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OCULISTS' FORMULÆ FILLED IN OUR OWN WORKSHOP.
Here's a Happy New Year to one and all. May the year '95 be more prosperous than any preceding year in the history of the Institute.

In the columns of this issue will be found two of the papers read before the Washburn Engineering Society. We hope to be able to publish the other papers, read the same evening, in our next number.

And the hour is at hand when the careless shirk begins to look pale and talk of study, and wonder how many conditions he will get; and the grind begins to calculate his standing, and determine just how many A's he will get. In other words, the mid-year examinations are almost here, and every one is studying.

Unfortunately, examinations are a necessary evil, and we must make the best of them. We trust that when the final hour comes, no one will be found unprepared. We wish all success, and especially the poor Senior, who is so near, and yet so far from the goal with its reward of a sheepskin.

It is now time for the Institute to turn its attention to the Burlesque.

Mr. H. W. Doe has signified to the committee his willingness to write the libretto, and, indeed, has it already under way. Mr. Doe's abilities are too well known to admit of question as to the quality of his work.

From now on, work will be pushed as rapidly as possible, and it remains for the students to say what the result shall be. The committee must have earnest, enthusiastic support in every way. We must make this burlesque a success, for we have already made a reputation in this line of work which we cannot suffer to become tarnished. This very reputation assures the financial success of the affair, and this assurance must be preserved for the future.

Again, there is another side to the subject. The author of the libretto gives us his time and his labor, and neither of these items is a small one, so it seems but simple justice that we give the product of his work such a setting that he need have no cause of regret for wasted effort.

To accomplish the desired result is a sim-
ple task. Let each man take a personal interest in the production, and lend his every ability to its success. Do not despise the chorus, for on no other element is success more dependent. So come out and try when the call comes, and then attend rehearsals promptly and faithfully. In this way, only, will you do yourselves credit.

Remember the honor attendant upon the production of 1893, and let it not be said, when the Burlesque of 1895 is a thing of the past, that the men in the Institute could not fill the places left vacant by the classes of '93 and '94.

Owing to press of work at the Printing-Office, this issue has been delayed somewhat.

SOME OF THE SPEECHES DELIVERED AT THE ALUMNI RECEPTION.

Editor WPI:—

Your last issue contained a brief notice of the somewhat tardy, but none the less enthusiastic welcome recently extended to President Mendenhall by the Tech Alumni. Believing that a report of the speaking on that occasion would be of interest to your readers and of possible profit in several directions, I have endeavored to reproduce copy of the remarks then offered. I delayed the effort so long that I met considerable difficulty in accomplishing that object. Dr. Mendenhall's remarks made so firm an impression upon me that I was able to recall to him the points he made, and he kindly offered to relieve me by dictating to his stenographer an abstract for your use. Mr. Russell fortunately had a memorandum of his heads, and at my earnest solicitation he consented to dictate something, which, if not just what he said, would be just as good.

Mr. Salisbury said he was surprised to see so largely attended a meeting, and thought it augured well for the future of the Institute and the Alumni. Pres. Wyman had threatened to call upon me for a speech, and I suppose the approaching possibility of that calamity was responsible for causing me to shed so much of Mr. Salisbury's remarks, that I was unable to re-suggest to him the words he used. When I approached Mr. Washburn, some three weeks after the meeting, he hadn't the remotest idea what he said, and, contrary to custom, he had no manuscript of extemore remarks. I suppose I was still suffering some apprehensions of Mr. Wyman's intentions, and I was unable to refresh his memory. I forward under same cover the reports I have been able to secure.

Wm. L. Chase.

Dr. Mendenhall's Address.

"It is hardly necessary, Mr. President and Gentlemen, for me to express my appreciation of your kindness in extending to me the hearty welcome which I meet here to-night. It is, I might almost say, the culmination of a series of welcoming receptions which have from the beginning, not only given me great personal satisfaction, but have shown me the great interest which is generally felt in the progress of the Worcester Polytechnic Institute; and I am particularly glad to see this interest exhibited by one of the bodies upon which the Institute must most depend for its welfare.

"In the comparatively short time since I came to Worcester I have naturally been obliged to give my attention to many things, but among the many, much time and thought has been given to the study of the great body which you so fitly represent here to-night.

"I enjoy, and have enjoyed for several years, the personal acquaintance of a few of the Alumni of the Institute, but this number is not sufficiently great to enable me to draw any important conclusions based upon actual personal knowledge. I have been, however, a somewhat diligent student of the catalogue during the past month or two, and I have sought for information from some of my colleagues in the Faculty, so I am able to give you a few of the conclusions which I have reached, which have interested me very greatly and which, I trust, will not be without interest to you. I find, to begin with, that the Institute has graduated, from the beginning, a total of 635 men, and that of this number 34 are now dead, leaving 601 graduates living, and in active life almost without exception.

"I am struck with one fact with reference to this statement, and that is the excellent showing that it makes for the graduates of the Institute from the standpoint of the life statistician. Although nearly twenty-five years have elapsed since the graduation of the first class, the number of deaths during the whole time is but little more than 5% of the whole. This shows, in my judgment, that the graduates of the Worcester Polytechnic Institute constitute an excellent risk for life Insurance Companies, as the death-rate is certainly low when compared with an equal
number of men taken from the population in general. I have also been interested in a little examination into the occupation of these men, as far as it has related to the distinctive character of the training which they received while members of the Institute. Of the total 601 men I find that not more than twenty-five at the present time are not engaged in active business life of one kind or another, and I am by no means sure that the number of those not so engaged is anything like as great as twenty-five, but I mean simply that there are about that many concerning whose occupation we are uncertain. Of the total number of those actively employed, I find that all, with the exception of about ten, are employed in pursuits for which the education and special training which they received at the Institute especially qualifies them, so we may say that, in round numbers, out of six hundred men who have been fitted for their life-work at the Polytechnic Institute not more than ten have taken up occupations for which they might have been prepared without the training which they there received. I believe this to be a remarkably good showing, for I doubt if any other professional school of this type can make so good a demonstration of the practical application of its work as this. I am sure that if we were to examine the statistics of the graduates of any law school, or theological seminary, or medical college during the past twenty years we will find that a considerably larger per cent. of them have not finally found their places as lawyers, or clergymen, or physicians, and I think perhaps we are safe in saying that it would have been better had a still larger per cent. of them found occupations outside of those respective professions. However, it will not do to have any controversy with our friends of other professional work, especially the legal profession, for we have in our own ranks several members of that profession, all of them engaged in a department of it for which their training at the Institute especially qualified them.

"Now, I may be pardoned for saying a few words with regard to the general interests of the school. In looking at an Institution like this one finds at once that there are four great factors which are each of its degree essential to the success of its work. I refer now to what may be termed the living factors that have to do with it, not the inanimate material which would be found upon the Institute hill to-night if there was no living person near it; such as the buildings, the apparatus, machinery and other material appliances. As to the living forces, I say there are four which must be considered essential, and it is important that each of these four should perform its proper functions. Enumerating these in the order in which they might naturally occur, I mention, first, the Board of Trustees, and I need hardly say that the Institute is particularly fortunate in this respect, having for its Board of Trustees a body of gentlemen who are earnestly and enthusiastically interested in the progress of the work with which most of them have been connected for so many years.

"Next, I would mention the Faculty of Instruction, and, as I am sure you are all aware that college faculties are remarkable for their modesty, among other things, it would not become me to make any comments to-night upon the efficiency of this body. You are, yourselves, so familiar with it, in the main, that you can form your own judgment.

"Third, is the student body connected with the Institute at the present moment, and I am sure that no words are necessary to emphasize the importance of this element, because without it the other forces would find themselves idle, as a machine without material upon which to do its work.

"Now, the fourth, and, although coming last, by no means the least, is the great body of Alumni of the Institution. I sometimes imagine that the Alumni of a school do not fully appreciate the importance of their relation to it, and that they do not fully understand in what degree they represent the character of the work which is done at the Institution. Very many of you are engaged, in one way or another, in connection with manufacturing establishments and other places where raw material is worked upon and issued as a product, and know perfectly well that the reputation of an establishment so engaged in transforming raw material into finished manufactured articles depends, finally, absolutely upon the character of this product, and you know that no establishment can long maintain a reputation, and therefore it cannot long do business, unless its product is, in the main, and with, of course, occasional exceptions, satisfactory. You, therefore, stand for this finished product as far as this Institution is concerned, and upon your character in that respect the record of the Institution in the past must stand. I am sure I need not say that so excellent has been this record that the Institution has had good reason to feel proud of the six hundred illustrations of its work which are scattered around the country. But it is not alone in this capacity that you can be of service to us; your knowledge of this sort of work is sufficient to show you that the character of a product of this kind, as well as the product of any manufacturing establishment, depends very largely upon the nature and quality of the raw material upon which it does its work. Now, an institution of learning
may be ever so thoroughly equipped, and may have a Faculty of ever so accomplished men, and its interests may be guarded ever so carefully by the most painstaking and industrious Board of Managers, but unless it is furnished with good material in the way of students upon which to do its work, it must in the end make a poor showing. I do not wish to be understood as complaining in any way of the character of the material which we now have or which we have had in the past, but I do wish to emphasize the possibility of improvement along that line and to call your attention to the fact that no one can assist us so readily in this way as you. In order that we may secure the best material, it is necessary that we have a large amount available; always a larger amount than can be consumed, because if the consumption is just equal to the supply, it follows that no selection is possible. If, however, we have a supply several times as large as that which we can, or wish to, make use of, then selection becomes possible and we can choose the very best. In this way you can be of much service to us in the matter of increasing the constituency of the Institute, both as to numbers and as to area of distribution. We need many more applicants for admission than we can admit. At the present time, and for some time past, the number of students has been just about as many as can be conveniently accommodated, but with the addition of our new engineering laboratories, now well underway, the increased facilities thus provided will enable us to take care of a somewhat greater number. I would be glad, therefore, if, during the coming season, we should have two or three times as many applicants for admission as we can take care of; as this would at once enable us to raise our standards somewhat, although they are already very fair and compare favorably with other institutions of a similar character. It would also enable us to make something of a selection of the best from those who apply. I have thought it not impossible that one applicant for admission to the next Freshman Class could be provided by every five members of the body of Alumni. That is to say, I have thought that if every Alumnus would consider himself an agent to be actively interested in looking after the interests of the Institute in that direction and bringing its claims before those who have to advise young men as to what course they shall follow, the result would naturally and easily be something more than one hundred applicants for admission, growing entirely out of this effort on the part of the Alumni.

"I wish to close, then, by urging you to take this thought with you, and if you find that you can serve us in this direction, I am sure that, with other means of drawing upon the young men who are legitimately our constituency throughout the country, we shall very largely increase the number of those who are knocking at our doors for admission to our facilities; and if this happens we can promise that those facilities will be greatly increased in the near future. To this end I trust we shall receive the cordial assistance of every Alumnus present here tonight, and that through you we may reach the far greater number who are absent."

Remarks by John M. Russell, '76.

"One's feeling of affectionate regard and kindly solicitude for his Alma Mater should be akin to his devoted fondness for his natural parents, and I am sure we, who are assembled here on this auspicious occasion, are actuated by just such promptings in extending to Dr. Mendenhall his first hearty welcome to the good-fellowship of our Alumni Association.

"We are indeed very proud that our Alma Mater, even through advancing so rapidly in age and experience, has shown such excellent good judgment in her choice of a third husband, and it surely does us great honor to address him as our step-father.

"It is surely very fitting that Dr. Mendenhall's first introduction to the Alumni of the Institution to which he has brought his best thoughts and experience, should be at a gathering of this kind, constituted, as it is, almost wholly of resident members of our Association; for it not only affords us the opportunity of intimate acquaintance with him as the head of the Institution of which we are all so proud, but likewise give us the opportunity to welcome him to that citizenship which certainly is, or ought to be equally the pride of every resident of the Heart of the Commonwealth.

"Glad indeed should we be to receive into our midst every influence tending to elevate the standard of our citizenship, by the intellectual cultivation of the people who compose it, for is it not true, that upon such a standard our prosperity as individuals and our development as a city most largely depends?

"It is, however, to our Alma Mater that the greatest benefit is undoubtedly to come from this fortunate alliance, and we shall watch with renewed interest its development and progress."

"This brings me to the thought touched upon in Dr. Mendenhall's most excellent address, viz.: the duty of the Alumnus to his Alma Mater. What is the measure of our obligations, and are we living up to it?

"In the first place, I fear that we are all too apt to think of the Institute as still remaining just
about as we left it, regardless of the tremendous advancing strides it has since taken. We forget that a fifth of a century has passed away since some of us completed the curriculum of our course, proudly tucked our sheep-skins under our arms and started out upon our life-work as men; and while, of course, it would not for a moment be expected that we would admit that the graduates in more recent classes were any improvement over ourselves as graduates, yet we are surely happy and proud to admit that in a broader and more comprehensive plan of work, accompanied by greatly increased and more fully equipped facilities for doing the work, our Institute has made most wonderful progress.

"It is, therefore, especially important that the resident Alumni should keep themselves thoroughly familiarized with all the details of the progress that is being made, and thus be able to convey the knowledge of the same to those members of our Association who are so located in business as to be widely separated from us, and who, without such knowledge, may become weaned to a greater or less extent from that interest in their Alma Mater which should be carefully and studiously maintained.

"The dissemination, among our members, of the knowledge we have of what is being done, is a problem of no easy solution and of no mean importance, but to my mind there are at least three ways in which it may and ought to be accomplished.

"First, by our becoming so enthusiastic in our interest in it ourselves that we will take occasion to discuss it personally with them whenever and wherever we meet them.

"Second, by some plan whereby the several other branch organizations of the Alumni Association shall be officially visited on the occasion of their annual meeting by some resident Alumni who shall especially advise them as to all matters of interest that have taken place at the Institute, being fully prepared to answer any questions they may ask respecting the same.

"And third, through our most excellent Institute paper, the WPI. This I consider to be an especially valuable medium through which to keep up the interest of the Alumni in our Institute, and I believe it to be the duty of our Association to take greater official interest in its publication than has yet been manifested; and either by representation upon its board of editorial management, or through some specific committee appointed for the purpose, the WPI should be made the official organ of the Alumni Association as well as of the Institute.

"But I apprehend some may say what is the necessity of keeping up this interest after graduation. Men are too busy with their active bus-

ines pursuits; to which I reply that men should never be so busy as to forget the place where their intellectual character became rounded out and possibly the business career of their whole after-life determined, any more than they should come to neglect their interest in the old homestead, and further, we should not only continue our interest in it but should likewise consider its necessities, and as we have been prospered ourselves on the result of the teachings of our Alma Mater, so should we contribute liberally to her treasury in the hour of her need, which to my mind is the key to the necessity of keeping alive and warm in the heart of every Alumnus the devoted fondness for his Alma Mater to which I have already referred.

"Therefore, thanking you for your kind attention, and appreciating the many ways in which we as individuals and as an Association can be very helpful both to our Alma Mater and to him in whose honor we are here assembled, I will close what I have tried to say in a purely informal way, by simply re-emphasizing the importance of a studious effort on our part to keep informed as to the progress that is being made, thereby keeping up the interest of our Association therein, and always having reason to feel assured that in the thoroughness of its equipment, the quality of its teaching, and the standard of its work, the Worcester Polytechnic Institute is to be kept as it is now in the front rank of the scientific educational institution of our own land, if not of the whole world."

JOHN M. RUSSELL, '76.

W. E. S.

The Washburn Engineering Society held its regular meeting in the Salisbury Laboratories, Monday evening, Dec. 17, 1894. The attendance was quite large, the audience being composed mostly of Alumni. These were noticed among the audience: Billings, '71, Gordon, '81, Wyman, '82, Cole, '83, Fish, Smith and Tucker, '92, Butterfield, '93, Boyden, Rice and Coughlin, '94, Davis, Brooks, Bryant, Barber and Clapp, '95, Harris, Warren, Gifford, '96. The Faculty was well represented by the following members: Dr. Mendenhall, Profs. Sinclair, Alden, Gladwin, Bird, and Supt. Higgins.

The meeting was called to order by Vice-President Taylor, '95, owing to the absence of President Clement. Secretary Alden read the minutes of the previous meeting, which were approved. The name of C. F. Leonard was proposed for membership.

The regular programme for the evening then commenced with the reading of a paper, "Heating and Ventilation," by Edward P. Adams, '76.
This paper was very interesting, although quite long, lasting something over an hour. Mr. Adams had several diagrams, illustrating his paper very completely. He answered a number of questions given to him by some of the audience after he had read his paper.

The next paper was the "Analysis of Foundry Expense Account," given by W. W. Bird, '87. This somewhat novel paper proved very interesting, the reader giving a table from which all the expenses in the different details of a piece of work could be reckoned. Mr. Bird's work was very favorably commented upon by Wm. R. Billings, an old graduate of the class of '71, who is now engaged in foundry work in Taunton, Mass. He was very much interested in the paper, and gave quite a little talk on foundry work. Supt. Higgins also gave a short speech advocating the foundry business as a good trade for graduates to take up.

The third paper was by Wm. L. Chase, his subject being, "Some Expedients Adopted in Moving a Large Manufacturing Plant."

This concluded the regular programme for the evening, but Prof. Alden stated that Mr. Powell, '79, wished to give a short paper on "A New Form of Screw Thread." Mr. Powell stated that he wished to put his plan before the society before giving it out to the general public, in order to get the members' ideas on the subject. In his paper he very strongly set forth the advantages of the new thread in preference to the square thread. It is made like a square thread, except that it is made at an angle of 29°. The reason for using this particular angle is, that by experiment, it has been found that at this angle the least amount of friction is produced. The depth of the thread is the same as that of a square thread. It is claimed the thread wears better, is more easily made, and has better clearance at top and bottom than any thread made.

**MR. POWELL'S SCREW.**

*Mr. President and Gentlemen:—*

I wish to call your attention this evening to a new Screw Thread I have designed, which is to supersede the square form of screw thread so called, having none of the bad features of the square thread, but all of its good features, besides many unique in itself of much greater value.

The chief, and perhaps only real advantage in the square thread, unique in itself, is the fact that the line of thrust is parallel to its axis, and, that the friction being so much less, it is used for lifting purposes, or in the movement of parts of machinery, requiring continuous, or reciprocal motion, where a minimum, frictional resistance must be an important factor. This appears to me to be the only feature which should commend itself, at any time, to the mind of a progressive engineer and designer, in the construction of machines.

The fact that there is great difficulty in making proper fits, and the entire lack of provision for taking up wear or backlash should cause it to be cast aside by the practical mechanic.

Another thing in cutting a square thread screw, especially in cases where the thread is multiplied (or split as it is commonly known in shop parlance), the clearance of the cutter must be so great as to not only materially weaken the tool, but at the same time seriously question the accuracy of the finished thread itself.

For the same reason (the clearance of the cutting tool), it is impossible to cut this form of thread in a bolt cutter, or with a die plate, and, since the bolt cutter has made such rapid strides to the front as a great labor-saving tool in the machine shop, it has become imperative that a new form of thread should be devised, which can be cut with a die, producing a screw having substantially the valuable features of the square thread with none of its faults or disadvantages—a screw thread which would commend itself, and be accepted as a standard in the mechanical world.

To this end, at the earnest solicitation of a prominent builder of bolt and screw cutting machinery, to devise a form of thread to meet these requirements, I have designed the 29 degrees angular screw thread, which I take pleasure in submitting to the Society this evening.

Before proceeding to an explanation of its deduction, allow me to state that the 29 degrees angle, which I have used rather than any other, was from the fact that very exhaustive and satisfactory experiments have been made on angles for a worm thread. It was found that a worm thread cut with an angle of 29 degrees and to the proper depth, reduced the friction between the thread and teeth of worm wheel the greatest amount. In fact, gauges had already been made for this angle, and it has been adopted by all progressive engineers as the correct form for worm gearing.

Again, this angle gives the necessary clearance to the cutting tool, in excessive pitches, and also will permit the screw to be cut with a die. These facts appealing so strongly, I made the angle between the two sides of the new thread 29 degrees.

Now, not to make the matter of construction to differ materially from the present practice of constructing a square thread (by employing
elaborate formulas, which are apt to mystify and confuse the average workman), I have taken the depth of thread in every case to be identically the same as in the square form of thread; that is, if the pitch is 2 threads to the inch, the depth of the thread is \( \frac{1}{2} \) of an inch. If the pitch is 4 to the inch, the depth is \( \frac{1}{4} \) of an inch. In other words, divide \( \frac{1}{2} \) by the pitch. There is no necessity for micrometer calipers to measure the depth in thousandths or more, or figures given in decimals to puzzle the brain of workmen in devising means to measure it. The depth is always \( \frac{1}{2} \) divided by the number of threads to the inch or the pitch. The width of top of thread is equal to the space at root, and is determined by the tool gauge and the workman's calipers as to depth. I make no change in the construction of this thread different from what the workman has been used to doing every time he had occasion to cut a square thread. All that is required is to grind his tool to fit the gauge for the correct pitch, similar to what he has to do in cutting the Sellers, or even the square thread itself for that matter; in fact, the only difference is simply in the form of the thread, in relation to its construction.

By referring to the diagram.

Drawing the triangles ABC and CDG, having the angles ABC equal angle BCD, equal angle CDG, equal 29 degrees; and the distance between point B and point D equal 6" or \( \frac{1}{2} \) pitch, so called. Now, if we bisect triangle ABC, we have two right-angled triangles, AEB and CEB, in which the angles EBC and EBA equal 14 degrees 30 minutes, and EBC equals AE, equals 3".

Now, EB equals EC cotangent 14 degrees, 30 minutes, equals 3 \( \times \) cotangent 14 degrees, 30 minutes, equals 11.601; taking depth of thread for \( \frac{1}{2} \) p, which is 3", from this amount, 11.601 minus 3 equals 8.601. \( \frac{1}{2} \) of this is the top of the thread, and \( \frac{1}{2} \) of it is the bottom of the thread. \( \frac{8.601}{3} \) equals 4.3005, which makes width of top of thread equal to width of space at bottom of thread, as is evident. Again, this width of top of thread equals (4.3005 tangent 14 degrees, 30 minutes) \( \times \) 2 (AE being only \( \frac{1}{2} \) of angle), which equals 2.2242, which is also the width of space at bottom of thread. Now, the thickness at root equals [(3 plus 4.3005) tangent 14 degrees, 30 minutes] \( \times \) 2 equals 3.7758, which is also the width of space at top threads. This being added to width of top of thread equals 2.2242

\[ \text{3.7758} \]

\[ \text{6.0000} \] equals 6" the distance from centre of the thread, to centre of next, being correct for \( \frac{1}{2} \) pitch.

From these computations the following formulas are deduced from which the exact dimensions of any thread can be accurately computed from its pitch. By the term pitch, it is assumed as being so many threads to 1 inch.

| Pitch. No. Threads to one inch. | Depth of Thread | Width at top Space at Bottom of Thread | Thickness at Root Equals Width Space at top of Thread.
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>( \frac{1}{2} )</td>
<td>1 in.</td>
<td>.7414</td>
<td>1.2586</td>
</tr>
<tr>
<td>1</td>
<td>( \frac{1}{2} ) &quot;</td>
<td>.3707</td>
<td>.6293</td>
</tr>
<tr>
<td>2</td>
<td>( \frac{1}{2} ) &quot;</td>
<td>.1985</td>
<td>.3147</td>
</tr>
<tr>
<td>3</td>
<td>( \frac{1}{2} ) &quot;</td>
<td>.1285</td>
<td>.2098</td>
</tr>
<tr>
<td>4</td>
<td>( \frac{1}{2} ) &quot;</td>
<td>.0927</td>
<td>.1573</td>
</tr>
<tr>
<td>5</td>
<td>( \frac{1}{2} ) &quot;</td>
<td>.0741</td>
<td>.1259</td>
</tr>
<tr>
<td>6</td>
<td>( \frac{1}{2} ) &quot;</td>
<td>.0618</td>
<td>.1049</td>
</tr>
<tr>
<td>7</td>
<td>( \frac{1}{2} ) &quot;</td>
<td>.0529</td>
<td>.0899</td>
</tr>
<tr>
<td>8</td>
<td>( \frac{1}{2} ) &quot;</td>
<td>.0463</td>
<td>.0787</td>
</tr>
<tr>
<td>9</td>
<td>( \frac{1}{2} ) &quot;</td>
<td>.0413</td>
<td>.0699</td>
</tr>
<tr>
<td>10</td>
<td>( \frac{1}{2} ) &quot;</td>
<td>.0371</td>
<td>.0629</td>
</tr>
</tbody>
</table>

The valuable features of this new thread, making it superior to the square thread, lie not
only in its ease of construction, but in the fact of its form admitting adjustments for wear.

The diameters of screws will vary as widely as will their pitches. A screw may be required in one shop to be 2 1/16 in. cut 4 pitch double. In another shop it might be the same diameter, but cut 3 pitch double, and so on. So we must not look for a standardization of the 29 degrees angular thread, like the Sellers or so called U. S. S. One fact must be settled on whatever may be the diameter of the screws, the tap must be made 2 1/10 larger in diameter, and the thread must be cut with the same tool as is used in cutting threads, and must be cut 1 7/10 deeper than the screw is cut, making the diameter of the tap at the bottom of thread the same as diameter of screw at bottom of thread. This makes the point of thread on the tap .0052 narrower than on the screw, which makes a clearance of 1-100" in the nut at top of screw.

The tap drill should be 2-100 larger in diameter than the diameter at bottom of thread on screw, which allows 1-100 clearance between nut and bottom of thread.

This screw obviously can be fitted much more easily to the nut than the square thread, and, as has been shown, having clearance top and bottom in the nut, allows taking up for wear.

The further superiority of the new thread at once is seen in the additional strength at the root, as well as the greater wearing surface, owing to angle, and, at the same time, the angle is not so great as to materially change the axial force on which the screw acts, from the square thread.

Respectfully submitted.

A. M. Powell, B. S.,
Mechanical Engineer, [President The Powell Planer Company.

ABSTRACT OF PROF. BIRD'S ARTICLE.

The next paper, "An Analysis of a Foundry Expense Account," was presented by Mr. W. W. Bird, of the class of '87. He divided the total expense into several parts, mentioning the various materials and their uses in each division, also the labor items for each. He also presented a table showing the ratios of each division to the total expense and to the cost of moulding, as well as the percentage of labor in each.

After fully explaining the table he took several examples and showed how the table might be used in determining the price per pound for castings.

A LECTURE BY F. P. GOULDING.

The senior class listened to a very interesting lecture, Tuesday, December 18, by F. P. Goulding, Esq., on the subject, "Laws Relating to Inland Water Rights."

He stated the earliest Massachusetts law on the subject, which was to the effect that great ponds could be used by any of the inhabitants for fishing and fowling, provided no trespass was committed upon the meadow land or growing corn of persons owning the land bordering on its shores. Great ponds were defined as any inland pond whose area exceeded ten acres. The limit has been since raised to twenty acres.

He then drew the distinction between running streams and surface water, and cited the law stating that for ponds the land of abutters extended only as far as low-water mark, while for streams the right extended to the thread of the stream. The mill privileges of owners of streams were then taken up in detail and clearly defined. In this connection he brought up the right of cities and towns to take certain ponds and streams for a domestic water supply. He showed that they had the right, but were liable to damages, which could be collected by mill owners and others whose rights were destroyed by this confiscation. The various methods of assessing damages were then taken up. The old method, where the damage was fixed as the amount it would cost to produce an equivalent horse-power by means of steam for that taken away with the water.

This brought up the question of the right of the city of Worcester to use Kettle Brook for this purpose, and it was satisfactorily dealt with by the speaker.

Then the new way of reckoning damages, on the basis of what the city would receive from users of water. This was the result of the decision of the justices in the case where a brook in Hopkinton was taken by the city of Boston for a water supply, and it was decided that the city of Boston should pay on the basis of what it received for the water from the users in the city.

The lecture was full of practical advice and knowledge for the engineer, and was entirely appreciated and enjoyed by the class.

COL. HOPKINS' LECTURE.

The fourth in the course of lectures for Seniors, was given Tuesday, Jan. 8, by Col. W. S. B. Hopkins, City Solicitor, on the subject of "Laws of Municipalities."

He gave Blackstone's celebrated definition that, "Law is rule of action," and then pro-
ceeded to discuss the origin of law, which he showed to be in the State, whether the State was the king or the people. He stated that laws were in general of two kinds: one referring to the relations of man to man, or to the general community; and the relation of man to his surroundings.

Government rule manifests itself in the establishment of order, that is to provide for the public peace; then follow the preservation of health, life, and property rights.

He then took up the various things regulated by municipal laws. Cited the case of the City of Worcester taking the water of Kettle Brook as entirely without warrant in usual circumstances, but in case of a necessity like the present, the city was enabled to proceed as it did without fear of an injunction. He drew several amusing illustrations of this power of necessity, and closed with a few remarks on the interpretation of obscure points in the new City Charter.

It was one of the best of the series, and the speaker was warmly applauded at the close.

DR. MENDENHALL ADDRESSES THE STUDENTS.

At noon, December 19th, a mass meeting of the students was called to order by President Mendenhall. The object of the meeting was to inform the students of the course of general lectures, which was to be begun the first Monday after the Christmas recess. Dr. Mendenhall said that these lectures would be given every other Monday, in the chapel, at eleven o'clock, commencing January 7th, 1895. The Doctor said that, owing to the fact that arrangements had not been made during the summer, it was impossible to have a lecture given every week this term, but commencing next September these lectures will be a weekly affair.

The list of lecturers for the present course is not yet complete. Only the first two are definitely known. These are Dr. G. Stanley Hall, President of Clark University, and Dr. George Lincoln Goodale of Harvard University. Dr. Hall lectured on January 7th on the "Brain," on which subject he is a recognized authority. Dr. Goodale has chosen as his subject "Certain Relations of Australasia to the United States of America." Professor Goodale has travelled extensively and is very competent to speak on this subject.

The President said that every student would be expected to attend these lectures, and that the recitations which come on Mondays at eleven o'clock would be changed to twelve o'clock, so that everyone could attend. The Doctor also said that everyone must be in chapel promptly at the designated time, and that the members of the Faculty had been instructed accordingly.

Dr. Mendenhall then referred to the semi-annual examinations. He informed the students that each one of their number had been discussed at recent meetings of the Faculty, and as a result of such discussion he had a list of names of the students who were in danger of being dropped before next term. He did not, however, read this list, but took up each class as a whole. He said that several Seniors' names were down on his list, and that about six Juniors were in danger, some in more than one subject, and one in three subjects. In the Sophomore Class there is a larger number of men on the danger line, about eight or ten are from the Freshman Class. The Doctor had two lists. One extensive list contained the names of ones who were a little weak in several subjects, while the other was a list of those who are very doubtful. This last list contained only five or six names.

The President then talked of the value of examinations. He said that there was no part of instruction of more value than an examination, because it shows what one can do on a test, and a man does not do his work in the world always under favorable conditions. The man who can do the most on the spur of the moment is the best. Again, he said that an examination told exactly what a student could do on his work. The Doctor then gave the students advice about studying, and after a few words on conduct in the buildings, the mass meeting was adjourned.

ATHLETIC ASSOCIATION ELECTIONS.

A meeting of the Athletic Association was held in the chapel at noon, January 4. George A. Denny, '95, was elected chairman of the meeting, and Thomas H. Coe, '96, was chosen to act as secretary pro tempore.

Fred W. Parks, '95, chairman of the show committee, then made a brief report on the show, which was mainly devoted to informing the association that it had never even thanked two outside men who gave their time and help unstintingly for the benefit of the show, two years ago. He said he hoped that this would not be repeated. The annual election of officers then took place, according to the Australian ballot system. Mr. Denny appointed as tellers, Field, '95, Morse, '97, and Booth, '98. The printed ballots were then distributed, and the result of the voting shown by the list printed below resulted in the election of:
DR. MENDENHALL'S VACATION.

Dr. Mendenhall passed a part of the Christmas holidays in the city of Buffalo, where he went as the representative of the American Government, to consult with the English commissioner regarding the boundary between New Brunswick and Maine.

Dr. Mendenhall is the American commissioner, and has been engaged in the work for two years past. The boundary was formerly defined as the St. Croix River, but, as the river mouth is at the head of Passamaquoddy Bay, it was found necessary to fix the line down through the bay to the Atlantic.

American fishing-vessels from the town of Eastport, have been seized by Canadian authorities, in water over which, it is claimed, they had no jurisdiction. To settle the matter, the two Governments appointed each a commissioner, and under their direction, the attempt is being made to fix the line. The directions have been defined by means of monuments erected on the shores of the bay.

DR. G. STANLEY HALL'S LECTURE.

An Innovation.

Last Monday morning came the first of the series of lectures arranged by Dr. Mendenhall. Dr. G. Stanley Hall of Clark University, was the speaker, and his subject was "The Brain."

Dr. Hall's lecture was profusely illustrated by charts, diagrams and models which he had brought with him. Dr Hall said that it is comparatively lately that we have come to know anything of the brain; that formerly the heart was supposed to be the seat of the soul and intellect. But, in the first part of this century, the importance of the brain began to be recognized. The first important discovery was the existence of two sets of nerves running from the spinal column,—the sensory and motor nerves. The law of isolated conductivity next claimed attention, and it is to the failure of this law to act, that softening of the brain is due.

It seems strange that an organ as large as the brain, its weight being from 40 to 65 ounces, has so long been unknown. But the explanation is the complexity of its construction and action. Different neurologists have estimated the number of cells in the brain to be from six to twenty-four millions. That all motive and sensory action is controlled by the brain seems remarkable, until we think of the number of combinations and permutations attainable from so large a collection of cells.

Another hindrance to the study is the necessarily large vocabulary which the student has to use. The brain is also complicated chemically. In fact, an analysis has never been made completely. Some seventeen substances have been found in the single cell.

Many conclusions have been reached recently by scholars in this science. One important step is the localization of the different functions. The nerves from the spine run to the different parts of the body, and have their source in a certain part of the brain. The seat of the will and muscles is in the very top of the brain. The arms and the legs are governed from the left side of the head. Paralysis is caused many times by the clogging of an artery in the brain. Often the seat of the trouble can be definitely located, and an operation successfully performed. Speech comes from the left side of the brain in right-handed persons. Many persons who have lost their power of speech gradually regain it after a time. This is due to the slow education of the cells on the other side of the head. One discovery which is revolutionizing many medical theories, is that fatigue acting through the brain is one of the great causes of disease. A German's version of the beginning of the world—"In the beginning was fatigue"—created considerable amusement.

To show the rapidity of action of the nerves and brain, Dr. Hall took four students and had them stand hand in hand. He then pressed the first one's hand, who in turn pressed his neighbor's, thus transmitting the action through the whole line. The time would average about a tenth of a second to a man.

Dr. Hall was heartily applauded when he finished, and all seemed well pleased with the first of the proposed series of lectures.

THE POLO TEAM.

During the last month the polo team has had some hard work under Captain Gordon, whose quick and snappy work makes the team play a stiff game. The make-up of the team will
probably be the same as that of last year, although Sibley, rush, and Darling and Zaeder, goaltenders, are very promising candidates, for their respective positions. Saturday last the team had its practice above the Causeway at the Lake. The ice was in very good condition and many of the fellows watched the practice. Philpot is as yet not up to his old-time play, he juggles the ball fairly well but has a lack of life and passes poorly, although his drives at goal were well placed and opportune. Knowles was fairly quick and sure in passing, and keeps awake. Warren and Carroll were effectual at times, while Zaeder at goal would make a good man if he could handle himself on skates. He is quick and sure, but as yet rather clumsy.

The first game will be on Saturday, Jan. 12th, with Brown, who defeated us last year.

The tennis courts have not been flooded as the city water supply is so low that we cannot have the amount of water necessary. No way out of the difficulty has presented itself as yet.

**TECHNICALITIES.**

'89. The residence of Mr. and Mrs. Wm. M. Freeman, No. 9 Ripley street, was the scene of a pretty wedding at 5.30 O’clock, Saturday, December twenty-second, when Miss Caroline M. Freeman was united in marriage to Mr. A. P. Allen of Boston.

Mr. Allen was a very prominent athlete during his Tech course, and his fame is still fresh in the undergraduate mind. Mr. and Mrs. Allen will reside in Cambridge.

Marshall, ’83, and Linnell, ’94, were seen in the city during the holidays.

'94. Goss is with the Dexter Folder Company at Pearl River, New York. He is at present learning the business.

H. J. Fuller, ’95, was taken ill during vacation in Washington, D. C. His condition was very critical, but he is now convalescing. It is extremely unlikely that he will be able to return this year.

F. E. Wellington and H. L. Abbott, both of ’95, returned to recitations Monday, after long illness.

Dr. Mendenhall has received a very neat pamphlet from the Rose Polytech. on “Physical Units.”

On the evening of January third, after he delivered his lecture at Association Hall, General Lew. Wallace, the author and diplomat, was quietly entertained by Pi Iota Chapter of Phi Gamma Delta. The General, who is a member of the Fraternity, amused his brothers by inter-

esting stories of his own experiences in foreign lands. His visit was thoroughly enjoyed.

The Seniors held a class meeting Wednesday noon, January 9, to decide on a class photographer. After considerable controversy as to the merits of the various bidders, Holden, of Worcester, was elected by a vote of 32 out of a total of 47.

The mechanics of the Senior class have been asked to prepare designs for covering the windows of the chapel, in order that future speakers may illustrate their lectures. The plan will be chosen, if any are deemed suitable, for high efficiency at a low cost. A drawing stand is the prize offered. Competition closes January 20th.

Men are still at work on the interior of Dr. Mendenhall’s future residence.

One needs but to look at the dark room of the Camera Club to understand its condition. The club does not have the support it deserves from the student photographer and its remarkable advantages are only enjoyed by a very few.

During the Christmas recess workmen have been engaged in piping the dynamo room at the Salisbury Laboratory for steam. When the building was erected, no provision was made for heating this room. Later, pipes were put in, but it was discovered that they were below the boiler level, and so remained full of water. As now arranged, the pipes are overhead, ensuring good heating, and saving considerable floor space.

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