Vol. II. No. 2.

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THE ANGLER.

The angler to the brooklet hies,
Puts on his hook the tempting bait
Of wiggling worms or gaudy flies,
And for the troutlet lies in wait.

Next day when by his friends besought,
The nature of his luck to state,
He tells what heavy fish he caught,
And as before he lies in weight.

—*Exchange.*

The W T I.

Vol. II. WORCESTER, NOVEMBER, 1886. No. 2.

THE W T I.

Published Monthly, during the School Year, by the Students at the Worcester Technical Institute.

Terms: One Year, $1.00. Single Copies, 15 Cents.

☞ Remittances should be made to the Financial Editor. Exchanges should be addressed to the Exchange Editor, P. J. McFADDEN, 13 Auburn Street. Communications with regard to all other matters should be directed to the Editor-in-Chief.

☞ Single Copies may be obtained at SANFORD & CO.'S, 364 Main Street, or at WALTERS & HOLDEN'S, 149 Main Street.

Entered at the Post-Office at Worcester, Mass., as second-class matter.

CHAS. HAMILTON, PRINTER, 311 MAIN ST., WORCESTER, MASS.

CATCH, then, O catch the transient hour;
Improve each moment as it flies;
Life's a short summer—man a flower—
He dies—alas! how soon he dies. —*Johnson.*

LASSELL *Leaves* has some comparisons to make in the October number, between English and American girls. The criticisms weigh heavily against the latter, but not undeservedly so. We are ready to uphold the assertion that of all the women on earth none are the peers of American girls —our sisters. Yet they have characteristics in which we take no pride. Lassell points them out; says they are due to social environment. Perhaps she is right. Whatever the cause, we wish it would cease.

We are a studious set here at the Tech, but when the Professors are off guard, we go out to see the girls sometimes. Among them are a few whom we know thoroughly. They are royal women. Of them we are not speaking. Among our casual acquaintances however are a host of such as are condemned by Lassell. We meet them, often, through the kind offices of a mutual friend. Beautiful girls they are, and reliable information tells us they are as refined and cultured as they are beautiful. An evening's experience however does not reveal it. From eight o'clock we gossip away, discuss engagements, talk of marriage and giving in marriage, until ten o'clock finds us on the way home—hostess and guest disgusted with the evening's work. Cannot Lassell reform this sort of thing. She says it is coming around all right and is "merely a question of time." That is comforting as far as it goes; but hurry up please, we will soon be out of the Tech, leading the industries of the country. Then we will want to rake together some Lassell leaves and search for a choice one to wear for life on the lapel of our coat. We want the best. Nor must that best be always a "sere and yellow leaf," but one in the full springtime of life;

"A perfect woman nobly planned
To warn, to comfort and command."

We hope our Lassell author is a power among her kind and will have force enough to leaven the whole school.

ELECTION-TIME is once more approaching, and rival editors and politicians are beginning to bless each other in the beautiful manner characteristic of modern politics. The Republican proves, with many figures and numerous references to the past history of his party, that he alone can navigate the ship of state safely through the intricate shoals of the great crowds of office-seekers. The Democrat, starting with the same figures and the same history, proves that the Republican was of about as much help in the said navigation as the popcorn boy on a Hudson river steamer is to the navigation of that boat. Then the Protectionists mount the stand and state, in as loud a voice as their small numbers can summon, that the Republican and Democrat are both faithless at their posts, and that they, the Protectionists, should be allowed a chance to show how safe an administration becomes when entrusted to them. Then Henry George steps forward and claims that the working people should own the world and have a fence around it, outside which the bloated capitalists are to sit and see how well the workingmen know how to do the statesmen's labor.

Turn to the labor troubles. Probably many of the readers of this article have read and thought over the recent articles on the relations between labor and capital that have appeared in *The Century*, *Harper's*, and the *Popular Science Monthly*. The writers are all of acknowledged standing and worth, yet their views of the situation and especially their remedies of the existing evils are certainly somewhat conflicting. In the midst of so much doubt on all political subjects, where shall we turn for guidance? Shall we go the way our fathers went, or branch off on another track? General Garfield once said: "Don't vote the Republican ticket just because your father voted it. Don't vote the Democratic ticket, even if he does." Every political weathercock is pointing to new issues. New platforms must soon come, and then we shall be obliged to think for ourselves before casting our lot with any party. The great influx of Germans, Irish and Swedes is changing the national characteristics, and allowances must be made for the change.

Now what is our duty in these matters? We all receive in the senior year a short course of instruction in political economy. No one has ever complained of this course, for the simple reason that it is based on a knowledge of the Constitution of our country, and not on a text-book advocating the ideas of some political economist. It is the most sensible course of its length the writer has yet heard of. In a class in one of the largest high schools in this state, not one member knew the qualifications that make a person eligible to a seat in the United States Congress, although the majority of the class could tell you about the English corn laws and their repeal, or write a long article on the blessings of a democratic government. But the short course is all too short to give a thorough understanding of any of the great questions, and it seems to the writer that our duty is to study some single department and try to make ourselves familiar with one question, so that instead of being led in a half-blind fashion in all directions, in one path we

may take the lead and confidently guide our friends through one of the many industrial swamps that lie in our way.

THE recent action of '89 regarding a foot-ball team will, if present intentions are carried out, bring about a revolution in several features of our athletic sports, and we hope that in their new step '89's men will receive a warm support from the rest of the school. On account of our limited time, it is almost impossible for two classes to practice together at any season of the year; and, as affairs have stood for some time, no class could get men enough of its own interested in sports to practice. So our foot-ball team has been weak on account of insufficient practice. Now, if each class would get up a team of its own, and train its own men, it seems that a great improvement in the school team would soon be evident. This is what '89 proposes to do, and as it has the longest time before it of any class it ought to turn out good players before '89. Then, too, foot-ball playing hardens a man's muscles, and a man once interested in playing soon finds that he can do something else. Each sport helping another, we shall soon find an increase in the number of our athletes.

NATURE'S "GOOD NIGHT."

AT this season of the year,
When gladly shines the Autumn moon,
And corn, now ripened in the ear,
Gives signal for a husking soon,
Dame Nature having done her best,
Droops her fair head and sinks to rest;
While every soul in grateful tone,
Sings to her praise "Well done."

But ere she seeks her needed sleep,
This mindful mother of us all,
Bids each his senses keen to keep
While she prepares a wondrous ball.
Her daughters gay, in fairy dresses,
Happy faces, flowing tresses,—
Preparing for the season's dances,
Nature's beauties suit all fancies.

Here Miss Maple, graceful lady,
That she may be early ready,
Goes out in night's frosty air
To take on that complexion fair
Which the sunlight in the morning
Makes so blushing and enchanting,
And from Heaven the dew, God's blessing,
Gives that perfume so refreshing.

Near her stands the forest Oak,
With her red, autmnal cloak,
While close around her, holding up
Many an acorn's tiny cup,
Are her children, forest charms,
Spreading out their iron arms
To protect, from storms severe,
The weaker that are clustered near.

Chestnut trees with burs now opening,
Hickories, the squirrel's blessing,
Beach, Sumac and Elm are dressing
For a beautiful appearing.
Unmourned of men, in silence weird
The Flowers and Ferns have disappeared;
For here on earth the fairest one
Is sure to be the first one gone.

A happy thought in this grand ball,
Which comes and goes with every Fall:
"A thing of beauty 's a joy forever,"
So saith Scripture, what can sever
Things so beautiful as these,
Our New England Autumn trees,
From him who, with glad eyes, will gaze
On beauty wrapt in Autumn's haze?

THE WAYSIDE INN.

ANYONE standing on the wharves of Boston, New York or Philadelphia during July or August might imagine the tide of emigration taking an eastward turn, as steamer after steamer glides away with her deck-load of summer emigrants. As they pass from view,

the last glimpse of the confused, varicolored mass of hats, handkerchiefs and parasols, waving a farewell over the stern, reminds one of a view through a huge kaleidoscope. Looking over the office list, representatives are found from every part of the land. From the southwest and northwest they have come on their sight-seeing tour, often passing on their way to the sea some of the grandest scenery on earth. The art galleries of railway stations picture in vain the glories of the Rockies, the Yellowstone and the Yosemite. Nothing but Europe will satisfy.

Some talk of their own country being good enough for them. True, but for all that there are interests in the old countries—pleasures there, of which our own affords but little. The continent which saw the mightiest moves shaping the destiny of things must be a place full of interest. Here are found the battle-fields on which were won the victories that stand as milestones along the path of progress. Here a field where the white plume showed the way; there another where imperial eagles led the van. Here men fought like demons, while above them floated, almost as in mockery, the peaceful emblem of the lily or the rose.

Europe is full of such. Every acre is sacred to the memory of something. He who can visit scenes like these and not feel a quickened interest in them is dull indeed, while he who can rise to the full enjoyment of them tastes of pleasures seldom found here.

Not history alone but song and story lend their charm to places otherwise bare and uninviting, infusing them with living interest. Though based on fiction the enjoyment is none the less keen. Characters, incidents, or narratives dropped from the pen of genius have woven a charm around the place and will ever be associated with it.

Let anyone pass over Brooklyn Bridge, walk by the Tombs, glance at the tower over Trinity Church, and the graveyard around it, and we venture to assert that within an hour the impressions experienced, if any, will have passed beyond recall. Try the experiment elsewhere. Step on the bridge over which Tam O'Shanter rode; walk beside the old Marshalsea Prison; stand beneath the tower in which hang "those Shandon Bells," or by the graveyard where they buried Little Nell. Think you the impressions gained would soon be lost, or would the pleasures of past readings be renewed with lasting effect? The remembrance that all was a myth would not detract from it. You would not search the gravestones for the name of Little Nell, nor the prison register for that of Little Dorrit's father. You are sure none lived bearing their names, yet somehow the places interest you deeply.

To these places and for these pleasures our people go yearly, with a feeling that no such attractions exist here. In the main they are right. We are not however left entirely dependent upon the old countries.

The thoughts already expressed were suggested while thinking of a little jaunt taken last Decoration Day by a party of Worcester people. Leaving the city on the 8 A. M. train for South Framingham, a "'bus" in waiting there carried

us through a beautiful farming country to an old-fashioned tavern in the town of Sudbury. It was built over two hundred years ago by a family named Howe, who, on losing their former wealth and position, opened the Red Horse Tavern as a means of subsistence. Its active usefulness ceased years ago,—summer visitors being now the only guests of importance. Among these in recent times was Dr. Parsons of Boston, translator of Dante; Prof. Treadwell of Cambridge; and Mr. Monti, Italian instructor at Harvard. The latter was an intimate friend of Henry W. Longfellow and, as natural between friends, often spoke of his summer sojourn and of his companions. Seizing this slight thread of fact, the poet added the necessary material, in part original, and produced the well-known Tales of a Wayside Inn.

In them Dr. Parsons, Prof. Treadwell and Mr. Monti are respectively introduced as the "Poet," "Theologian," and the "Sicilian." The "Musician," Ole Bull; the "Student," Mr. Henry Ware Wales; and the "Jew," Israel Edrelei, the latter an Oriental dealer in Boston, are added purely from imagination, they never having been at the Inn.* The group as given in the Tales is all fancy, yet it is doubtless typical of many that have gathered there during the long New England winters of the past. At the hands of the poet the place has been lifted to celebrity, eclipsing former fame. Even its old name is gone and it is now known only as The Wayside Inn.

The building is a regulation old-time relic—huge timbers and rough nails fashioned by hand are to be found in it. Wall-paper in pieces a foot square, with stencilled figures, is the rude attempt at decoration. In the left wing is the ball-room, with a raised platform at one end, and box benches around the sides, answering the dual purpose of seats and repository for wraps. The rooms are studded low, and in two are the usual chimney-crane and pot. Over the dining-room mantel is a gorgeous sketch of the Howe coat-of-arms. Beside it are two panes of glass, on which Major Molineaux scratched with a diamond his autograph, with verses. These latter relics are mentioned by Mr. Longfellow in his introduction to the "Tales." Other rooms in the house are equally interesting. One is prized from having at one time lodged General Lafayette. To us, however, the most interesting of all was the bar-room. This not very spacious room has at one end a high bar, over which hangs from the ceiling a wooden grating, fastened to the ceiling during the day, but let down at night. The bar-room communicates with the kitchen by a small entry, one side of which contains shelves, like a dresser. Over these, and at about the height of a man's head, we noticed that the wood-work was mutilated as if a pointed instrument had been driven into it thousands of times; and, indeed, such was the case. We were told that when wine was ordered the bottles were brought through the kitchen and opened in this passage-way—the fastenings of the corks being broken by a steel awl, which was thrown against the wall above, and there left sticking until it should be used again.

* For the above facts we are indebted to Rev. Samuel Longfellow, brother of the poet.

The wood-work for the space of about six inches square was "eaten" away to the depth of half an inch or more. If every puncture represented a bottle of wine, little else is needed to tell of the early habit of drinking or of the popularity of the Inn.

The immediate surroundings of the inn leave little to the imagination to supply as to what its appearance was over one hundred years ago. High oaks, spacious barns, the old pump—all the appurtenances to an old-time tavern are there, and were it not for the absence of the old swinging sign or the presence of an occasional ambitious photographer, there would be no visible indications that nearly two centuries have elapsed since this famous hostelry was on the full tide of prosperity, dispensing with a generous hand its hospitality and jolly good cheer. K.

PRESSURES IN THE EARTH.

HERR LIPSCHITZ has shown that the law of the increase of density of the earth from the surface to the centre is

$$d = 9.453 - 6.953x^{2.39},$$

where x is the mean radius of any homogeneous stratum, the mean radius of the earth being unity. From this it follows that the value of g at any distance x from the centre is

$$g = g_1 (1.694x - .694x^{3.39})$$

g_1 is its intensity at the surface, and the earth is here supposed spherical and motionless. Thus g is greatest, not when $x = 1$, but when $x = .872$ (as will be found by solving the equation $\frac{dg}{dx} = 0$.); g is therefore greatest .128 of the way from the surface to the centre, and its maximum value is 1.0409 times its value at the surface. Also, it appears from the first equation that at the centre the earth's density is 9.453 times that of water, or about one and a quarter times that of cast-iron. Knowing g and d at all depths it is easy to find an expression for p, the pressure in pounds per square inch, at any depth, assuming the pressure to be transmitted as in a liquid (which must be approximately the case under the enormous pressures which surely must exist in the earth.) If we do this and then substitute zero for x we shall find that the pressure at the centre of the earth is something like eighty-two millions four hundred and twenty-three thousand pounds to the square inch! This is truly appalling. Under this pressure, assuming that each atmosphere lowers the freezing point of water .0074° C. (though of course this cannot hold true to such an enormous extreme), the freezing point would be 74,150° Fah. below zero! Also, making as before the extravagant assumption that the coefficient remains constant, a cylinder of water as high as Mt. Washington, subjected to a vertical pressure equal to that at the centre of the earth, would shrink down till it was only nine inches high.

It is evidently useless to talk about the solidity or fluidity of the interior of the earth, for the awful pressures and the high temperatures which undoubtedly prevail there must produce a state of matter of which we know nothing—which is neither a solid nor a liquid nor a gas. Sir William Thomson has shown, however, that the earth must be about as rigid as steel, since the moon does not produce any very considerable tides in the planet itself.

Those who doubt these figures are advised to read Herr Lipschitz's article in the 63d volume of *Crelle's Journal.* If this does not make converts of them it will at any rate remove the awful suspicion from the shoulders of the editors of the W T I.

NORMAL EQUATIONS.

1. IN all accurate work it is found that successive measurements of the same quantity give results not quite identical. These differences are due to a variety of causes, and are found to be less in work done by practical observers than in that done by observers not so skilled. After a set of measurements has been made it therefore becomes important to know how to deduce the most probable values of the unknown quantities involved. It is evident that if we knew the precise values of these unknown quantities we could tell each time we made a measurement what the error of that measurement was. In practice we have to face the problem from the other side, and determine the unknown quantities by considering the errors we have made. For the sake of illustration we will first consider the case of a single unknown quantity. Let r_1, r_2, ... be a series of measurements of a single quantity—say the length of a bar of metal at a given temperature. Also let V be the true length of the bar. Then $r_1 - V$, $r_2 - V$, ... are the errors of the respective measurements. We do not know the numerical value of any of these, but the Theory of Errors teaches certain properties that they may be expected to have. In the first place it is probable that the algebraic sum of them is either zero or very close to it. Hence, approximately, $(r_1 - V) + (r_2 - V) + \ldots = 0$; or solving for V we have

$$V = \frac{1}{n}(r_1 + r_2 + \ldots) \qquad (1.)$$

That is, the average of all the observations is the best available approximation to the truth. (This and what follows supposes that the observations are all equally good.)

2. If there is more than one unknown quantity involved in the measurements we must have recourse to a second theorem in the Theory of Errors. It is this: *Out of all possible sets of values of the unknown quantities that set of values is most probable which makes the sum of the squares of the remaining errors least.* This is the great principle upon which the whole Theory of Errors is founded. As a special case take the problem already mentioned—that of a single unknown quantity. We have by this theorem $(r_1 - V)^2 + (r_2 - V)^2 + \ldots =$ a minimum. (See Bowser's Calculus, p. 155.) To find the value of V we differentiate this expression and equate the result to zero. Solving the result for V we have equation (1.), as of course we ought if our previous reasoning was valid. This does not give us the *true* value of V, but merely the value which is most *probable*. Our theorem says nothing about the actual value of the unknown, and it is highly probable that no one ever did find the *actual* magnitude of any quantity by measuring it.

3. We shall now discuss the more general case of n unknown quantities. Let us suppose there are n unknown quantities x, y, z, &c., connected by equations of the form

$$ax + by + cz + \ldots + l = 0$$

where the coefficients are known quantities and the absolute term l is measured, and is therefore only approximately known. If we have only n equations of this form we can solve them by the ordinary processes of elimination; but

it is obvious that the more absolute terms we measure the more knowledge of the values of x, y, z, &c., we ought to obtain; but in order to have more than n absolute terms we must have more than n equations. That is, we must have more equations than there are unknown quatities; and as these equations are from their natures both independent and simultaneous we find ourselves in a very curious plight. We shall find by trial that, taking any n of the equations and solving them as usual, the resulting values of x, y, z, &c., will only approximately satisfy the remaining equations. Ultimately we come to the conclusion that none of these equations are *exact*, but that each is slightly in error. Looking at the problem in this way it becomes quite simple, for, in accordance with our theorem, we have only to select for the unknowns that set of values which makes the sum of the squares of these errors least.

4. Let us write the equations in this form:

$$\left.\begin{aligned} a_1x + b_1y + c_1z + \ldots + l_1 &= e_1 \\ a_2x + b_2y + c_2z + \ldots + l_2 &= e_2 \end{aligned}\right\} \quad (2.)$$

$$\ldots\ldots \qquad \ldots\ldots$$

We must make $e_1^2 + e_2^2 + \ldots$ a minimum. Therefore we must make

$$(a_1x + b_1y + c_1z + \ldots + l_1)^2 + (a_2x + b_2y + c_2z + \ldots + l_2)^2 + \ldots\ldots = \text{a minimum.}$$

All these n unknowns are supposed to be independent. Therefore the problem may be considered in n parts,

(1.) For any given values of y, z, &c., what value of x makes the sum of the squares of the errors least?

(2.) For any given values of x, z, &c., what value of y makes the sum of the squares of the errors least?

And so on. To find x we differentiate with regard to x and equate to zero.

To find y we differentiate with regard to y and equate to zero. And so on.

(See Bowser, p. 155.) After differentiating with regard to x we have

$$a_1(a_1x + b_1y + c_1z + \ldots + l_1) + a_2(a_2x + b_2y + c_2z + \ldots + l_2) + \ldots = 0.$$

Collecting all the x's, y's, &c., we have

$$(a_1a_1 + a_2a_2 + \ldots)x + (a_1b_1 + a_2b_2 + \ldots)y + (a_1c_1 + a_2c_2 + \ldots)z + \ldots + (a_1l_1 + a_2l_2 + \ldots) = 0.$$

Here a_1a_1 is written instead a_1^2, &c., for the printer's convenience. This result may be very elegantly written by using the sign [ ] to mean "the sum of all the quantities of the same form as the enclosed." Thus

$$[aa]x + [ab]y + [ac]z + \ldots + [al] = 0.$$

By proceeding with the other quantities as we have with x we obtain in all the following n equations:

$$[aa]x + [ab]y + [ac]z + \ldots + [al] = 0.$$

$$[ba]x + [bb]y + [bc]z + \ldots + [bl] = 0.$$

$$[ca]x + [cb]y + [cc]z + \ldots + [cl] = 0.$$

$$\ldots\ldots \qquad \ldots\ldots$$

These n equations are called Normal Equations, and the solution of them by ordinary algebra gives us the most probable values of the unknown quantities x, y, &c.

5. Let us take the following numerical example. The following measurements were made in 1872 by the United

States Lake Survey for determining the excess in length of a certain bar over a Standard Yard, at 62° Fah. It was impossible to keep the two bars at 62°, and they were therefore compared at various temperatures with the following results. l is the observed excess in hundred-thousandths of an inch.

DATE.	l.	t. Fah.
March 5.	791	24°.7.
" 26.	833	61°.7.
April 4.	820	49°.3.
" 12.	847	66°.8.
" 20.	849	71°.5.

Let x be the difference at 62°, and y the increase of this difference per degree Fahrenheit. Then we ought to have

$$x + (t - 62°)\,y - l = 0.$$

Substituting in this general equation the values of t and l in the table, we have the following five equations:

$$\begin{aligned} x - 37.3y - 791 &= 0. \\ x - 0.3y - 833 &= 0. \\ x - 13.7y - 820 &= 0. \\ x + 4.8y - 847 &= 0. \\ x + 9.5y - 849 &= 0. \end{aligned}$$

The easiest way to proceed will be to first find approximate values for x and y. Subtracting the first from the last and dividing by 46.8, gives us y = about +1.3. Therefore put $y = Y + 1.3$. The resulting equations show that x = about +838. Hence put $x = X + 838$. These changes made we have

$$\begin{aligned} X - 37.3Y - 1.49. \\ X - 0.3Y + 4.61. \\ X - 13.7Y + 0.19. \\ X + 4.8Y - 2.76. \\ X + 9.5Y + 1.35. \end{aligned}$$

Then [aa] = +5.0, [ab] = —37.0, [bb] = 1692.4, [al] = +1.90, and [bl] = +51.2. The normal equations are

$$\begin{aligned} 5X - 37Y + 1.90 &= 0. \\ -37X + 1692.4Y + 51.2 &= 0. \end{aligned}$$

Add to the second 7.4 times the first. This gives Y. Substitution in the first gives X. Thus, Y = —.05 and X = —.75, or x = +837.25 and y = +1.25. Thus the original observations show that it is probable that at 62° Fah. the bar was 0.008372 in. longer than the standard yard.

6. The fact that the sum of the errors must be zero furnishes a convenient check to our work. As an example, substituting in equations (2) the values we have found for x and y, we have as the second members of those equations respectively, —.37, +3.87, +.13, —3.75, and +.13. The sum of these is as nearly zero as could be expected, and would be exactly so if our arithmetic work were perfect. These are the errors of the respective equations, and would all be zero if our observing were perfect. There are three things for which these errors should be examined.

(1.) They should be small. Our results are not so good in this respect as we could wish, but that is the fault of the observer, as (3) shows our work has been satisfactory.

(2.) The numbers of positive and negative errors should be nearly equal, and will be so if the observing is good and the computation correct. This is satisfactory in our case.

(3.) The sum of the errors should be zero. This does not depend at all upon the observing, but simply upon the arithmetic of the reductions.

7. Great labor may often be saved by the substitution in these normal equations of an approximate value for an unknown, plus a small correction to that value, as illustrated in our example. Otherwise the labor of forming the sums [al] and [bl] may be exceedingly great. A great aid to this kind of work is Dr. A. L. Crelle's *Rechtentafeln*, "welche alles Multipliciren und Dividiren mit Zahlen unter Tausend ganz ersparen." In the absence of a Crelle, a table of squares may be used as a multiplication table by aid of the formula

$$ab = \tfrac{1}{2}[a^2 + b^2 - (a - b)^2]$$

Thus Crelle gives 201,744 as the product of 934 and 216. With a Haswell, Barlow or Trautwine we may proceed as follows: $a = 934$, $b = 216$, $a - b = 718$.

$$a^2 = 872{,}356$$
$$b^2 = 46{,}656$$
$$a^2 + b^2, \quad 919{,}012$$
$$(a - b)^2, \quad 515{,}524$$
$$403{,}488 \div 2 = 201{,}744.$$

After a little practice this will be found much easier than logarithms, especially if Barlow's table of squares is used. It seems a small matter to multiply two numbers together, but where many numbers have to be multiplied together the strain becomes very great, and processes like that here given save much brain-energy. Besides one is less likely to make mistakes where nothing but addition and subtraction are involved.

8. A still shorter way of multiplying with a table of squares is the following; only it requires the table to extend to 2000 instead of only 1000, as in the preceding method. The formula is

$$ab = \tfrac{1}{4}[(a + b)^2 - (a - b)^2]$$

Thus as before let $a = 934$ and $b = 216$. $\therefore a + b = 1150$, and $a - b = 718$. Then the process is:

$$(a + b)^2 = 1{,}322{,}500$$
$$(a - b)^2 = 515{,}524$$
$$806{,}976 \div 4 = 201{,}744.$$

SOME DETAILS OF THE Y. M. C. A. WORK IN THE INSTITUTE.

THE Y. M. C. A. of the Institute, in common with all organizations, passes through various experiences and from them endeavors to gather wisdom for the future. In order to do vigorous work it needs not only the hand of each individual member but the heart which feels an impulse to strive for the "chosen things" and follow the "good way." One of the most interesting features of the Association's work is its Bible class, which has received much enthusiasm from those who attended Mr. Moody's Bible study this last summer. The class, consisting of only active members of the Association, at first takes up, topically, the study of such subjects as "How shall I study the Bible," "Theme of the Bible," etc., while later the fundamental truths relating to God, Sin, the Grace of God, etc., are studied. Proof texts are searched out and a small number, with their references, are committed to memory. Thus a few passages directly bearing upon each topic are made familiar.

At each weekly session of the class a few minutes are devoted to a Bible drill, in which some passage of Scripture is

quoted by one and the others endeavor to locate it. If the chapter and verse cannot be given, the book or author are given as the next nearest locating reference. Also an exercise in finding references rapidly is practiced. One gives a reference, while the others search for it. The first who finds it gives another, and so on. These drills are practiced for only a few minutes at each lesson, but even in a short time much aid is given in accuracy of location of passages and aptness gained in finding references. The students conduct the study in the class by a leader chosen from among themselves. It has lately been decided to invite one of the Faculty to conduct a regular review once in four or five weeks. The plan meets with unanimous approval among the members of the class.

It is sincerely hoped the Association may receive visits from any of the alumni of the Institute who chance to visit the city or are resident here. They would be cordially welcomed at the Sunday meeting at 3 P. M.

Any good word from those who were with the Association as members and helpers last year would surely lend much encouragement. The President or Corresponding Secretary stand waiting for any such word, and, in return, will assure the writer an itemized bill of the good it does the Association. B.

FAME.

HER house is all of Echo made
Where never dies the sound;
And as her brows the clouds invade,
Her feet do strike the ground.

—*Ben. Jonson.*

WHAT SHE SAYS.

YOU boys have said in terms quite fine,—
We thank you for the compliment—
You like the lavender and wine
With a little of us for accompaniment.

We thank you much for telling
The reason we're asked out,
To sit all day in freezing gust
To see you run about.

That you may tell your handsome friend,
Who comes from out of town,
"You see the third one from the end?
She's the one I call my own."

Of course that sounds quite gay,
But, you never told *us* so;
The reason why we cannot say;
Perhaps some of you know.

But now, in turn, 'tis fair to tell
The sort of boy we'd choose.
'Tis not the one with full-dress suit
Who wears such girlish shoes.

'Tis not the one with collar high,
With laugh much like a crow,
And cigarette, and dudish cane,—
Him, we don't care to know.

'Tis he in athlete's suit,
He with determined face,
In whom the slightest motion
Shows forth such perfect grace.

He who when in the game
Will strive to gain first prize,
Who struggles for his class's fame—
He's the favorite in our eyes.

So tell us what you will
Of lavender and wine;
The boy who carries home the prize,
He, only, can be mine.

DAISY.

SMALL BOY ON "PROCESSIONS."

THERE are meny and varyus kinds of Processions such as strete processions and side walk processions Day processions and nite processions funral processions and horible processions and the Cirkus Procession which is the best

kind of a procession exsept the tech Procession.

Processions are of very meny diferant sizes sum are large consisting of th:ee persons or more and Sum are smawl. tech Processions are usualy large but not allways.

Processions are made in very meny diferant ways such as when two men over take two other Men on the strete and follo them in procession to the Erpotherkarys stoar and they all drink Soder warter but I think root bere is the best because it goes off with a pop only sumtimes it spills all over the floar and that makes the girl mad if it is hoam maid bere and you lose half of the drink because it dont look so good after it is moped up off of the floar and the rag squeazed out.

Processions are also formed by men and boys cuming out of the Dym sho and walking hoam with each other.

Sumtimes when people cum out of church they form a procession but this isn't the way the techs make there processions or at leest not as often as in the dym Sho way.

In sum places processions are not alloud and it is unsafe for more than one person to walk together for fear they may be seen and punished for taking part in a procession and if they are the ring leeder it is worse still.

A ring leeder is one who leeds a ring. A ring leeder doesn't ware any uniform as you would think he had ort to and so it is hard for any one to find out who he is and sumtimes the rong one gets nabed and then the one that nabed him gets left.

When a procession has paper boxes on sticks with candles inside and funy pictures on it then it is a parade. A Parade is moar fun than a procession and the techs used to have them real often but now they dont have them any moar.

There used to be a man by the name of mister Shovenay and once he died and the techs were real sorry and they all went to the funral and woar morning (only it was nite when they went) and sang gospell hims and colledge songs and had a band and paid all the expenses and went with the corps to where mister Shovenay wanted to be buryed and since he had allways believed in Creamation they started a creamery and gave him the first go, after they had first made sure he was ded and the crys of the morners were herd from Tatnuck to millbery.

This is all I know about processions exsept that the techs cant have any moar bonfires because they dont want to do any thing that has any fun in it for fear it will disconcentrate there minds from there work and interfeer with the best interests of the school.

JOHNNIE KNOWALL.

FALL ATHLETIC MEETING.

IT was with the expectation of pleasant weather that the Athletic Association decided to hold its Fall Field-day on Saturday, October second; but, to the disappointment of ticket-holders and contestants, the day proved to be anything but auspicious. In the morning the sky was overhung with heavy clouds, through which the sun shone at rare intervals; while in the afternoon a cold west wind blew across the grounds

with a force that was chilling to the courage of the most enthusiastic admirers of athletic contests.

Consequent upon the small number of spectators, due to the unfavorable weather, the new regulation of charging an admission fee did not meet with the success anticipated.

The sports began at two o'clock, and the events followed each other with a promptness that was in marked contrast to the halting and undecided manner of former meetings.

I. The first race on the list was the 120-yards hurdle, which called out three men. From the start it was a good race between Harvey, '87, and Chadwick, '88; but at the fifth hurdle Chadwick began to draw away from Harvey and won by a few feet in 18$\frac{2}{5}$ seconds.

II. Three men started in the mile run, but Duncan, '88, falling out at the end of the first half, the race was left to Streeter, '87, and Bartlett, '89. Bartlett, having set the pace at the start, soon secured a lead which Streeter was unable to overcome, and crossed the line in 5 min. 12$\frac{1}{4}$ sec. Thus lowering the record by 17$\frac{3}{4}$ seconds.

III. The standing broad-jump was a slight improvement on that of the Spring meeting; but still about six inches below the record. Chadwick, '88, won by a little over two inches from Griffin of the same class.

IV. '88 and '89 each entered two men in the half-mile bicycle race. Unfortunately Harriman, '89, the winner in the Spring sports, was unable to ride. Spiers, '88, won handily in 1 min. 34 sec.; Marshall, '88, finished soon after, but was ruled out because his second stepped over the line in starting him. The second place was consequently given to Gilbert, '89.

V. The hundred-yards dash called out a large field of good men, and proved a close race between Harvey, '87, and G. H. Kimball, '89. Kimball took a splendid start and '89 looked confident of securing first; but just before the finish Harvey made a telling spurt and reached the tape an instant before Kimball. The other entries were Allen, '87, Cushman, Jewett, Myers and Smith, '88, and Allen, '89.

VI. Owing to the strong wind, it was impossible to kick the foot-ball to good advantage. Emory, '87, made the best kick, but it fell some 15 feet short of his record. Rice, '88, secured second by a of kick 111 ft. The other contestants were Ferry and Patterson, '88.

VII. The pole-vault had few entries. It was not closely contested and was therefore less interesting than usual. Marshall, '88, easily secured first place, but displayed little of the grace that characterized his vaulting in the Spring games.

VIII. The standing high-jump was considerably below the record which was before held by the winner, Cushman, '88.

IX. Harvey, '87, again came to the front in the 220-yards dash, closely followed by Allen, '89. G. H. Kimball, 89, dropped out just before the finish.

X. The record for throwing base-ball seems to be hopelessly out of reach. Seven men entered in this event and the best throw was nearly sixty feet short of the record. Griffin, '88, secured first; Emory, '87, second.

XI. The running high-jump was contested by Allen and Harvey, '87, and Cushman and Lovell, '88. Harvey, though a graceful jumper, was unable to clear the rail above 4 ft. $7\frac{1}{5}$ in. Cushman succeeded in clearing 4 ft. $10\frac{4}{5}$ in.

XII. Putting the shot, though considerably below the record, was interesting owing to the closeness of the contest between Camp, '88, and Emory, '87, there being scarcely an inch between their best "puts."

XIII. In the mile bicycle, Spiers, '88, again showed himseif at home on the machine and by splended riding succeeded in lowering the record by nearly half a minute. Gilbert, '89, also did some good riding in this race and we trust with further training he will make a fast rider.

XIV. Considerable interest was felt in the 440-yards dash owing to the number of good runners brought together. The start was rather uneven, but Doon, '88, soon took the lead and finished a little ahead of the record made by him last Spring.

XV. Everybody was surprised by the splendid record made by Jewett, '88, in the hop, step and jump. Chadwick, of the same class, succeeded in securing second place.

XVI. The tug-of-war between '87 and '88 was probably the most interesting event of the day. At the word, both teams took a quick "drop" and with a pull so nearly equal that the ribbon scarcely moved from the centre line. Then followed a succession of "heaves," which gradually drew the rope to '88. The '87 team reserved its strength; and it was not till toward the end of the tug that it put in some splendid work, which started the rope in the direction of victory, and had not time been called at the instant of '87's best effort, all of the lost rope would probably have been regained. As it was '88 won by about two inches.

XVII. Again in the running broad-jump, Jewett's skill stood him good stead and the record made by him last Spring was beaten by $2\frac{3}{5}$ inches.

XVIII. Still another record was broken in the half-mile run. Doon fully met the expectations of his friends in breasting the tape four seconds ahead of the record.

This race was the last event of the day. At the finish the band struck up Auld Lang Syne, which was thoroughly appreciated by the spectators, and in a few moments the grand-stands were emptied. The opinion heard from nearly all present was that another red-letter chapter had been added to the history of Tech athletics. Although some of the events were open to criticism, the majority were of a standard that compares very favorably with that of institutions in which the students have the advantage of systematic training.

Seven records were broken: Mile and half-mile runs, mile and half-mile bicycle, 440 yards dash, hop, step and jump, and running broad jumps.

Seven records are now held by '88, four by '86, three by '84 (one jointly with '82), two by '82, one by '87 and one by '89.

The meeting was, altogether, the best Fall meeting ever held and reflected credit on both contestants and officers.

LAWN TENNIS.

TWO of the most enjoyable months of our school year have come and gone, leaving us, as is always the case, filled with astonishment at the fast pace of old Father Time, for a scholar never yet existed that could do more than keep him in sight, as at the end of the week he crosses the line. As he passes this time he leaves behind the grand old month of October and brings the lover of tennis face to face with the fact that the season is over and he will be obliged to make an extraordinary effort to get sufficient exercise for five months to come. In the meanwhile, however, he can console himself with thoughts of Spring and of the success of the past season. The association renewed its life this Fall somewhat reduced in numbers by the absence of '86, but full of energy and purpose to continue the work, so well begun last year, of placing its affairs on a good working foundation. A wise move was made in awarding the contract for keeping the grounds in order to a member of the association, who would realize better than an outsider what was needed, and the result has been that the grounds have never before been so uniformly in good condition. The widespread complaint about the absence of balls has also been done away with by establishing the rule that each member shall furnish them for himself. The individual playing this Fall, as evinced in practice and in the tournament games, showed a marked improvement over the previous year. The unavoidable delays in playing off the series served, as before, to diminish the interest taken in the tournament by the school at large, which, however, was far ahead of last season. The prizes were handsomer this year, even than last, while the first in the singles included, in addition to the badge and the Landsing cup, a superior Horseman racket, for which the association is greatly indebted to F. A. Clapp & Co. of this city. The Landsing cup gracefully parted with by Mr. Myers, '88, shows none the worse for wear, and now bears the inscription ordered by the association last year. On the cup is inscribed: "Landsing Prize Cup," while on the rim of the plate are the names of the winners with their class and the date. Cushman, '88, won first place in the singles with the greatest ease. Grimes, '87, showed a marked improvement over his play of last year and made a bold stand for his class for second place and was defeated with great difficulty by Chadwick, '88, who showed an equal improvement. The best contested series in the singles was the final for second place between Chadwick, '88, and Nelson, '88. Chadwick won the first two sets, but Nelson after a hard uphill fight carried the next three, securing second place, leaving Chadwick third. In the doubles, to the astonishment of all, Myers and Nelson of '88 defeated easily the champions of the Worcester Club, Cushman, '88, and Kimball, '89, and after a much better contested game with Chadwick and Chittenden of '88, who play well together, secured first place. Cushman and Kimball withdrew and Chadwick and Chittenden, after defeating McClurg, '87, and McFadden, '88, took second. Because of the unfavorable weather, third place has not yet been contested.

ATHLETICS.

THE first game of foot-ball played by the Tech Eleven was that with the "Gentlemen of England," Oct. 9. The game was marked by no brilliant playing and showed that the boys need practice and a better knowledge of foot-ball rules.

The game was called somewhat later than the advertised time owing to the slowness with which the "Gentlemen of England" got ready to play and to the fact that no arrangements had been made for a referee.

Harriman, '89, kindly consented to referee the game, and the ball was kicked off by the Techs. A touch-down was soon scored by the Techs and from that Emory kicked the only goal obtained during the game, although several other trials were made.

The Englishmen scored nothing during the first half, being greatly surprised at the rush with which our boys played at the outset. In the last half they scored a safety. The Techs scored, in all, six touch-downs, two safeties and a goal, making the score 30 to 2. Kimball and Cushman did some pretty passing, and Nelson and Emory good running during the last half.

The second game, played with the Worcester Academy Eleven, did not result so favorably for the Techs but has been the means of opening their eyes to see that training goes far towards winning a game, and that to win anything this Fall they must train.

The game was delayed many times and a great deal too much quibbling was done. We cannot criticise the referee for intentional partiality, but believe a man can be so confident that his favorites are always right that he may sometimes allow his decisions to be determined by them. As, for instance, when our boys made a touch-down. The referee evidently didn't know what it was, but when advised by the Academies he first called it a touch-back. The Techs justly objected, but even after it was clearly shown him that it was a touch-down, he called it a safety. Such a way of making a decision ought to disqualify any man.

However, the victory of the Academies was by no means due to a poor referee, for they excelled the Techs in every point of playing. They played as eleven men, but the Techs seemed determined to play single. Then, too, Kimball was disabled by badly spraining his ankle in the first of the first half, and Cushman in the first of the last half, by a cramp. So we can hardly wonder that the boys were beaten so badly. Holmes and Ajax did the best playing for the

OCTOBER 2. FALL ATHLETIC MEETING. 1886.

TABULATED RECORDS.

EVENT.	WINNER.	TIME, OR DISTANCE.	SECOND.	TIME, OR DISTANCE.	SCHOOL RECORD.	TIME, OR DISTANCE.	COLLEGE RECORD.	TIME, OR DISTANCE.
Hurdle Race.	Chadwick '88	18 2-5 s.	Harvey '87	19 3-5 s.	Hawes '82 Fuller '84 Stevens '84	18 3-8 s.	Yale.	17 s.
Mile Run.	Bartlett '89	*5m. 12 1-4s.	Streeter '87	5 m. 46 s.	Rogers '86	5 m. 30 s.	Yale.	4 m. 37 2-5 s.
Standing Broad Jump.	Chadwick '88	9′ 7″ 4-5 10′ 2″ 1-2	Griffin '88	9′ 5″ 2-5 10′ 6″ 1-2	Fairbanks '86	10′ 2″ 1-2	Swarthmore.	10′ 6″ 1-2
Half-Mile Bicycle.	Spiers '88	*1m. 34 1-10s	Gilbert '89	1 m. 48 s.	Weston '87	1 m. 37 s.		
100 Yards Dash.	Harvey '87	11 s.	Kimball '89	11 1-10 s.	Fuller '84	10 3-5 s.	Harvard.	10 s.
Kicking Foot Ball.	Emory '87	124′	Rice '88	111′	Emory '87	141′ 4″		
Pole Vault.	Marshall '88	8′ 1″ 2-5	McFadden '88		Gordon '86	8′ 10″	Princeton.	10′ 5″
Standing High Jump.	Cushman '88	4′ 3″ 2-5	Allen '87	4′	Cushman '88	4′ 5″ 3-4	Harvard.	5′ 0″ 1-4
220 Yards Dash.	Harvey '87	25 3-4 s.	Allen '89	25 4-5 s.	Watkins '86	24 3-8 s.	Harvard.	22 s.
Throwing Base Ball.	Griffin '88	282′ 10″	Emory '87	274′ 6″ 3-10	Jordan '82	361′ 8″	Holy Cross.	387′ 8″
Running High Jump.	Cushman '88	4′ 10″ 4-5	Harvey '87	4′ 7″ 1-5	Gordon '86 Fairbanks '86	5′ 0″ 1-2	Univ. of Penn	6′ 0″ 1-4
Putting 16 lb. Shot.	Camp '88	29′ 3″ 3-5	Emory '87	29′ 2″ 2-5	Priest '84	34′ 4″	Harvard.	39′ 0″ 1-2
Mile Bicycle.	Spiers '88	*3 m. 25 s.	Gilbert '89	3m. 47 3-5 s.	Weston '87	3 m. 52 1-5 s.		
440 Yards Dash.	Doon '88	*58 3-4 s.	Allen '89	1 m. 2-5 s.	Doon '88	59 1-5 s.	Harvard.	47 3-4 s.
Hop, Step and Jump.	Jewett '88	*44′ 1″ 1-5	Chadwick '88	39′ 3″ 3-5	Jewett '88	40′ 11″ 3-4		
Tug of War.	'88	2″ 1-2	'87					
Running Broad Jump.	Jewett '88	*18′ 9″ 3-5	Lovell '88	16′ 1″ 3-5	Jewett '88	18′ 7″		21′ 3″ 3-4
Half-Mile Run.	Doon '88	*2 m. 13 s.	Bartlett '89	2 m. 17 s.	Marshall '86	2 m. 17 1-2 s.	Harvard.	2 m. 1-5 s.

*Record Broken.

Academy; Cushman the best for the Tech, while he played. The Academy scored 26 points, Tech 4.

Oct. 23, William Hanner of Yale ran two miles in 10 min. 40⅘ sec., lowering the previous college record of 11 min. 2 sec. by 11⅕ sec.

Oct. 13, Harkins of Holy Cross College threw the base-ball 387 ft. 8 in., beating the college record by 8 ft. 1½ in.

The first game for championship of the Northern foot-ball league played Oct. 23, at Amherst, between the Amhersts and Boston Technologies, resulted in a score of 18 to 0 in favor of Amhersts.

Scientific Notes.

GALVANI discovered voltaic electricity one hundred years ago.

China intends to issue a loan of $50,000,000 for the construction of railways in the empire.

By a law lately enacted in Germany and in Switzerland, principals are requested to dismiss their pupils at noon of every day on which the temperature at 10 A. M. is as high as 77° F.

The point at the summit of Mt. Wachusett which the U. S. C. & G. Survey used as a station in the primary survey of the coast, is in Latitude 42° 29′ 20″.784 N., and Longitude 71° 53′ 13″.984 W. of Greenwich.

The *Engineering and Mining Journal* says that under proper management the furnaces in the Birmingham (Ala.) district can produce pig-iron at a cost not exceeding $8 per ton.

From observations made in Munich on a zinc roof which had been in use for twenty-seven years, it is estimated that such a roof $\frac{1}{48}$th of an inch in thickness would last for 1,243 years. It was found that the rust of zinc, instead of hastening the oxidation of the metal underneath, really protects it.

An English company has laid 3,600 miles of cable to connect with Europe the several settlements of the western coast of Africa.

Turkey is very poorly supplied with railways. With a population of over 42,000,000 and an area of some 2,406,000 square miles, or nearly 80 per cent. of the area of the United States, her railway system, at last accounts, aggregated less than 1,100 miles.

Officers of the English Navy advise their government to connect Halifax, Bermuda and England by cable. Among other benefits that England might derive from such a connection is mentioned the fact that it would make her independent of American weather reports in case of estrangement between the two countries.

Prof. Frothingham, formerly instructor in archæology at Johns Hopkins University, has resigned to accept a chair at Princeton. He will be succeeded at the University by Prof. Rodolfo Lanciano, who, although still a young man, has made a wide reputation for himself, especially in the department of Roman archæology.

In the manufacture of water-oil gas, steam superheated to about 1000° F. passes through an injector and draws with it a quantity of oil; the mixture is further heated to about 1300° F., when more oil is added, and finally this mixture is heated to about 2400° F., whereby it is converted into permanent gas, suitable for use as an agent of heat or of illumination.

On October 5 a patent was issued to Prof. Dolbear of Tufts College for his method of electric communication without wires. He establishes a positive potential at one "ground" and a negative at another, using the earth as a conductor; then, according to the patent

he "varies the potential of one ground by means of a transmitting apparatus, whereby the potential of the other ground is varied, and, lastly, operates receiving apparatus by the potential so varied." The possible long range of this system has not yet been determined. It is well adapted to telegraphing between vessels at sea.

Natural gas has been discovered on the shore of Lake Huron, Mich.. within the precincts of the city of Port Huron, at a depth of a little more than 1500 feet, and two wells that have been sunk and have given a great flow of gas exhibit a pressure of 180 pounds to the square inch. This find is regarded as affording great promise to manufacturing and salt-making in that region. Two years ago not more than six rolling mills and steel works in the United States used natural gas as fuel; now we have a record of 68 rolling mills and steel works that use the new fuel and of 16 that are making preparations to use it. Every rolling mill and steel works in Allegheny county, Pennsylvania, 55 in all, now uses natural gas.

The Mexican (Vera Cruz) Railway Company has, in an experience of two years, thoroughly tested steel ties, says the Mexican *Financier*, and the opinion of Superintendent Foote will be read with interest, especially in the United States, where the merits of metal ties are under discussion. The Vera Cruz road, says Mr. Foote, began using steel ties in 1884, and has now some 20,000 of them on its road-bed, some on level country and others on what would on any other than the Vera Cruz be considered heavy grades. So satisfactory has the experiment been that 40,000 more of these ties have been ordered from England for use this year, and it is proposed to put in from 40,000 to 50,000 per year hereafter. The change from wooden to steel ties is made entirely in the interest of economy, and it is calculated that in a few years the permanent section gangs on the road can be replaced by travelling gangs who will be able to keep the road in order; the number of men to be employed under the new system being only 50 per cent. of those embraced in the present permanent section system. The "life" of a steel tie is considered as indefinite, but it may be safely set at from thirty to fifty years, the former being an American estimate by a competent metallurgist. The steel tie is now produced in England—where the manufacture has been so extended as to make the production very much cheaper than formerly—for 5 shillings apiece, or $1.25 gold. —*The Railway Review.*

Personals.

AT Lowell, Oct. 22, Dr. Fuller was elected a vice-president of the Y. M. C. A. of Massachusetts and Rhode Island.

Mr. Jas. Logan of this city recently entertained at his residence several members of the old Glee Club of '76-'77, with their wives. It was a most enjoyable occasion, and the singing indicated that a Tech glee club is a thing of beauty and may be a joy forever.

Mr. John B. Allen, a graduate of the Worcester Technical Institute, class '80, who has since been in the machinery business in Chicago, will be married to Miss Florence A. Buss, of Grand Rapids, Mich., Oct. 6.— *Worcester Spy, Oct. 2.*

Early in August Prof. Albert L. Tucker, class of '82, delivered an address on Manual Training before the Nevada State Teachers' Institute. He, at present, holds the position of superintendent of the wood-work department in the Manual Training School of Chicago.

Fuller, '84, has left the Union Rolling Mills at Cleveland, and has opened, for a company, a laboratory in Hurley, Wisconsin. The analysis of iron ores will be the principal work.

Melms, '84, has entered the employ of the Omaha Electric Light Co. for one year.

Setchel, '84, began work about a month ago for the Thomson-Houston Electric Co. of Lynn.

Small, '84, in the employ of the above-mentioned company, was in the city recently, putting up electric lights in the Crompton Loom Works.

The following is taken from an article in the *Niagara Falls Gazette* on the new pier which has been built at the head of the canal in that place by Mr. W. C. Johnson, '84:—

The pier proper is located about sixty feet from the shore, and some twenty feet below the entrance to the basin. It is 18′ x 18′, and twelve feet high, is anchored to the solid rock with bolts, and is built of heavy oak logs laid up cob-house fashion, and weighted with stone. The pier contains about 9000 feet of logs and 160 tons of stone. It sits eight feet in the water, and the upper side is faced with boiler iron. Leading from the main shore to the pier is a boom built in the Howe truss pattern, seventy-eight feet long on the outer edge, six feet across the top, and set three feet in the water, and top one foot out of water. On the main shore lies a boom 175 feet long, built of four strips 10″ x 12″, six inches apart and firmly held in place by heavy iron bolts. As soon as the cold weather comes on the boom will be placed across the mouth of the basin running from the pier to the lower side, and will be held in position by chains. This, with the pier, will prevent any ice drifting into the canal, which was the object of their construction. The whole structure has the appearance of being strong enough to withstand any ice pressure, and reflects great credit upon the engineer, Mr. Johnson.

Humphrey, '85, is at present in the employ of the A., T. & S. Fé R. R. as rodman on the bridge engineering corps.

Brooks, '86, has secured the position of leveler on the engineer corps of the St. Paul & Duluth Railroad Company.

Carter, '86, is at the E. P. Allis works in Milwaukee, Wis.

Sawyer, '86, is pattern-maker at the Washburn Machine Shop.

Walker, '86, who, until recently, was engaged by a civil engineer in Cambridgeport, has gone west to practice his profession in the employ of the N. P. R. R. Co.

Exchanges.

The *Horæ Scholasticæ*, we are pleased to see, devotes considerable space to the associations and societies of the school (St. Paul's). Such matter makes the paper more interesting to the students, and is always pleasant reading to the alumni. In the same paper the writer of the article on Minot's Ledge Light-House has been careless in some of his descriptions. We were fortunate ourselves, however, in having seen the Light, and agree with him that a visit to it is an enjoyable affair and one not soon to be forgotten.

The *Young Idea* has evidently been taught how to shoot. The current number is its first appearance in magazine form.

The *Dartmouth* is trying hard to boom athletics in its college. The cause is a good one; we hope it will succeed.

Our friend, the *Niagara Index*, is the biggest chestnut dropped to us since frost set in. We mean nothing of disrespect. The thought was suggested when we found the harsh, uninviting exterior held a kernel so pleasant to the

taste. Our appetite is good; give us more.

We welcome two new journals this month—the *Westminster Review* and the *Rambler*. This being their first issue, we must be charitable. We cannot, however, but think that there was misjudgment and a want of originality in giving the world another *Rambler*.

The *College Messenger* is the newsiest journal that comes to our desk. Its last number contains forty-four pages, and although much of its matter is clippings, it has for all that a goodly number of original articles well worth the reading.

In the *Delaware College Review* the exchange editor gives an excellent definition of the office of the exchange column, but is a little inconsistent with some of his principles when he resumes the war of words commenced between his predecessor and the *College Rambler*. In its change of management the *Review* should have seen the opportunity of dropping the matter and ceased making itself ridiculous in the eyes of its contemporaries.

We read with pleasure *Lassell Leaves'* article on English girls, which has suggested thoughts to which we give expression in our editorial column.

The *Beacon* is fortunate in having a foreign correspondent. Miss Fessenden, evidently a devoted alumna, writes an interesting letter from Berlin. From her closing sentence, we infer that another of her letters will be published soon. May she not disappoint us.

We congratulate brother Wilson of the *College Rambler* on his success in gaining the second prize in the Illinois Oratorical Contest.

The *Monmouth Collegian* touches upon a thought that must be of interest to its co-laborers in college journalism, as well as to the classes electing those editors. In speaking of college papers, it says: "* * * * Their merit generally corresponds with the size and character of the colleges that support them, and they are the truest advertisements of their respective institutions." With but few exceptions this is the case; for while the faculty has nothing to do with conducting the college paper, nevertheless its character is but the expression of the literary tone of the college; and a stranger is justified, to some extent, in forming his idea of the standing of a college by the paper it supports.

Here, then, is a hint to us editors. Besides the labor of making our paper interesting to its readers, we have the additional task of upholding the respectability and prestige of our college.

Communications.

MR. EDITOR:

On the last field-day of your Athletic Association, I endeavored to find out which among the many colors displayed was the school color, and after some trouble, I learned from a "Tech" that he thought that wine-gray was the school color. Judging from appearances, you have no permanent school color, but each class selects some combination for its own use. In fact it can be said with safety that half the whole number of students at the Worcester Free Institute know no other color than their class colors; whereas in most colleges and schools of this sort, class colors are secondary affairs. Yale has its blue for a college color and the different classes usually choose some color which looks well with blue. Why would not some plan of that sort work well at the Tech? When your foot-ball or base-ball team plays a game with another school-team it would at least enable spectators to distinguish the Tech players if they wore their school color.

Respectfully,

AN INTERESTED PARTY.

MR. EDITOR:

Dear Sir,—Please allow me a little space in your columns for a few remarks on foot-ball. There is an abundance of material in the Tech for a foot-ball team and it wants only training to make its Eleven an excellent one. The great drawback is the lack of time for any outside work. Yale trains her men two hours a day and nearly every college trains at least one hour a day. Our men have, perhaps, two hours practice during the week and so there is not much chance for training. It seems to us that some arrangement can be made, so that the foot-ball men will be able to put more time into practice. The game as it is now played is not rough, and injurious to a student's health as some claim; but, on the contrary, the men who play on the college teams usually get so much good from playing that they do better work during the year than they would if they did not play. The same is found to be true of all other out-door exercises in which students usually indulge. We would like to see the Tech Eleven put into training for an hour a day, but how can it be done? Cannot some way be found? S.

Technicalities.

Instruments and books to the value of about one thousand dollars have lately been added to the laboratories and library. The necessary funds were furnished by a few of the Institute's friends and admirers.

One of the Washburn lathes built here has been recently set up in the shop; also a new speed lathe built last spring.

Bird, '87, and Marden, '88, were delegates to the annual meeting of the Massachusetts and Rhode Island Y. M. C. A. at Lowell.

Professor Alden's course in Steam Engineering for the Middlers embraces a study of Thurston's "Steam Engines" during the first half, and indicator work during the second.

Justin McCarthy drew a larger number of Techs to his lecture on "The English Parliament" than any lecturer or entertainment since the "Mikado" has done.

Enthusiastic Middler, illustrating the technical meaning of the term "Work": "Now if Ajax had something to stand on while holding up the earth he would be doing no work."

The emery grinders which the Middler mechanics are building, are sold as soon as they are finished. Two two-inch, and two five-eighths machines are among the later sales.

Professor: "What shall I put for the second half of the equation representing this reaction?"

Student, who doesn't want to give in: "Something equal to the other half."

The valves of the engine at the machine shop having become so much worn that the engine cannot be run, the reversible one built by the class of '80, is being employed during the repairs.

Professor: "Was kauft der Koch?"

Student (translating): "Who is the cow buying?"

Out of the nine prizes offered in the tennis tournament, '88 won seven, including all the firsts and seconds.

Professor: "I suppose you all know what is meant by a horse-power?"

After a pause a voice confidently answers, "Yes, sir."

Professor: "What is it?"

Student: "A pressure of 2000 lbs. on a square inch."

The faculty has lately added to the library Lieut. Reed's "Topographical Drawing and Sketching," one of the handsomest text-books we have ever seen and one well repaying inspection by those interested in any kind of drawing or engineering.

A two-and-one-half-inch valve for Washburn & Moen, a twelve-inch chuck and a two-inch truing machine for the Norton Emery Wheel Co., are orders on the books. Besides these, there is a great variety of small work which will keep the students busy for some months to come.

At the shop there is such a pressure of business, that it has been run eleven hours a day, and on this account, the Seniors have not yet commenced regular work on their lathe. Two large elevators are in process of construction for a firm in Jacksonville, Fla., and there are orders for seven more from various parts of the country.

Professor of Mathematics: "How would you find the traces of a line in a plane parallel to the ground line?"

Student (evidently unprepared): "Oh, ah, you'd revolve the plane into H and then you can very easily find the traces."

Professor: "Yes, so you can if you know how. The next."

Professor: "Translate this sentence 'Fritz iszt eine Birne' into English."

Student. "Freddy is a pear."

Professor gasps.

The Tech Sportsman's Club has held two field-days up to the time of writing. The boys report game very scarce. The total bag so far consists of two gray squirrels, one partridge, one small American bison (*Tamia striatus*), one Yankee ostrich (*Cyanurus cristatus*), and an English sparrow. The last was secured only after great exertion. The club labors under the disadvantage of having to limit each party to four members, as more than that number, especially when carrying their guns, would look like a procession.

By vote of the City Government, that part of the Jo Bill Road that lies between Boynton and Salisbury streets is made a public way. Former members of the school will rejoice at the prosperity of this old thoroughfare.

Museum of Antiquity.

LOVE AND PHILOSOPHY.

'TWAS at the Concord sages' school
We met, one summer's day;
I guessed—and used no logic rule—
I guessed what she would say.
"'Tis very warm,"—this with a sigh—
"The sun that shines from Thence,"—
She said, and pointed to the sky,
"Is rolling toward the Whence."

I told her that it must be so,
At least, it seemed so there;
For there was much I did not know
Of the Whatness of the Where.
About the only thing I knew,
When she was standing near,
Was that the sky was much more blue
In the Nowness of the Here.

She smiled, and said perhaps 'twas well
Those pretty themes to touch;
And asked me if the rule I'd tell
Of the Smallness of the Much.
I told her that I did not know
That rule, but then I knew
A rule that just as well would go—
The Oneness of the Two.

She blushed and looked down on the ground,
And said, "It can't be so";
And then the whole earth turned around,
For my heart was full of woe.
"Unto the Ceaseness of my End,"
I said, "I now shall go."
She murmured, "Don't you comprehend
The Yesness of my No?"

—*Puck.*

THE editor sat in his sanctum,
Letting his lessons rip;
Racking his brains for an item,
And stealing all he could clip.

The editor sat in his classroom,
As if getting over a drunk,
His phiz was clouded with awful gloom,
For he made a total flunk.

The editor returned to his sanctum,
He hit himself in the eye.
He swore he'd enough of the business,
He would quit the paper or die.

A book on etiquette might justly be termed a work on haughty-culture.—*Boston Post.*

Rhetoric class giving figures of speech. Prof. W.: "'He did it with his little hatchet.' What is that, Mr. H.?" Mr. H. (promptly): "That's a chestnut."—*Lantern.*