

The

OPPI.



Vol. XI.

Saturday, June 1, 1895.

No. 4.

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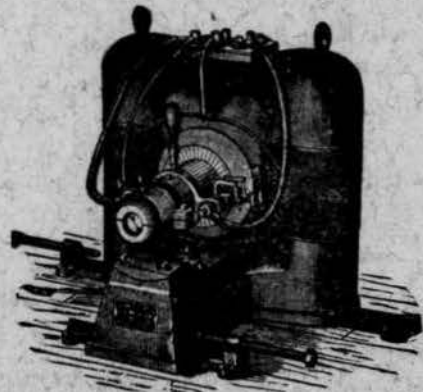
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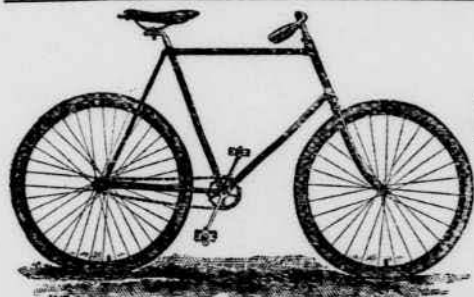
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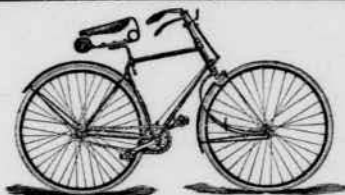
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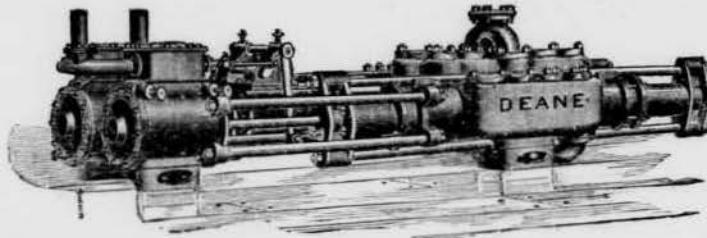
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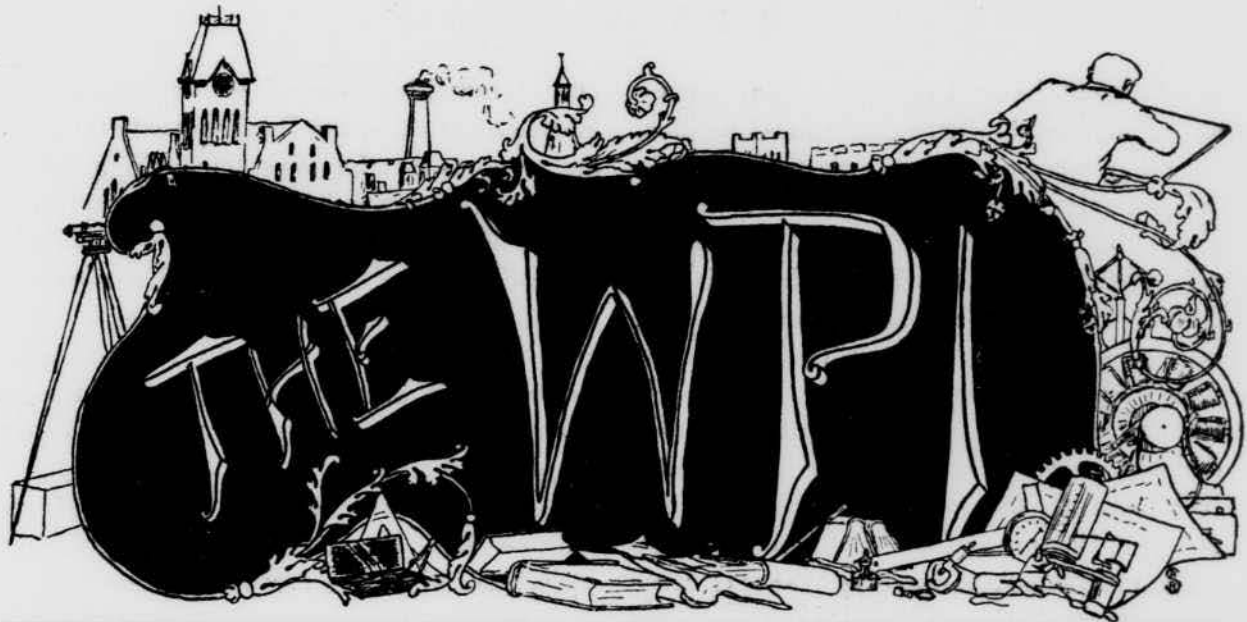
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WORCESTER, JUNE 1, 1895.

No. 4.

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The W P I is published by the students of the Worcester Polytechnic Institute on alternate Saturdays during the Institute year. Items of interest are requested from students and alumni of the Institute. All matter must be accompanied by the name of the writer. Subscribers who do not receive their paper regularly, or who make any change of address, will confer a favor by immediately notifying the Business Manager.

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The much-talked-of Intercollegiate meet is over, and while our athletes failed to score more than five points, the general feeling is that our men made a creditable showing. It will be remembered that last year we did absolutely nothing, and when one considers that a team cannot come up to the front in a single season's training, the showing made this year ought to encourage every man to do his best next spring. If this is done there is no reason why our college should not be up among the leaders.

Looking at the games from a general standpoint, the result seemed to give satisfaction to all, except the M. I. T. men. Dartmouth came down to win, Brown came up to make a fight for the place, and both did nobly. The sentiment seemed to be,

anything to beat M. I. T., last year's champions. The only reason for this feeling was the easy manner in which they won last spring, and the fact that it looked as if they might repeat the feat this year.

However, M. I. T. fell to fourth place and the other colleges felt that "revenge is sweet."

Anyone who witnessed last week's ball game between the two lower classes, cannot help feeling that class ball-games should be a fixture at the Tech. It is needless to say that more interest was aroused over this game than over many games played by the Varsity nine; and the query is, why don't we have class games as we used to. The only reason that is apparent, as far as we can see,

is that when the '96 Preps gained supremacy on the diamond in such a determined manner, no other class cared to play them. So the annual contests were unceremoniously given up. Now, in the opinion of many, a very great mistake was made when this was done. The reason is that the class contests, besides stirring up a very healthful class feeling, which is indispensable to the welfare of athletics at any institution, also develop new material for the representative team of the college. Nearly all the men on the present college nine obtained their positions because they showed their ability in the class games of two years ago. What greater argument could be had than this?

There is natural feeling of rivalry between classes in any institution, and why should it not be settled on the diamond as well as on the athletic field. We sincerely hope that another year will not go around without the resurrection of these most inspiring contests ever held on Tech Hill.

In a number of our New England Colleges the Cane Rush is an established custom and one of the events of the college course. The Faculty and upper class men gather about the contestants on the campus and cheer them on until time is called. The members of the class having the larger number of hands on the cane are entitled to wear canes the remainder of the year, the losing class being debarred from this privilege.

Next to a campus and a fence, these Cane Rushes are more promotive of genuine college spirit than anything we know of. Why should it not be an annual event at Tech?

Our Commencement number will be of unusual interest to the members of the Senior class, and also to the undergraduates, Alumni, and friends of the college.

It will contain accounts of the Class-day

and Graduating exercises, including the addresses at each, the Baccalaureate sermon, and reports of the Washburn Engineering Society meeting and the Alumni banquet.

A cut of one of the Institute Athletic Teams will also be found in this number, together with much matter of general interest. In a word, it shall be our endeavor to make this number one of the features of Commencement and a souvenir one in every respect.

Persons desiring extra copies will please address the Business Manager or leave orders in the W P I box in Boynton Hall.

The Cleveland Alumni Association's invitation will be found in another column. This Association, true to its Western location, is one of Tech's most vigorous infants and loyal supporters. If we are to judge from accounts of their previous banquets, the one which is to take place soon will be a most enjoyable affair for those fortunate enough to be present. We wish the Association a merry time, increased numbers and continued prosperity.

We admit that the Freshmen had good cause to be exuberant over their victory, and to celebrate in a becoming manner; but this does not justify the wanton mutilation of the Institute Buildings, which is nothing short of vandalism. There is a decided sentiment in the college against such proceedings, and it is to be hoped that it will prove effectual in suppressing such breaks in the future.

We are pained to announce the death of Mr. J. W. Chalfant's sister, which occurred at Louisville, Ky., May 15th. This is the second death in the family within a month, his father having died, as was stated in these columns, April 20th.

Mr. Chalfant will not resume the duties of Editor-in-chief until September.

The ready response which met the appeal of the Athletic Association is not only gratifying but significant. It shows that the students take a warm interest in the Association and stand ready to support it in an emergency.

Through the kindness of the Spy Publishing Co., of this city, we are enabled to publish in this issue cuts of several of the winners in the recent Intercollegiate games.

SENATOR HOAR'S LECTURE.

All students assembled in the Chapel, Monday, May 27, to hear the last lecture of the course, which was by Hon. George F. Hoar, who had for his subject, "American Citizenship," and of which the following is a brief abstract:

"I believe that the flame of patriotism never burned brighter or clearer anywhere than it does in the bosoms of the educated youth of America to-day. Whatever may be the variety of taste or temperament or capacity, in one thing it will be hard to distinguish any one of you from another,—that is, in the eager desire that your education may enable you to render some honorable service to your country.

"Yet I am sometimes astonished that any American youth can love his country at all, when I consider the tone of the press, of men of letters, and even of writers of history, when they describe her. We are restive under foreign criticism; we resent angrily the common speech of the Englishman; we are disturbed by the bitter, contemptuous utterances of English magazines like the *Saturday Review* and newspapers like the *Times*. Is it strange that the papers of foreign countries should adopt the opinions which are constantly uttered by our own metropolitan press? Is there any offence of this sort in London which cannot be matched in New York?

"One of our historians writes a chronicle of the discarded and rejected scandals of all past generations, and styles it 'The History of the United States.' According to another, Jefferson was a poor, impractical philosopher; Madison, a poltroon and coward. A generation of horse jockeys and swindlers covered the continent and drifted aimlessly into empire, the dreary and desolate waste being only relieved by an occasional glimpse of the austere countenance of the historian's grandfather."

Senator Hoar emphasized the fact, that in spite of these mistakes we should not discard our great poets and scholars as leaders and

teachers. We will still look to the scholar for our abstract truth, and the poet for our ideal of virtue.

"I believe that the conduct of public affairs is growing better, purer and wiser from generation to generation. I believe that, in the main, the motives, by which our public men are governed in the administration of national, or State, or local affairs, are honest and upright.

"If the critical and fault-finding temper to which I have referred be not justified by the truth, you will agree with me that its effect must be infinitely mischievous and pestilent. I do not see how the love of country can long abide toward a country which is altogether unlovely. No man can feel a noble pride in a base history. I can not understand why these fault-finders, who can not find ten righteous men in their Sodom or Gomorrah do not get out it before the fire from heaven comes down.

"So I think I may perhaps perform a useful service if I can help you to believe that these people are mistaken.

"There are two classes of complaints which I think are likely to make an impression upon good men, and especially upon young men, which, if not altogether without foundation, are at least greatly exaggerated.

"First—The complaint of what is called 'party spirit,' and

"Second—The impatience of the slowness, fickleness, and inefficiency of legislative bodies.

"Perhaps the charge against the conduct of public affairs in some States to-day, which makes most impression on conscientious men, comes from the existence of political parties. It is said that we substitute party government for popular government, party spirit for public spirit, and the interest and advantage of party for public well-being. Under these malign influences we no longer vote for the best men for places of honor and trust, but take the candidates of our party, regardless of character or capacity."

Senator Hoar argued that political parties were necessary for good government; without them it would be the government of a mob. The parties hold men together for certain principles. He believed that many offices, purely executive, should be removed from the domain of party conflict, and he thought that men should vote for such officers irrespective of party. He also said that party ties should not compel a man to aid in an unjust act.

"But there is a class of public officials, such as Presidents, Governors, members of either House of Congress and members of the State Legislature, who are chosen, not for what they themselves are, not to honor or decorate, or

crown the brows of individual men, but for what the country or State, as a moral being, is to do through their votes. In regard to that class of officials I have never been able to approve or to respect the opinion of the man who classes himself as an independent in politics."

Concerning the second topic, he said, "that when one considers that the nation is the largest business organization in the world, that it employs more than a hundred thousand men and women, and that it must not only provide for managing the army and navy, post-office, tax collections, custom houses, courts of justice, patent office, Indian tribes, etc., but it must enact laws by which all these are to be governed, and provide the executive officers by which they are to be administered, it is infinitely senseless and foolish to complain of the length of session of our Congress—as industrious and faithful a body of men as ever gathered anywhere.

"My life for thirty years has been given in a humble way to the public service. I have known intimately, through and through, the men whom the people, from all the States of the country, have entrusted with the conduct of public affairs. You can not be one of sixty or eighty men, shut up together in the same room for twenty years, to debate and deal with the most exciting subjects of human interest, without knowing pretty well the temper and character and quality of your associates. There is a good deal of human nature in all of them. They are subject to the passions of anger, to the infirmities of impatience and of ambition. They meet each other under circumstances tending to excite rivalry, jealousy, distrust, and often hasty and passionate judgment and speech. And yet, I am sure that among the men of all parties and of all shades of opinion on public questions, of all sections of the country, the men who are not governed in their public conduct by an honorable love of country and an honorable desire to do their best for the highest interest of the people, are the rare exceptions and not the rule. And in this respect there has been a steady and constant and certain improvement. There are a few exceptions. But the men in this country who are clothed with legislative powers lead frugal, temperate, simple lives, the hours of the day and the days of the year occupied by honest hard work in the public service.

"Of the group of men who assembled in my office in 1868 to propose this institution, I am now the only one left. At that time the application of science was almost unknown. Electricity was then unknown as a force and existed only as a terror. Chemistry was but the play-

thing of a few wealthy students. Now, young men, you have come into life trained for enabling your country to take its rank among other nations. Upon you her prosperity, wealth, education in peace, superiority in war, and her future, depend. Now I entreat you to aim to that highest and noblest service, the condition of lofty and noble citizenship."

THE N. E. I. A. A. CHAMPIONSHIP.

Won by Dartmouth. Last Year's Champion,
M. I. T., Fell to Fourth Place.

When the college men awoke on the morning of May 18th, to find a steady down-pour of rain, it is no wonder that their spirits were cast down, and every one asked himself what effect the wet weather and heavy track would have on the chances of their favorites. Nothing upsets the calculations of the athletes like a cold rainy day and a wet track. None of the men can do their best under such conditions, but some are placed at a greater disadvantage than others. Then again many falls and accidents are almost sure to occur on such a day.

When this is considered, it is really remarkable that such good time was made in the events and everybody considers that it was an afternoon of rare sport.

The trials for the 440 yards dash were run off in the forenoon, in the midst of a heavy rain. Rockwell, last year's winner of the event, fell in his heat, and was not placed. Daniels, of whom the Worcester men expected so much, fell while in the lead, within 75 yards of the tape. Brown and W. P. I. each had three men placed in the final.



B. HURD, JR., M. I. T.
President of the Association.

The trial heats were won as follows:

First Heat.—Hull of Brown, first; Christophe of Dartmouth, second; O'Connor, W. P. I., third. Time, 53 1-5s.

Second Heat.—Sparks of Trinity, first; Olney of Brown, second; Allen, W. P. I., third. Time, 53 2-5s.

Third Heat.—Ham of Dartmouth, first; Vaughn, W. P. I., second; Adams of Brown, third. Time, 53 3-5s.

About noon the clouds began to break away and once in a while a glimpse of the sun could be had. Old Sol however did not venture out to stay, and the afternoon was overcast although no rain fell. By 2 o'clock a large crowd had poured into the Oval, and the grand stand was almost completely filled, while many seats on the bleachers were taken. Large numbers of the fair sex were present, and the pretty maidens, wearing the fluttering colors of their favorites, made a truly picturesque sight. Seldom does Worcester see such a gathering of fair young girls.

Promptly on time the men faced the mark for the first event, the 100 yards dash. The race was run off in four trial heats, a heat for second men, and the final. The heats were run as follows, in order of names:

First Heat.—Leffingwell of Trinity; Sargent of M. I. T. Time, 10 2-5s.

Second Heat.—Patterson of Williams; O'Brien of Brown. Time, 10 2-5s.

Third Heat.—Carr of M. I. T.; Shead of Amherst.

Fourth Heat.—Grosvenor of Amherst; Daniels of W. P. I.

Daniels did not start in the heat for second men, and it was won by O'Brien in 10 4-5s.

The final heat was made up of fast men, but Patterson was a good winner in 10 1-5s., breaking the former record of 10 1-4s. held by himself. Grosvenor finished second, with Leffingwell a close third.

The half-mile run was a pretty race, and was won by Bolser of Dartmouth, a dark horse. He took the lead at the start and was never headed, winning the race in 2 min. 4 sec. Hull of Brown finished second, with Buck of Williams running in third place.

The next event, the 120 yds. hurdle, brought out the star of the whole meet, Steve Chase, a man of whom Dartmouth has just cause to be proud. He was looked upon to win this event, and it proved an easy thing for him. There were three trial heats, a heat for second men, and the final. The first heat was won by Chase in 16 sec. with Hurd of M. I. T. second. Sumner of M. I. T. won the next heat in 16½ sec. with Putney of Williams second. The third

heat was won easily by Lungren of W. P. I. in 17½ sec. Hurd won the heat for second men without trouble in 16½ sec.

Those who had seen Lungren run in practice, felt almost sure that he would beat out Hurd for second place in the final, but were doomed to disappointment. For the first three hurdles Chase, Hurd and Lungren seemed about on even terms. Here Chase began to draw away, and Lungren losing his stride, failed to take his next hurdle in shape, and was out of the race. Chase won in 15½ sec., breaking the record. Hurd was second with Sumner third.

The next event, the 440 yds. final, was the prettiest race of the day. The race was thought to lie between Hull of Brown and Sparks of Trinity, but Allen of W. P. I. ran an excellent race, and won in 54½ sec. Hull fell at the start and could not catch the leaders. Olney of Brown led the race till in the stretch, where he fell. O'Connor, who was running finely just back of Olney, would surely have got a place had not Olney's fall thrown him off his pace. Sparks and Howe had a hard finish for second place, the former winning by a few inches.

The mile run was easy for Cummings of M. I. T. Pringle of Dartmouth won second over Tower of Wesleyan.

The two-mile bicycle race was run off in two trial heats, the first three men in each to ride in the final.



LOUIS F. SOULE, BOWDOIN.
Two-Mile Runner.

The first heat was won by Gary of Dartmouth. Marmon of M. I. T. was second and Perkins, W. P. I., third. Time, 6 min. 17½ secs. The second heat was won by Burns, M. I. T., in 6 min. 22½ sec. Hayden second,

Durgin third. The final was a loaf till the last lap, and was won by Gary. Marmon second, Burns third. Time, 6 min. 40 $\frac{1}{2}$ sec.

The next event, the 220-yds. hurdle, was run off in four trial heats, only first men to run in final. In the first heat Morse of W. P. I. led until the third hurdle from the finish, where he fell and was out of the race. Chase of Dartmouth won in 27 $\frac{2}{5}$ sec. Second heat won by Hurd of M. I. T. Time, 26 $\frac{1}{5}$ sec. Third heat won by Howe of Bowdoin in 28 $\frac{2}{5}$ sec. Fourth heat won by Williamson of Williams in 27 $\frac{1}{5}$ sec. Chase won the final heat in 26 $\frac{1}{5}$ sec. with Howe second, Hurd third.

The 220-yds. dash was easy for Patterson, who won the final in 23 sec. Grosvenor of Amherst was second, Dayter of Williams third. Allen and O'Connor, W. P. I., both got into the semi-finals, but did not secure a place in the finals.

Houghton of Amherst won the mile walk easily, the nearest man being an eighth of a mile behind. Barbour, W. P. I., finished fourth, not being able to get any nearer the leaders.

Soule of Bowdoin ran away from the field in the two-mile run, winning in 10 min. 2 $\frac{3}{4}$ sec.

The field events were going on while the races were being run, and were full of excitement. Brigham, of whom the W. P. I. men had great hopes in the hammer and shot events, could not secure a place. The running broad-jump was the surprise of the day. Steve Chase came out and made only one jump, which won the event and broke the previous record. The distance was 22 ft. 3 in.

The following table shows the scores of the different teams. First place counts five points, second place three and third place one. It will be seen by the table that Dartmouth won five firsts, Williams two, Brown three, and Amherst, M. I. T., Bowdoin and W. P. I. one each.

	Amherst	M. I. T.	Bowdoin	Brown	Dartmouth	Trinity	Wesleyan	Williams	W. P. I.
100 yards dash	3	-	-	-	1	-	5	-	-
Half-mile run	-	-	3	5	-	-	1	-	-
120 yards hurdle	-	4	-	5	-	-	-	-	-
440 yards dash	-	-	-	1	3	-	-	5	-
Mile run	-	5	-	3	1	-	-	-	-
Two-mile bicycle	-	4	-	5	-	-	-	-	-
220 yards hurdle	-	1	3	5	-	-	-	-	-
220 yards dash	3	-	-	-	-	-	-	6	-
Mile walk	5	-	1	-	-	-	3	-	-
Two-mile run	-	5	1	-	3	-	-	-	-
Pole Vault	4 $\frac{1}{2}$	-	-	-	4	-	1	-	-
Putting 16-pound shot	1	-	5	3	-	-	-	-	-

Running high jump	3	-	1	5	-	-	-	-	-
Throwing 16-lb ham'r	-	-	1	8	-	-	-	-	-
Running broad jump	-	3	-	5	-	-	-	1	-
Total	19 $\frac{1}{2}$	17	10	22	33	4	8	16 $\frac{1}{2}$	5

'97 vs. '98.

An Exciting Contest and "Scrap."

The much talked of Freshmen-Sophomore baseball game is at last a reality and will probably be remembered for some time to come by the members of both classes.

At half-past three on the afternoon of the 23d of May, the representatives of these classes appeared on Bliss's field, prepared "to do or die." Ten minutes later the game began with Instructor Viles as umpire.

The contingents of both nines cheered lustily, and as the game proceeded, fairly boiled over with enthusiasm. The gentle melody of

Rick, rack, roo!
Rick, rack, roo!
We're '98,
Who are you?

was followed by the chorus,

Hoopity Hoop!
Hoopity Hoop!
'98 is in the soup.

Between yells the men on the side lines were continually guying the players, making bets, and offering flattering inducements to the pitchers to strike out the batsmen.

The players were:

- '97.
- Philpot, c.
- Walsh, s.s.
- Lamson, p.
- Molloy, c.f.
- Coghlin, l.f.
- Fish, 3b.
- Barnard, 1b.
- Smith, r.f.
- Morse, 2b.

- '98.
- Ferry, 2b.
- Brown, c.
- Booth, l.f.
- L. Smith, s.s.
- R. R. Smith, 3b.
- Hill, 1b.
- Bicknell, p.
- Moody, r.f.
- Briggs, c.f.

Nothing serious happened until the eighth inning.

It was during the first half of this inning that trouble began. '98 started in with a home run by Booth. This put the Freshmen in high spirits, and when run after run continued to pile up their score, a frenzy seized them and they yelled and gesticulated in the wildest fashion. Lamson then exchanged positions with Barnard. Hardly had the exchange been affected when Synyer, '98, was espied coming from the Shops with a board nailed to a pole on which was daubed '98. This was too much for the spirited Sophomores. At the first sight of the approaching sign, Daniels, Throop and Merchant, '97,

followed by the rest of the '97 men present, made a rush for it. '98 as a man rushed to their champion's assistance, while the '97 men on the diamond left their positions to combat for their class.

The sign was buried beneath four or five tiers of struggling classmen, all trying to get a hold upon it. Around on all sides, the two different classes rushed each other back and forth. It was nip and tuck. As quick as a '98 man made a lunge at the sign he was dragged away by '97 and vice versa. After twenty minutes of slugging which would put the fiercest game of football in the shade, it was agreed to count hands as in a cane rush. Brigham, '96, the referee, decided in favor of '98, the odds being 14 to 6. Daniels, Brown and Molloy clutched the staff for '97, while Bicknell, Brown, Synyer, Perkins, Knowles, L. Smith and Bliss upheld '98. After the conflict, the participants were a sight to behold. One man had lost a shoe, another a hat, while the hats, coats and vests of the majority were in a sorry plight. Everybody kept in the best of temper and nobody was hurt, so it will have to be voted that the side issue to the game was a big success.

At the close of the eighth inning, the score stood 18 to 22 in '98's favor, they having made eight runs in this inning, while '97 made one.

In the ninth, '98 piled up six more runs and shut out '97, leaving the final score:

'97, 18; '98, 28.

'97 is very much dissatisfied with the result, being confident that they have the better team. At a class meeting held the next day it was decided to challenge '98 to another game.

DOG AND FOX PROBLEM.

Editor W P I:—

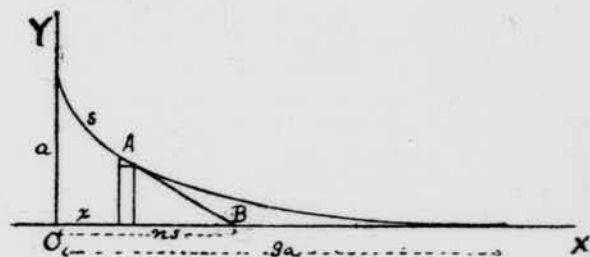
There is in mathematics a curve which was quite famous in the early days of the Calculus. It is the "Curve of Pursuit," so called because having given a point moving uniformly along a certain curve, it is required to determine the path traced by a pursuing point, starting from a given position and always moving directly toward the first point with a uniform velocity. The ratio between the velocities of the points being usually given.

There is such a problem in Bowser's Calculus used at the Institute, which so far as I have been able to ascertain has been solved but once, and that about ten years ago. Quite recently I was fortunate enough to solve it, and hoping that it may be of some interest to the readers of the W P I, I send it to you.

The problem as stated in the Calculus is as follows: A fox started from a certain point and

ran due east 300 yards, when it was overtaken by a hound that started from a point 100 yards due north of the fox's starting-point, and ran directly towards the fox throughout the race. Find the length of the curve described by the hound, both having started at the same instant, and running with a uniform velocity.

It will be seen from the statement of the problem that we do not know the relative velocities of the fox and the hound, but we do know the distance travelled by the fox, hence if we can find the relative velocities we can easily compute the distance travelled by the hound. So we may find an equation for a curve of pursuit, in which the pursued moves in a straight line, containing a constant n , which will stand for the relative velocities. The form of the curve will depend upon n , and the relative positions of the starting points. But if we know the starting points and also the point at which the pursuer and pursued are together, we can make substitutions in the equation and determine n , and consequently find the distance moved over by the pursuer.



In the figure let the fox start from the origin O , and move along the axis of X , and let the hound start at a distance a from the origin on the axis of Y and move always directly towards the fox, overtaking it at a distance $3a$ from the origin on the axis of X . If we represent by s the distance travelled by the hound, and by n the ratio between the velocities of the fox and hound, then the fox will have gone in the same time a distance ns .

Since the hound runs always directly towards the fox, the line between them, AB , will be a tangent to the curve

$$\therefore - \frac{dy}{dx} = \frac{y}{ns-x}$$

The minus sign being used because y is a decreasing function of x or s .

$$-nsdy + xdy = ydx$$

$$ns = x - y \frac{dx}{dy}$$

Any equation containing the arc s or ds , explicitly or implicitly, may be freed from it by differentiating.

$$n \frac{ds}{dy} = \frac{dx}{dy} - y \frac{d^2x}{dy^2} - \frac{dx}{dy}$$

$$\text{or } n \frac{ds}{dy} = -y \frac{d^2x}{dy^2}$$

$$\text{Put } \frac{dx}{dy} = u, \text{ and } \frac{ds}{dy} = -\sqrt{1 + \left(\frac{dx}{dy}\right)^2}$$

The minus sign is used for the same reason as above.

$$\text{Then } -n\sqrt{1 + u^2} = -y \frac{du}{dy}$$

$$\text{or } \frac{ndy}{y} = \frac{du}{\sqrt{1 + u^2}}$$

$$\therefore n \log. y = \log. (u + \sqrt{1 + u^2}) + C$$

$$\text{When } y = a, u = 0$$

$$n \log. a = \log. 1 + C$$

$$C = n \log. a$$

$$\therefore n \log. y = \log. (u + \sqrt{1 + u^2}) + n \log. a$$

$$\text{or } n \log. \left(\frac{y}{a}\right) = \log. (u + \sqrt{1 + u^2})$$

$$\therefore \left(\frac{y}{a}\right)^n = \left(\frac{dx}{dy} + \sqrt{1 + \left(\frac{dx}{dy}\right)^2}\right)$$

$$\left(\frac{y}{a}\right)^n - \frac{dx}{dy} = \sqrt{1 + \left(\frac{dx}{dy}\right)^2}$$

$$\left(\frac{y}{a}\right)^{2n} - 2\left(\frac{y}{a}\right)^n \left(\frac{dx}{dy}\right) + \left(\frac{dx}{dy}\right)^2 =$$

$$1 + \left(\frac{dx}{dy}\right)^2$$

$$\therefore 2\left(\frac{y}{a}\right)^n \left(\frac{dx}{dy}\right) = \left(\frac{y}{a}\right)^{2n} - 1$$

$$\text{or } 2\left(\frac{dx}{dy}\right) = \left(\frac{y}{a}\right)^{2n} \left(\frac{a}{y}\right)^n - \left(\frac{a}{y}\right)^n$$

$$2\left(\frac{dx}{dy}\right) = \left(\frac{y}{a}\right)^n - \left(\frac{a}{y}\right)^n$$

$$2dx = \left(\frac{y}{a}\right)^n dy - \left(\frac{a}{y}\right)^n dy$$

$$\therefore 2x = \frac{y^{n+1}}{(n+1)a^n} - \frac{a^n y^{-n+1}}{(-n+1)} + C$$

When $x = 0, y = a$

$$\therefore \frac{a^{n+1}}{(n+1)a^n} + \frac{a^n a^{-n+1}}{(n-1)} + C = 0$$

$$C = -\frac{2an}{n^2 - 1}$$

The equation for the curve of pursuit is

$$2x = \frac{y^{n+1}}{(n+1)a^n} + \frac{a^n y^{-n+1}}{n-1} - \frac{2an}{n^2 - 1}$$

In the given problem, when $y = 0, x = 3a$.

$$\therefore 6a = -\frac{2an}{n^2 - 1}$$

$$3n^2 + n = 3.$$

$$n = \frac{-1 \pm \sqrt{1 + 36}}{6} = \frac{-1 \pm 6.0827625302 +}{6}$$

$$n = .8471270883 +$$

$$ns = 3a = (300)$$

$$s = \frac{300}{n} = 354.13813 +.$$

A. HARRY WHEELER, '94.

COMMUNICATION.

WORCESTER, May 17th, 1895.

Editor of W P I.

Dear Sir,—In your issue of May 4th, there appears a communication from Geo. B. Grant of Lexington, Mass., criticising, to some extent, my paper on odd-shaped gearing, printed in your issue of April 20th.

I was not finding fault with Mr. Grant's "Treatise on Gearing," but simply said it did not explain the construction of eccentric bevel gears.

Mr. Grant says he has never been called upon to make such gears; but in this he must be mistaken, for here is what Mr. O. W. Schaum writes me from Philadelphia:

"In answer to yours of the 6th inst.. I do not recollect writing to the Grant Gear Works, but I called personally at their Philadelphia shop and talked the matter over with them very thoroughly, and was informed that it was not practical to make such a pair of gears; however, the only proper way to make them would be according to a certain formula in their book, which he referred to at the time. The gears have been very successful."

In addition to what Mr. Schaum says, I distinctly remember our sending for a sample chapter of Mr. Grant's "Treatise on Gearing," as that would tell us all about the construction of eccentric bevel gears. But it did not; and now Mr. Grant says it does not deal with such small matters. I was surprised to learn by Mr. Schaum's letter that Mr. Grant had a branch shop in Philadelphia.

I am much obliged to Mr. Grant for calling my attention to McCord's kinematics. It is a valuable work and deals quite extensively with the eccentric bevel gear. There is one marked difference between Prof. McCord's method of drawing such gears and mine. He always forms a cone with a spherical ellipse for a base;

whereas I have shown an egg-shaped gear, and Prof. McCord could not draw such a gear by his method. With my system it would be easy to design a gear to run with a square bevel gear.

One more point in favor of my method over Prof. McCord's. He does not know under what rule, or law, his gears vary in speed. In my system the velocity increment can be settled upon at the beginning, and the gears be designed to give the predetermined result.

If one knows what he wants in speed variation, he can design gears to suit the conditions. Is not that a good point in my method?

I am sorry Mr. Grant cannot understand my drawings and explanation; and think he did not study them sufficiently. With a little explanation and oversight from one who does understand the subject, I know from experience that a good pattern maker will have no trouble in making an eccentric bevel gear from my drawings.

Please observe that my great point is:— Have the pattern maker get out the bottom cone, according to my instructions, and then tack the teeth onto it. By working on this plan eccentric bevel-gear patterns can be made far easier than by Prof. McCord's method.

CLINTON ALVORD, '86.

PROGRAMME FOR COMMENCEMENT WEEK.

Sunday, June 16th, Baccalaureate sermon by Archibald McCullagh, D.D., at 7.30, at Central Church.

Tuesday, June 18, Senior Class reception at Horticultural Hall. Also examinations for admission begin at 9 a. m. in Boynton Hall.

Wednesday, June 19th, Meeting of Washburn Engineering Society in Chapel at 2 p. m. Following at 3.15, entire society and alumni will take a special car for Chaffin's, for the purpose of seeing the Hydraulic Testing Plant in operation. At 6 p. m. the Alumni will hold their annual meeting. Banquet at 8, Association Hall.

Thursday, June 20th, Class-Day exercises on Institute grounds, on Campus, at 2.30 p. m.

Graduating exercises at Association Hall at 8 p. m.

CLASS DAY PROGRAMME.

The programme for the Class Exercises, is as follows:—

Planting of Class Tree.

Greeting, Harry S. Davis.

Tree Oration, Fred M. Martin.

Class History, Alba H. Warren.

Data of a Three Years' Test, Henry S. Favor.

Class Oration, Chas. A. Harrington.

Farewell Address, Clarence W. Barton.

COMMENCEMENT.

The following members of the Senior class will read abstracts of their theses on Commencement night:—

Mechanical Engineering course, William H. Morse, Jr.

Civil Engineering, George O. Sanford.

Chemistry course, Alexander W. Doe.

Electrical course, Harry R. Barber.

Graduate Electrical course, M. C. Allen.

W. E. S.

The following will be sent to every member of the W. E. S. and alumni:—

The nineteenth regular meeting of the Washburn Engineering Society will be held in the Chapel, in Boynton Hall, on Wednesday, June 19th, 1895, at 2 o'clock P. M. After brief remarks by Dr. Mendenhall, and the transaction of business, the meeting will adjourn to inspect the new Laboratories and other Institute buildings.

At 3.15 P. M. a special excursion train on the Fitchburg R. R. will leave Lincoln Square for Chaffin's, the site of the Hydraulic Testing Plant recently completed by the Institute as a part of its laboratory facilities. A test of a Hercules Turbine will be running there, thus enabling visitors to see the whole equipment of the plant in operation. The train returning will reach Worcester about half-past four.

GEO. I. ALDEN, Secretary.

CLEVELAND BANQUET.

President Mendenhall is to deliver the oration at the commencement exercises of the Case School of Applied Science, Cleveland, and will be tendered a dinner by the Cleveland Alumni Association, at the Hollender, on June 5th, at 6.30 p. m.

As this will be the first opportunity given in this section of the country to meet President Mendenhall, there can be no excuse why every alumnus of the Tech within two hundred and fifty miles of Cleveland—and this includes the suburban town of Pittsburgh, where there are several graduates—should not be present. A cordial invitation to all such is extended, and it is hoped that a special effort will be made to attend, the only condition being that they signify their intention to be present not later than June 3d, to J. G. Oliver, Secretary, care Bardous & Oliver, Cleveland.

Come one and all, and have a good time.

F. W. TREADWAY.

SOCIETY OF ENGINEERS.

Dr. Mendenhall addressed the Worcester Society of Civil Engineers, Thursday evening, May 16th, on the "Actions of the Magnetic Needle." The meeting was held in the directors' room at the power station of the Worcester Electric Light Company, and the speaker was favored with one of the largest audiences that the society has mustered for some time.

At the conclusion of his remarks, Dr. Mendenhall suggested the consolidation of the Worcester Society of Engineers with the Washburn Society of Engineers, and on motion of John E. Gallagher, a committee, consisting of President William H. Coughlin, Arthur J. Marble and Prof. G. H. White, was appointed to confer with a committee from the Washburn Society.

The next meeting of the Worcester Society will be held June 13th, and Prof. White will read a paper.

ANNUAL MEETING AND BANQUET OF INTERCOLLEGIATE PRESS ASSOCIATION.

The annual business meeting and banquet of the New England Intercollegiate Press Association was held at the Bay State House after the sports. Officers for the ensuing year were elected and steps taken to put the organization on a sounder basis.

The following officers were elected: President, the Tech; Vice-President, Amherst Lit; Secretary and Treasurer, Brunonian. The officers were also empowered to act as an executive committee.

At the close of the business meeting, the delegates had their annual banquet in the parlor of the hotel. In the absence of the editor of the Amherst Student, H. H. Morse of the W P I acted as toastmaster, and the following toasts were responded to: "Our Society Editor," Amherst Lit; "Dividends," Brown Daily Herald; "The College Organ," University Cynic; "The New Woman," Williams Weekly; "The Waste Basket," Trinity Tablet; "The Devil," Tech.

Those present were J. E. Colburn and S. Weston, University Cynic; O. I. McCook, Trinity Tablet; George B. McClellan, Brown Daily Herald; H. E. Wheeler, H. H. Morse, C. F. Leonard, W P I; J. S. Murdock, Brunonian; C. P. Nott, Brown Magazine; H. H. Roper, Aggie Life; Fred B. Whitney, Williams Weekly; C. G. Hyde, Tech; W. C. Holman, Amherst Lit.

THE COLLEGE Y. M. C. A. PRESIDENTIAL CONFERENCE.

The annual conference of the presidents of College Y. M. C. A.'s was held at Williams College, April 25-28.

It was composed of representatives from nearly all the colleges and preparatory schools in New England and New York. This conference is held every year at some college for the purpose of instructing and educating the presidents of the Y. M. C. A.'s there represented as to the best methods of carrying on the Christian work in colleges, and how better to compete with the problems and difficulties that confront the various associations.

At the conference this year, advanced lines of work were discussed, and a generally improved plan was proposed. The evils and temptations that confront the college men and how best to overcome them was the subject of the whole conference. The influencing of new students to take a stand for Christ, the awakening and maintaining interest in Bible study, Christian literature, missionary enterprise in colleges, a higher Christian standard in colleges, the Northfield conference, the duties and possibilities of the president of the Association, and in general how to lead college men to become Christians, were among the topics discussed.

It is hoped that our Association at the Tech may derive some of the benefits of this conference, and that it may be a power for the advancement of right and Christianity in this institution the coming year. Every Christian man in the Tech ought to be connected with it.

FOOTBALL.

Manager Crawshaw has been very busy this spring making dates for the football contests in the autumn, and as a result has succeeded in making up an admirable schedule. It is as follows:—

HOME GAMES.

- Sept. 21. Worcester Academy.
- Oct. 12. Trinity.
- Nov. 9. Troy Polytechnic.
- Nov. 28. Boston University.
- Oct. 26. Open.

OUT OF TOWN.

- Sept. 28. Amherst Aggie.
- Oct. 5. Troy Polytechnic.
- Oct. 9. M. I. T.
- Oct. 19. Tufts.

At least three good men are expected to enter the Institute from the High School this fall, and possibly another experienced man from the Academy. There will undoubtedly be men

from other preparatory schools to draw upon, who combined with the football material already here make the outlook very encouraging.

Captain Brigham will be in his old position at left guard. The right-guard position is vacant, although Simpson of the High School is looked upon as a likely man. Mayo and Sibley will try for quarter, and Harris will be on the end. Riley will probably be at centre again, and Morse full-back. Other men are Booth, Hitchcock, and Harrington if he comes back. A coach has practically been engaged, and will be with the men every afternoon from the beginning until the close of the season. An arrangement will probably be effected whereby absence from shop practice will not militate against the marks of the players. All in all a most successful season is expected, and it is barely possible that the students will not have to go as far as the Oval to witness the home games. The candidates held their first meeting Tuesday noon.

ANDOVER 10, TECH 1.

The ball team went to Andover, last Saturday, and were defeated by the above score. The main reason for Tech's defeat was its inability to hit Sedgewick's pitching, only three hits being made by our team. Another reason was that Tech made errors when Andover made hits, and the combination naturally resulted in runs. Andover also made errors, only one less than Worcester, but they occurred at times when they amounted to very little. As a whole our opponents put up a good steady game, which, coupled with considerable favoritism on the part of the umpire, made it quite easy to win.

The following is the score :

ANDOVER.						
	A.B.	R.	B.	P.O.	A.	E.
Drew, c	5	3	2	5	2	0
Barton, lb	5	1	1	7	0	1
Sedgewick, p	5	0	1	2	2	0
Elliot, s.s	4	0	1	2	3	2
Dayton, c.f	5	0	2	1	2	0
Wardell, r.f	5	0	0	0	0	0
Edwards, 3b	4	1	1	1	2	1
Davis, l.f	3	3	0	3	1	1
Hacker, 2b	4	2	1	6	1	1
Totals	40	10	9	27	13	6

TECH.						
	A.B.	R.	B.	P.O.	A.	E.
Philpot, 2b	4	0	0	2	3	0
Knowles, 3b	4	1	1	2	2	1
Zaeder, lb	4	0	0	13	0	1
Harris, r.f	3	0	1	0	1	1
Bunker, l.f	3	0	0	1	0	1
Cullen, s.s	3	0	0	2	2	2
Sibley, c.f	3	0	0	3	0	0

Fisher, c	2	0	1	4	1	1
Martin, p	3	0	0	0	3	0
Totals	20	1	3	27	12	7
Innings	1	2	3	4	5	6
Andover	0	0	2	0	2	0
Tech	1	0	0	0	0	0

Two-base hit, Davis; sacrifice hits, Bunker, Wardell 2, Hacker 2; stolen bases, Drew 3, Davis, Bunker; base on balls, Sedgewick 2, Martin 1; passed balls, Drew 1; wild pitch, Martin 1; hit by pitched ball, by Sedgewick, Harris; by Martin, Davis. Umpire, John Glynn.

ALUMNI NOTES.

'88. G. F. H. von Wrede has resigned his position as master mechanic of the Reading Division of the Philadelphia & Reading R. R., to take effect May 15th. He will spend the summer in Europe.

'79. We are in receipt of a very interesting and instructive pamphlet, entitled "Cable-way Sketches," through the kindness of Mr. T. S. Miller, of the Lidgerwood Mfg. Co., New York.

'93. Henry Lucian Phillips, was recently married to Miss Frances Louise Armington, at Pine Grove Farm, Holden, the home of the bride. Rev. F. A. Balcom officiated.

TECHNICALITIES.

Captain Allen saved the day.

C. F. Day, '97, is ill with appendicitis.

F. E. Ross, '96, is back after an absence of several weeks, due to sickness.

As stated in the catalogue, the examinations begin Monday, June 3d, and continue throughout the week.

The Faculty have not annulled the 80 per cent. rule. This will meet with the hearty approval of the students, as many have been making extra efforts with this end in view.

Dr. Mendenhall lectured in the hall of the English High School, Friday evening, May 17th, his subject being, "The Weight of the Earth." He will deliver the anniversary address at the State Normal School Commencement, June 27.

A special meeting of the Athletic Association was held in Boynton Hall, Monday, May 20th. The reports from the various classes showed that the amount of money subscribed amounted to considerably more than was asked for. It was voted that all who had subscribed \$1 or more would be considered as having paid their dues for the year.

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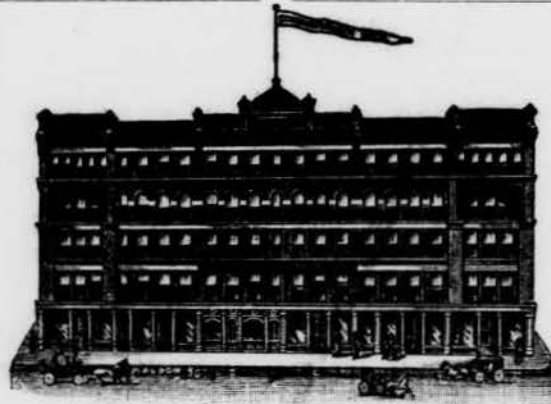
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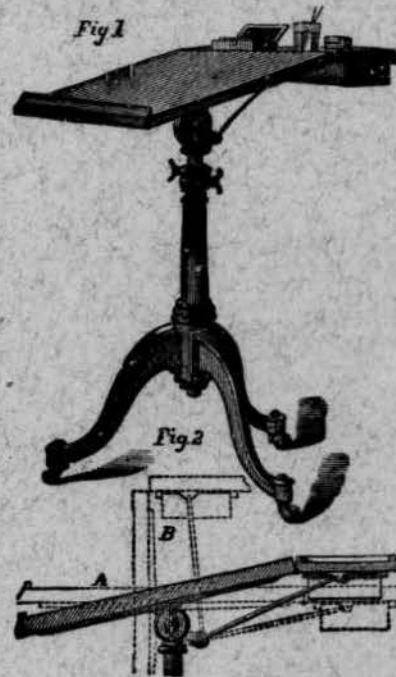
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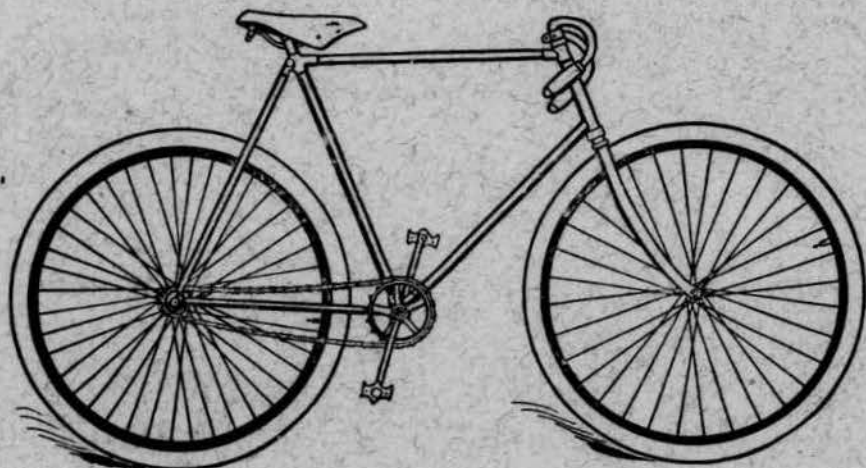
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