered upon, which has been a year or more in contemplation, of making a complete survey of the southern heavens.

According to the *Electrical Review* an electrical locomotive is being built at the New York Locomotive Works. The engine is to be operated solely by electricity and is designed to run on all roads where steam is now used. It will weigh fifteen tons, and when turned out of the shop will be an exact counterpart of an ordinary locomotive, though considerably smaller and lighter. When finished, an electrician from New York will take charge of it, and place in it the electrical apparatus to be used as a motive power.

Recent experiments with a sub-marine boat, made at Toulon, have been very successful. The boat moves horizontally as well as vertically, and is easily kept at any depth that is desired. It can be run at a speed of from nine to ten knots. The light is good and respiration easy. Its crew is ordinarily three, but during the experiments, five persons were on board. The *Revue Scientifique* says that the new boat is a complete success, and will become of the greatest importance in marine warfare.

A French scientist has calculated that a cargo boat driven by a triple-expansion engine is by far the most economical of all means of transport. It carries 2,500 tons of coals and goods, consumes 10½ tons of coal in the twenty-four hours, and easily makes 8½ knots an hour. Thus 11 grammes, or not ½ oz. of coal is sufficient to develop the power necessary to carry a ton at the rate of 14 ft. per sec. Another calculator has calculated that a half-sheet of note paper will give when burnt enough heat to carry one ton a mile in an Atlantic ship.

An English ship has just obtained two very deep soundings to the south of the Friendly islands,—one of 4,295 fathoms and another of 4,430 fathoms, equal to 4.9 and to 5.09 English miles, respectively. These depths are more than 1,000 fathoms greater than any before obtained in the southern hemisphere, and only surpassed, so far as is yet known, in three spots in the world,—one of 4,655 fathoms off the northeast coast of Japan, obtained by an United States ship; one of 4,475 fathoms south of the Ladrone islands found by the British ship *Challenger*, and one of 4,561 north of Porto Rico, also obtained by an American ship. The soundings were obtained with a sounding machine and galvanized wire. The temperature of the bottom is given as 33.7 deg. Fahr.

College News.

Dartmouth is to have a new Y. M. C. A. building.

Columbia has established an annex for the education of women.

Gen. E. Kirby Smith is Professor of Mathematics, in the University of the South.

The new catalogue of Yale shows a total membership of 1365, of which 688 are in the Academic department.

The catalogue of Harvard which has just been printed, shows a gain since last year in all departments except the Veterinary School. The total attendance is 1899.

The richest university in the world is said to be that of Leyden, Holland. It has real estate to the value of $6,000,000.—*Mail and Express.*

Dartmouth's new base ball cage is nearly completed.

The Columbia *Spectator* says that only "chumps and Freshmen" wear the College gown.

The first College gymnasiums in America were erected by Harvard, Yale and Princeton in 1859.—*Ex.*

Cornell has spent $500,000 on new buildings during the past year.

A Freshman at Oberlin was recently arrested for stealing overcoats belonging to his class-mates.

The rule has been passed at the University of the Pacific that two absent marks from any one class, shall debar the student from all exercises until excuse has been rendered and accepted.

The civil engineers of the University of Minnesota spent nine days in measuring a base line of three fourths of a mile in length, for Geodetic work. A second measurement checked within less than one hundredth of a foot.

The students of Wesleyan are happy in the fact that Dr. Bradford P. Raymond is to be their next president. He commences his duties with the beginning of the next school year. Dr. Raymond has been president of the Lawrence University in Wisconsin for several years where he is very popular with both students and faculty.

On the twenty-fifth of this month, delegates from Cornell, Columbia, University of Pennsylvania and Lafayette, will meet at New York to organize a base-ball association and to prepare a schedule.

The trustees of Dartmouth have sent a circular letter to all the Alumni who received pecuniary aid from the college while in attendance, asking them to repay the amount received, if their circumstances permit.

An article in the *Atlantic Monthly* for January, written by Prof. N. S. Shaler of Harvard, is of particular interest to all college men who give any time or thought to athletics.

Keefe, the New York pitcher, is to coach for Amherst this season.

There are more than sixty candidates for the Yale freshman crew.

All students entering Swarthmore College must first pledge themselves not to use tobacco in any form during the course. This is exacted in many other colleges from those who are aided by scholarships.

Isaiah V. Williamson has already paid over $2,000,000 to the trustees of the school which he has recently endowed.

A company of Maine State College students enjoy the honor of being the best drilled military company in the State.

The members of the Cornell foot-ball team have been presented by their manager with oxydized silver foot-balls as mementoes of the season of '88—*Ex.*

The *Technique*, an annual published at the Mass. Tech by each junior class, met with great demand this year. The first edition of 1000 copies (which was printed recently) was exausted in less than three hours after being put on sale.

The Maine colleges propose to have a State intercollegiate field-day next spring.

Besides the Boston and Worcester Techs, the University of Virginia also enjoys silver-gray and cardinal as school colors.

There are some men in college in whom the betting fever rages so strongly that they may be heard before chapel betting

as to whether the number of the hymn at morning prayers will be odd or even. This is one of those things that ought to be told in whispers.—*Pennsylvanian.*

This looks bad, but we sympathize with them when we hear our men betting that the organ will not hold out through another exercise.

It looks bad for the course in mathematics at the Mass. Inst. of Technology when we see the *Tech* publish the age of each of the fifteen men on the last fall's foot-ball team, and giving below, "average age 19 years," when the total for the *fifteen* amounts to 303 years, without taking account of the fraction of a year in each man's age. The average weight stands the test, being 151.6 pounds; also the height, 5 ft. 9½ inches. Four members only belong to the class which graduates this year.

John Clarkson, the famous base ballist, is to coach the Harvard base-ball team the coming season, and has already taken charge of the men. The Athletic Committee has passed a vote to allow the team to play against professional teams.

The civils of the Mass. Tech. complained to the faculty of being overworked. It was found that they had been required to work ten hours per week more than scheduled time and action was immediately taken to relieve them.

Stagg, the famous pitcher, refused a salary of $4,000, offered by the New York Athletic Association, to accept the general secretaryship of the Y. M. C. A. of Yale College.—*Ex.*

The forthcoming report of the United States Commissioner of Education will show the interesting fact that the number of colleges and universities remains exactly the same as ten years ago, while the number of students in them has in the same time increased from 32,316 to 41,171.

In the New England States where the greatest advance is being made in university instruction, the number of colleges has decreased by 3 in the last ten years, while New York has dropped 2. The Southern States have lost 23, while their number of students has increased by over eleven hundred.—*Mail and Express.*

The *Cynic* from the University of Vermont became financially embarrassed and called for a subscription from the school. A meeting was called and sufficient funds were raised to set the *Cynic* once more on its way rejoicing.

The following are among the captains-elect for next year's foot-ball teams:—

Harvard,	Cumnock.
Yale,	Rhodes.
Princeton,	Ames
Mass. Tech.,	Hamilton.
Dartmouth,	Odlin.
Amherst,	H. A. Smith.

A little book entitled "Brown Verse" has been issued by two of the editors of the Brunonian. It is made up of about forty selections; the first dating as far back as 1793. The first edition was quickly exhausted and a new supply is forthcoming. *Dartmouth Lyrics* a similar venture at Dartmouth promises good success.

The Stanford University is intended, as Senator Stanford said in a recent interview, for instruction in every useful art, from making shoes and clothing to painting and sculpture. Every student will have quarters as good as those in Oxford, Cambridge, or Harvard, and good board will be furnished at remarkably low rates. It is expected that individual expenses for a session will reach a minimum of $150 or $200. The study of literature and language will not be slighted.—*The Occident.*

Intercollegiate boating has received an added impetus by the decision of Cornell, Columbia and the University of Pennsylvania, to row an annual race at

New London about the same time as the other 'varsity races. An agreement was drawn up and signed by representatives of the three colleges, stipulating for an annual three-mile race between eight-oared crews with coxswains, to be held between June 20 and 25, on the Thames at New London, the exact date to be named before April 1. Columbia has also been invited to contest for the "Childs Cup," with Cornell and the University of Pennsylvania, but will probably decline, because of the great extra expense involved. The Harvard-Columbia race will be rowed this year as usual, as it was only set aside last year by the consent of both colleges. —*Ex.*

Exchanges.

We are pleased to receive the Wednesday editions of the *Mail and Express* which contains a department devoted to "The College World." The *Mail and Express*, one of the leading New York dailies, is ever ready to seize any opportunity to add to the perfection of the paper. The addition of this feature of college news is a new departure but is apparently proving successful.

The Wednesday edition of the MAIL AND EXPRESS, containing the "College World," may be subscribed for separately at the rate of $1.50 per year. Address communications to Editor College World, MAIL AND EXPRESS, New York.

The *Haverfordian* for December contains an editorial which suggests that students of good class standing should be exempt from final examinations. If the true state of affairs at Haverford is as bad as this article asserts, there is surely need for reform.

Many of our exchanges published an extra Christmas number or added some appropriate features to their regular issues. The *Tuftonian* was especially successful in this; their Christmas number being the most attractive and interesting of any which we received. The *Polytechnic*, *Swarthmore Phœnix*, and the *Pennsylvanian* also deserve mention.

The *Stevens Indicator*, a quarterly, published at the Stevens Institute of Technology, is a very valuable scientific magazine and is well worth preserving for future reference.

The article entitled "The Iron Industry of the United States" gives not only a valuable sketch of the history of the mining and manufacturing of iron but valuable statistics showing what is being done in that line at the present day.

"The Fast Set at Harvard," which was published in the *North American Review* has brought out so much comment from among our exchanges that we shall not try, at this late day, to offer any new criticism. On the whole we are inclined to agree with the *Swarthmore Phœnix* where it says:

> The only way to correct such a state of affairs in college life as is depicted in the *Review* article, is to do just what it is doing —to make such a social condition so unpopular and so despicable before the eyes of the better inclined youth, that it will not dare to exist, even in the great universities. But Harvard need not feel that she has had to bear the brunt of the writer's aim. It is directed at every institution in the United States where such things are to be found, and they are to be found, to a greater or less degree, in every college of any note anywhere. Taking its issue, as this article has, in the nation's greatest university, its effect will spread everywhere and go far toward what it has certainly made a good beginning to do—make college life what it should be, a model to the outside world.

We are pleased to see a marked improvement in the *Cynic*, especially in the editorial department. We, among others, took the liberty of criticising the editorials in a former issue of the *Cynic*, and for this reason so great an improvement is particularly gratifying to us. At the same time we expressed some pretty plain opinions of the *Westminster Review* and dwelt somewhat upon the

"freshness" of the Ex. editor. We are sorry that he had neither the grace nor good sense of the *Cynic* to listen to advice from another but after clipping our remarks about him for the benefit of his readers, he goes on in his characteristic fresh manner with a miserable attempt to kick back by criticising the W P I. We dislike to see a fellow lose his head as he did and attempt to handle subjects which are altogether too weighty for his young and tender mind. We are very glad that he has reprinted our paragraph because we are sure it expresses just what his readers have been wanting to say about him for some time.

We have just received the first (January) number of the *Collegian*, a prospectus of which we published some time ago. It is a remarkably interesting and valuable magazine to all college men, but more particularly to undergraduates, who will (commencing with the March number) be its sole contributors. We like the spirit which it manifests in saying "We are non-partisan, non-denominational, are kindly disposed to all creeds and politics." The *Collegian* is at the disadvantage of having to work its way upon untrodden fields, but if the merit of its first number is any criterion by which to judge, it gives promise of assured success.

Personals.

Mr. Higgins was home during vacation.

Mr. Joseph O. Phelon will have the Seniors in their review of Physics.

J. P. Taylor, formerly of '90, has accepted a position as assistant in the woodroom of the Washburn Shop.

Prof. Kimball is on his way home. He has engaged passage for the 23d, on the *City of Berlin*, of the Inman line.

The following notice, relative to Mr. C. D. Alvord, '83, whose death was mentioned in our last month's issue, was written by the President of Atlanta University:

In the death of Mr. Charles Dewey Alvord, a graduate of the Worcester Polytechnic Institute, Atlanta University has lost one of the most capable and promising of its younger teachers. He began his service as instructor of iron work and mechanical drawing in the autumn of 1887. It fell to him to inaugurate the work in both of these branches of instruction, previously untaught in the university. Such a task is generally a trying one, and the problems connected with it are not always easy of solution. But in the brief period of his service he has demonstrated his capacity for the work, and as the weeks passed he was manifesting increasing power as a teacher. He was possessed of remarkable simplicity, frankness and sweetness of disposition. The growth and strengthening of his Christian character through contact with the missionary work which Atlanta University is doing for an oppressed and needy people was especially marked. It was plain to those who knew him best that if his life could have been spared his work would have been of increasing usefulness to the university, and of widening influence and power among its students. He was not physically robust, and when the fever of which he died had fairly gained a hold upon him it did its work rapidly. His loss is a heavy one, not only to his immediate family and friends, but in an especial degree to Atlanta University, with the entire body of its teachers and students.

Grimes, '87, has charge of the work being done at the Clark University.

Myers, '88, is in the employ of an electric railway company at Richmond, Va.

Warren, '88, is still in Vermont in the employ of the Rutland R. R. Co.

W. R. Marden, '88, is draughting for the Riverside Bridge and Iron Works in the New York office of the company.

Mulliken, '88, is doing some special work in the mining department of the Boston Tech.

Chittenden, '88, visited Worcester

about Christmas time to take a part in the drama "Our Boys," which was given in Horticultural Hall. He deservedly carried off the honors of the evening by his fine acting.

McLane, formerly of '90, has returned to school to join '91, and Perry has come back to take up his work with '90.

Technicalities.

A happy and successful year to all our subscribers.

The hackneyed song of the middlers, "Half-way Through."

Dr. Fuller is hearing recitations in Physics during Prof. Kimball's absence.

Will '90 think of hiring the rink this year for base-ball practice, or will she depend on her prowess, established last year ?

Noted in the faculty's almanac: "About this time, look out for 'cribs.'"

Several of the candidates for next year's foot-ball team are practising in the gymnasium. All should endeavor to do so.

There will be nothing more intoxicating at the Half-way banquet, than the music of the Class orchestra.

We understand that the January graduation exercises will be very concise.

S. A. Kinsley and H. L. Dadmun, both of '91, have been elected to the W P I editorial staff in the places of Mr. Alley and Mr. Fay, who have resigned.

Can any one tell us the use of the lamp-post on the drive-way to Boynton Hall? Wouldn't it be more efficient if placed so as to light the foot-path.

Middlers will take up the study of Schiller's prose works, beginning with "The Thirty Years War."

The apples presented by the reverend gentleman for the use of the Institute horse met their fate in the blacksmith's shop. Here is a case for the long-named society.

Will all who consider themselves fathers of the W P I please notify us. We desire statistics.

Some one with enterprise might make a good thing, when there is snow on the ground, by letting toboggans at the Hall, for use to Boynton Street.

Can any of our subscribers inform us why certain unlawful helps, used by victims at times of scholastic inquisitions, are designated by certain appellations, such as, crib, pony, trot, etc.? All apparently connected in some way with our most valuable domestic animal.

Five senior mechanics have already finished practice, and nearly a dozen more are within thirty or forty hours of the end.

It will be to the advantage of all students to patronize the men who advertise in the W P I.

The desks for the chemical department of the Salisbury laboratories have been delivered, and the asphalt floor is being put down.

When the girl sends a special delivery letter announcing that it is the third and last (?) call, it is about time for the fellow to make tracks, and that's what he did do.

Would it not be a brainy scheme to find out what per cent. of our numerous debts the class of '92 will agree to liquidate before we give them the freedom of the city?

There is a possibility that the Y. M. C. A. will hold athletic sports in the rink some time during the winter. If the sports occur, the championship cup, presented by Mr. George S. Dickinson, and now held by H. L. Dadmun, '91, will again be contested for.

And then the man with the isolated whisker announced that they would next

listen to "a banjo and guitar quartet consisting of Messrs. D. and P."

Dadmun, '91, without any training, went to New York, the fifteenth of last month, to enter in some of the races at the Manhattan Athletic Club's meeting. In the half-mile run there were over thirty starters. Dadmun was given 39 yards and won the first prize,—a gold watch. In the 60-yards dash, with 4 yards start, he won second place.

The shop has plenty to do in all departments. The elevator in the Estabrook block on Pleasant street is about finished. It takes the place of a telescope elevator, which was removed. An elevator is being built to be placed in H. A. Hawley's flour and grain store in Waltham.

The apprentice room is to be enlarged immediately by moving the partition 16 feet to the north. This will necessitate some changes in the tool room.

A new face-lathe is being designed for the shop wood-room. It will have an 18-inch swing and be used principally for chuck work. It is hoped to have some of these built and running, so that the next apprentice class may do work on them.

The Coney Island elevators and accumulator are about ready for shipment. These elevators will run at a speed of about 400 feet per minute. To insure an easy stoppage of the car an ingenious automatic shipping arrangement, which will begin to check the speed of the car about 10 feet from the landings, has been devised. The accumulator is one of the largest ever built at the shop. It has a 12½-inch plunger, a run of 10 feet, and water connections of 6-inch pipe.

One of the Tech alumni, who has had a large experience in teaching in manual training schools, recently wrote of the system: "The arguments, pro and con, by learned educators who knew nothing practically of the matter whereof they talked so sagely, were always very funny to me—except for the serious side of it—so natural did the whole system seem to me with my Free Institute training. Though I have left teaching for business, I am an earnest advocate of the educational system which really took practical shape in my Alma Mater. And the mental, moral and physical effect is not one whit less beneficial in the younger class which is reached by the M. T. schools; while, as feeders to higher polytechnic schools, I am sure they will exceed the ordinary school."

Museum of Antiquity.

ART vs. NATURE.

WAS I pleased with her? Well, yes, immensely,
There 's no denying the truth.
She was looking so charming last evening
When presented to me as "Miss Ruth."

Her forehead was worthy of notice,
Her figure was shapely and true;
Her eyes? Well nothing enchanting
An unpleasant shade of light blue.

What was there about her I fancied?
What set my blood rushing so wild?
'Twas that pearly set of white ivories
So sweetly displayed when she smiled.

Of everything lovely in nature
Was e'er a sight nearly so sweet;
What ever was lacking for beauty
Her smile always made it complete.

* * * * * * *

One hour,—there she was in the hallway
Close beside her I happened to stand
Great Heavens! but would you believe it
She was holding *those teeth* in her hand.

HER INVITATION.

In the parlor they were sitting—
Sitting by the firelight's glow,
Quickly were the minutes flitting,
Till at last he rose to go.

With his overcoat she puttered,
From her eye escaped a tear—
"Must you go so soon?" she muttered.
"Won't you stay to breakfast, dear?"

—*Tom Masson in Life.*

Don't depend on a crib.
You will die on the spot,—
If you're caught.
If you don't have a trot,
Though you're killed just the same,
You'll die game.

A WINTER SYMPHONY.

To fly o'er the beautiful snow in a cutter
With a girl by one's side on a bright moonlight night,
A girl whose light touch puts one's heart in a flutter,
Fills the heart with a bliss that the lips can not utter—
Ah! this is indeed a surpassing delight.

How blissful the night, but how awful the morrow!
(Why always on pleasure thus swiftly comes ill—
Why ever on joy must so closely tread sorrow?)
We've got to go scouring the city to borrow
The money to settle the livery man's bill!
—*Boston Courier.*

A LETTER HOME.

Most esteemed Governor:—

Cold winter ist hier,—vacation ist went,
For a week I've been down mit der croup;
Mein window will soon frame der poster,—To Rent,
Und I shall turn up "in der soup."
Die Semis are kommen,—mein cribs are not made,
A spool of Dutch poetry is due;
Mein bets und mein breakage-bills still are unpaid,
Und that's why I'm feeling so blue.

Ach, Vater, I wish I had done it up fine,
Und mastered die trump-cards before,—
Why, I can't tell der trigonometrical sine,
From der sign on our tobacco-store.
Wenn I asked you, dear Vater, a tutor to sent,
I am sorry you couldn't keep cool;
You said, I straightway to Gahenna could went,
Und so I am back in der school.

But, Vater, don't worry,—der croup never kills;
Der Springtime will come back some day.
Next week I will send you a few pious bills,
Und in June I can come home,—to stay.
Already I see you awaiting your boy
Mit a rope round the fatted-calf's neck.
Please write me at once that I still am your joy,
I can tell by the size of your check.

Irate passenger (as train is moving off): Why the —— didn't you put my luggage in as I told you, you old—

Porter: E—h, man! yer baggage es na sic a fule as yersel. Ye're i' the wrang train. —*Punch.*

He was Dissipated,—In the chemical laboratory:

Professor.—"What has become of Tom Appleton? Wasn't he studying with the class last year?"

"Ah, yes; Appleton—poor fellow! A fine student, but absent-minded in the use of chemicals, very. That discoloration on the ceiling—notice it?"

"Yes."

"That's him."—*Journal of Health.*

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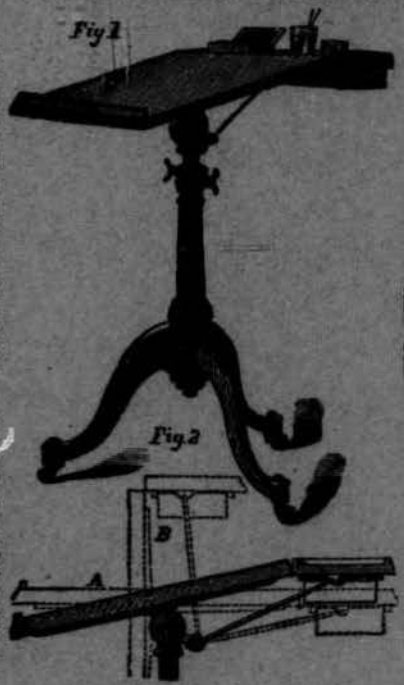

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