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We beg the indulgence of our readers for the delay of this issue. The monthly meeting of the Washburn Mechanical Engineering Society had to be fully reported, and this alone was the cause of the delay. These meetings generally delay the paper somewhat, but on account of the necessity of having cuts made for Mr. Cole’s article, we may be a little later than usual in getting out the paper.

The result of the Brown game should not in the least have any discouraging effect on the team or its supporters. The magnificent exhibition of the preceding Saturday—the game with Amherst Aggies—had given rise to the impression that a close game and even a victory might be recorded against Brown. The Aggie game was undoubtedly the best foot-ball game ever played by a Tech team. The team work was good—almost every man trying his skill at running with the ball and the interference at times being excellent. It was because of this game and the advent of a coach that the admirers of the team antici-
The cross-country runs in the first place were introduced as the best method of drawing men into athletics. It is an indisputable fact that a man is more capable of running for a long time slowly than he is for a short time with great speed. Thus it is possible that a man can run four or five miles at almost as fast a pace as he can run one mile or even half a mile. It is these men that ultimately become the best runners for the mile, half-mile, and sometimes quarter-mile runs. That is, if they take it upon themselves to undergo the training for it; it may take a few months or a few years, so that it is with the future of athletics in the Institute rather than the present with which the cross-country runs have to deal. Therefore nothing would be more pleasing than to see a large representation from the two lower classes, not only on account of the benefit they will derive at the present time, but principally because of the great good it will be to them in athletics before their graduation from the Institute.

While in a group of students lately a question propounded by one of them caused considerable discussion. Why is there not a Glee Club at the Tech? We have plenty of good singers; in fact, a few stars. Several have sung in church choirs, and in Festival choruses, while those who sang in the "Show" last spring brought no little credit upon themselves. So we have the material, and one obstacle is surmounted. The lack of time, which by the way is the Tech man's only excuse when asked to engage in outside pleasures, would probably be the greatest objection to the formation of a Glee Club. Then, too, there would be the difficulty of obtaining a sufficiently competent leader, although there may be men of enough experience in the Institute to undertake such duties. Assuming that a Glee Club is formed, what shall we do with it? What do other colleges do with theirs? The Glee Clubs of the greater colleges are famous all over the eastern part of the country, and some have even travelled westward. Of course we could not expect to run a Glee Club on such a grand scale as these colleges. But let the Banjo Club be absorbed into the Glee Club, or vice versa, and an entertainment given by both we feel sure would be well compensated. Short trips to adjoining towns could be made, and in vacations longer trips might be engaged in. Or, perhaps, if it is desirable to go into it even to so great a degree as this, one or two grand entertainments could be arranged and the proceeds given to the Athletic, Base-ball or Foot-ball Association.

These were in substance the arguments pro and con made by several men, and it seems on the whole that it would not be impossible for a Glee Club to exist in the Institute.

W. M. E. S.

The Washburn Mechanical Engineering Society held a largely attended meeting Monday evening, October ninth. The meeting was called to order by Pres. Nathan Heard, '93, and after the reading of minutes by Sec. Alden, the following names were presented and elected to membership: C. G. Harris, '94; Paul B. Morgan, '90; F. E. Killam, '94; W. R. Billings, '71; S. M. Green, '85, and E. G. Watkins, '86.

Mr. Heard then announced that the following dates were decided upon for the regular meetings: Dec. 11th, 1893; Feb. 12th, Mar. 19th, May 7th, and June 20th, 1894.

Mr. Wyman then read the report of the committee on election of officers, naming the following:

For President—E. L. Burdick, '94.
1st Vice-Pres.—H. P. Linnell, '94.
2d Vice-Pres.—G. M. Eaton, '94.
3d Vice-Pres.—G. E. Gladwin.
4th Vice-Pres.—Geo. I. Rockwood, '88.
5th Vice-Pres.—E. W. Vaill, Jr., '93.
Secretary—Prof. G. I. Alden.
Treasurer—M. P. Higgins.

Councillors:
W. R. Billings, '71; A. B. Upham, '78.
S. M. Green, '85; E. G. Watkins, '86.
E. O. Rogers, '93.
The report was accepted, and the meeting then had the pleasure of listening to an interesting discourse by Mr. Cole, '83, which we have the privilege of publishing.

After the discussion upon Mr. Cole's paper, it was announced that Mr. Upham was unavoidably detained, and that his paper which had been forwarded, had not arrived. Therefore Mr. Rockwood proceeded to entertain the listeners by describing and explaining, as much as he could consistently, the workings and advantages of a new engine called the "Compact Compound Condensing Engine." We regret that we cannot publish this article as Mr. Rockwood has prepared it for another party.

The meeting adjourned about 10 o'clock.

**Modern Ways of Controlling High Speed Elevators.**

The erection of the tall office building feasible only since the invention of the modern hydraulic elevator has in turn imposed new requirements upon the elevator itself. The service demanded of the elevator in these buildings has become more and more exacting and has led to entirely new methods of handling and controlling the machines. Where six, eight, or even twice that number of stories have to be traversed, the matter of time consumed in the transit becomes of consequence, especially as the occupants and users of such buildings are mostly men whose time during business hours is counted as so much money. A dozen years ago 100 ft. per minute was considered good speed for elevators. To-day less than 300 is slow, 400 to 509 ft. common, 600 ft. not unusual, while even greater speeds are found in occasional places. These high speeds are obtained by the very rapid admission of water to the elevator cylinders, through large pipes and large valves, and the method employed to operate these valves with ease, quickness and precision forms the subject of this paper.

It will not be amiss to state at the outset why the ordinary shipping-rope fails to suffice for this quick service.

The valves because of their very size shift hard, requiring considerable power to move them, and although it might seem that by suitable gearing the shipper-rope travel required to fully open the valve might be made indefinitely long and the pull thus made correspondingly small, yet both the requirement of quickly getting up to speed and the ordinary heights of well-rooms impose limitations so that a point is soon reached in this direction beyond which it is impracticable to go.

Moreover with a single shipping-rope passing through the car in the ordinary manner, the pulling of which, either up or down, starts the car in a direction opposite to that of the pull, the speed is limited to that at which the operator can move his arm for when this speed is reached his utmost effort will only allow his hand to remain at rest upon the relatively moving rope without imparting any further motion to it.

This objection is overcome by passing not only the direct but also the reverse or return rope through the car within reach of the operator. The pulling of this rope in either direction causes motion of the car in the same direction as the pull, so that by simply grasping and holding the reverse rope it is carried along with the operator and the valve easily opened to any desired extent. But when it comes to stopping, the operator moving at a high speed must grasp at a stationary rope, a feat requiring some skill to perform nicely and with precision, and it is hardly necessary to add, generally done with gloves on.

It would be thought rather crude for a locomotive engineer to have to reach out and grab at a telegraph wire in order to stop his train and yet this is about what the high-speed elevator conductor would have to do with an ordinary shipping-rope.

The 600 ft. speed lift needs to be as readily and as easily controlled as is the locomotive engine or the electric car.

The control gear about to be described divides itself into two distinct parts, viz.: The valve, and the arrangement for operating the valve from the car.

Let us first consider the valve:

To the common three-way balance-piston valve controlling the elevator is attached a motor cylinder generally cast integral with the body of the valve and in alignment with it. An extension of the valve stem carries pistons which work in this motor cylinder so that the admission of water to, or its exhaust from, the motor cylinder affects a movement of the main valve stem, while the confinement of water in the motor cylinder obliges the main valve stem to remain at rest. Supply of water to the motor cylinder and its exhaust therefrom is controlled by a small secondary valve technically called the pilot valve, because as will be presently seen it moves just ahead of and thus pilots along the main elevator valve. In order that the main valve may be always under complete control, the construction is made such that so soon as the pilot valve is opened a little by a slight movement of the shipping cords connected with it, the motion of the main valve stem, thereby set up, closes it again and with its closing, the main valve stem is brought to rest in its new position. Further motion of the shipping cords again opens the pilot valve and the main valve stem is once more shifted until its movement again closes the...
pilot valve. The action will be best understood by referring to Fig. 1 which shows a section of one form of valve.

Supply water enters the valve at $S$, is delivered to the elevator cylinder at $C$ and the exhaust pipe is connected at $E$. The ports $P$ are covered by the piston $A$, attached to the valve stem $B$. The piston $F$ at the exhaust end of the valve is of the same diameter as piston $A$ and serves as a balance piston on this end of the valve. At the other end of the stem is a piston $G$ of about twice the area of piston $A$. Consequently, when water is exhausted from the chamber $H$, at the right hand end of the valve, the excess of pressure on the left hand side of piston $G$ over that on the right hand side of piston $A$ will drive the stem $B$ to the right and open the valve ports $P$ the exhaust end of the valve. On the other hand, when supply water is admitted to this chamber $H$, the pressure on the two sides of piston $G$ becomes balanced and the unbalanced pressure on the right side of piston $A$ drives the stem to the left, opening the valve ports $P$ to the supply. When water is confined in the chamber $H$, there can be no motion of the main stem.

Supply water to the chamber $H$ and its exhaust therefrom is controlled by an auxiliary or pilot valve $K$, of the usual D slide valve form. This auxiliary valve $K$ works in a chest $L$ on the top side of the main valve. A passage $M$ leading from the supply chamber of the main valve supplies this chest $L$ with water, the passage $N$ connects the chest with the chamber $H$ and the passage $O$ connects it with the exhaust chamber.

The auxiliary valve $K$ is moved by the stem $Q$ which is attached at $3$ to one end of a lever $R$, the other end of this lever being connected at $I$ through a link $T$ with the main valve stem. A sliding rod $V$ connected with the shipping ropes is pivoted to the lever $R$ at $2$.

The action is as follows:—When the elevator is to go up, the ropes are moved to the left, carrying with them the rod $V$. Lever $R$ now acts as a lever of the third class, fulcrumed at $I$, power applied at $2$, and the motion transmitted at $3$. The movement carries valve $K$ to the left, opening communication between the passages $M$ and $N$. Water is admitted to the chamber $H$, shifting the valve stem to the left as afore described.

So soon, however, as motion is set up in the main valve stem, lever $R$ begins to act as a lever of the first class, $I$ becoming the point of application of power, and $2$ the fulcrum. This motion moves the valve $K$ to the right and closes communication with the passages $N$, confining the water in the chamber $H$ and bringing the main valve stem $B$ to rest with the ports $P$ more or less open as more or less travel of the stem $B$ was required to close the auxiliary valve $K$, and the amount of travel required to close this valve $K$ was proportional to the initial opening given it by a greater or less movement of the rod $V$ connected with the shipping rope. Thus for every position of the rod $V$, there is seen to be a corresponding position where the main valve stem remains at rest, and the main stem will quickly and accurately respond to the motion given the shipping rope. The design is such that a convenient movement of the hand, say through 20 or 24 inches carries the valve stem the whole length of its travel however large it may be or however much force may be required to shift it. The auxiliary valve is so small and its motion so little that its resistance to movement is scarcely felt.

The construction just described exemplifies the essential parts of a pilot valve as the whole structure is called by synecdoche. These essential parts may be summed up as follows: (1) a main valve, (2) a motor cylinder attached thereto, (3) a secondary valve for controlling the supply of water to the motor cylinder, (4) such connections between the main valve stem and some part of the secondary valve that will cause movement of the main stem to close the secondary valve while allowing this secondary valve to be opened by the shipping ropes independent of any motion of the main stem.

It is different forms of these connections between the main and secondary valves that constitute the difference in the four or five really different constructions of pilot valves made, and the patentable features (for these valves are all patented) lie in the different ways of making these connections.

Some of the other constructions are exceedingly interesting but to describe them in detail would be to lengthen my paper beyond proper bounds and moreover the general principle which, rather than specific construction, is what I have sought to set forth, has already been made clear. I have, however, brought over the drawings of some pilot valves built at the Washburn Shops which show a wholly different style of connections. The working will be readily manifest by a careful perusal.

The general principle of the rope connections is that a cord suitably connected with the valve rod shall extend the length of the well-room making a bight or loop over a sheave adjustable from the car so that the loop in the rope can be lengthened or shortened by the attendant, thereby shifting the valve rod. In practice two ropes or two sections of the same rope are employed to make the motion positive in both directions. Both the number of adjustable sheaves and the
manner of looping the ropes over them are considerably varied; but the different rope arrangements may all be classified in two distinct groups known as the Running Ropes and the Standing Ropes.

**Running Ropes.**

Fig. 2 shows one of the simplest forms of the Running Rope arrangements. Attached to the car C is a horizontal lever A fulcrumed in the centre at B, and D is a handle by which this lever A may be rocked. Attached to the extremities of the lever are two ropes or sections of the same rope, $R^1, R^2$, which pass down to the bottom of the well and make bights or loops around two sheaves, mounted at the ends of a T-shaped lever E which oscillates about a stationary fulcrum F. The ropes then extend up the well-room, over stationary sheaves at the top and thence down again to a connection with the car at $GG$. From the depending arm of the T-shaped lever extends the valve rod H. When the lever A is rocked by the handle D, one bight of the rope is lengthened and the other bight shortened the same amount so that the lever E at the bottom of the well is forced to rock in unison with the lever A on the car, thus imparting any desired amount of motion to the valve rod H and that in whatever position in the well the car may chance to be. Vertical motion of the car does not affect the adjustment of the levers A and E, as during such motion the cords simply run with the car (whence the name running ropes) like an endless belt, the sheaves revolving on their studs like idle pulleys and any adjustment of the levers may be made equally well whether the car is in motion or standing still.

Instead of fastening the ends of the ropes to the car as just described, they are sometimes fastened to independent weights, or again they are fastened to the counterweight; but the distinctive feature that the ropes travel or run with the car, and the valve rod be connected with the adjustable sheaves around which they make their loop, remains the same in all these modifications.

**Standing Ropes.**

Fig. 3 shows one arrangement of the Standing Ropes. To the side of the car C are pivoted four relatively stationary sheaves $A, A, A, A$. D is a handle or lever swinging on the fulcrum $B$ and carrying a pair of sheaves $G$ (one behind the other). The rope sections $R^1$ and $R^2$ are made fast at the top of the well-room and extend or stand up and down its length, hence the name Standing Ropes. The two sections are trained so as to each make a loop over an adjustable sheave $G$ between two stationary or guard pillows $A, A$. After passing around
suitable idle sheaves at the bottom of the well, these two sections unite in a connection with the lever $A$ fulcrumed at $F$ and to which lever is attached the valve rod $H$.

It is at once manifest that motion of the lever $D$ carrying with it the sheaves $G$ lengthens one loop and shortens the other, thus taking up one section and paying out the other in like amounts and this transmits motion to the lever $E$ and valve rod $H$ at the bottom of the well.

There are nearly a score of different ways of arranging the pulleys on the car and training the rope sections over them. Some of the methods employ less sheaves than the one I have shown, but I selected this one for illustration because the manner of lengthening and shortening of the loops stands out so prominently.

There are also in use one or two methods of transmitting from a handle in the moving car rotary motion to a vertical shaft extending the length of the well-room, and also a method of imparting horizontal motion to a vertically hanging rod; but these devices do not possess the simplicity of the rope motions and have been but little employed.

The use of standing and running ropes is about equal and there appears to be not much choice between the two systems, and but little choice between most of the different modifications of the standing ropes.

With the pilot system there is no way of automatically closing the main valve at the ends of the run, hence a second or safety valve is always placed in the water pipes and arranged to be shut by the motion of some part of the elevator as it reaches the end of its travel. Sometimes a single safety valve is put in the pipe between the operating valve and the elevator cylinder, and sometimes two safety valves are used, one in the supply and one in the exhaust pipe.

The pilot system is in general use on all large elevator plants in our modern buildings, and its use seems likely to extend to the smaller elevators as well, though, of course, it somewhat increases the cost of the machine.

W. F. Cole, '83.

**TECH vs. AMHERST AGGIE.**

The second foot-ball game of the season was played Saturday, Sept. 30th, at the Oval, and still discredit keeps aloof from the W. P. I. team. The entire game was full of brilliant plays by both elevens, but the all-round steady playing of the Tech boys won the day. As this is the first season in the three in which Tech has played Amherst Aggie where we have beaten them, to say nothing of keeping their score down to 0, it is a cause for elation.

The teams lined up as follows:—

<table>
<thead>
<tr>
<th>POSITIONS</th>
<th>TECH</th>
<th>AMHERST AGGIE</th>
</tr>
</thead>
<tbody>
<tr>
<td>left-end-right</td>
<td>Ware</td>
<td>Manley</td>
</tr>
<tr>
<td>left-tackle-right</td>
<td>Brooks, Harrington</td>
<td>Higgins</td>
</tr>
<tr>
<td>left-guard-right</td>
<td>Brigham</td>
<td>Boardman</td>
</tr>
<tr>
<td>centre</td>
<td>Boyden</td>
<td>Smith</td>
</tr>
<tr>
<td>right-guard-left</td>
<td>Burdick</td>
<td>Burrrington</td>
</tr>
<tr>
<td>right-tackle-left</td>
<td>Durand</td>
<td>Fairbanks</td>
</tr>
<tr>
<td>quarter-back</td>
<td>Harris, ’96</td>
<td>Warren</td>
</tr>
<tr>
<td>half-back</td>
<td>Chase, Lathrop, Allen</td>
<td>Mansfield</td>
</tr>
<tr>
<td>full-back</td>
<td>Zaedler, Nelson, Arnold</td>
<td>Gifford, Toole</td>
</tr>
</tbody>
</table>

The game opened at 3.13, and the Aggies have the ball. They start off with a flying V, which, by the way, seems to be their favorite opening tactic throughout the game, and make fourteen yards. Before they have time to get over the first effects of this a half-back loses the ball on a fumble, and Chase drops on it. A bad pass and fumble gives Amherst the ball again and they gain five yards at the next down.

Boydlen mounts upon the moving mass, has a ride, and brings them to the ground. At the next snap Amherst goes round the right end like a flash and makes a big gain. Durand tackles well and stops him. At this point the umpire declares a foul tackle by Worcester which causes a wrangle, and the ball goes to within ten yards of Worcester’s goal line. There is no gain in the next scrimmage, however. At the following play Nelson dives through Amherst’s rush-line, tackles and downs the full-back who has the ball. Thus Aggie loses some three yards. Amherst’s left half-back drops the ball and five yards more is lost. Four downs and the ball goes to Worcester, and a spell of good playing begins.

A gain of 6 yards is made in two successive downs, then Burdick goes through the centre and gains eight yards. Directly afterward the ball is forced three yards more toward Amherst’s goal line. Nelson punts to the full-back who is downed by Chase for a thirty-five yard gain. In the first down Amherst makes no gain. Then the left half-back tries to go round the end, but gains nothing. Tech gets the ball and gains three yards, then five through the centre, then two more. Four through the centre, and two between left-guard and tackle. Burdick takes the ball and makes four yards. Tech gets in a crowd and forces the ball three yards, then Allen takes it and gains three more by going through between right guard and tackle. Worcester gains two yards. Ball is dropped but Zaeider gets it first. The signal gives Brigham a chance and he goes round the centre and gains two yards. At the next down the ball is dropped and an Aggie man gets it and gains five yards for Amherst. Right-half runs around the end and
gains twenty-five yards. Full-back makes four yards. A half-back goes round the right end and makes seven yards. Then two yards more. Ware tackles well so that Amherst gains only one-half of a yard. Right-half takes the ball and gains two yards. At the next down Aggie gains six yards. Then loses two by running backward. At this point a delay occurs by an Amherst man being hurt. Chase, also, is shaken up some, and Lathrop takes his place for a time. By main strength Worcester forces the ball two yards but, in some unaccountable manner Amherst gets the ball. The full-back goes round the right end and is well tackled by Nelson. Nelson again tackles but Aggie gains a little. Gifford gains nine yards and is downed by Ware. Durand tackles and brings the next man down. At the next scrimmage there is no gain for Amherst. Ware again tackles well. Third down, a yard to gain. Aggie gains twelve yards, then loses one by trying to run round the end. Second down, five and one-half to gain. Third down, two to gain, and in the next two scrimmages Marshall gains five yards, then Toole three. Shortly after the ball goes to Worcester on four downs. Zaeder pushes it ahead three yards. Then it goes through the rush-line for three more. Nelson punts and gains some thirty yards. Ball is held by the Amherst full-back. Worcester gets the ball almost immediately but before anything can be done time is called. Score 0 to 0.

Worcester's ball. A gain of one and one-half through the centre. No gain. Allen makes five yards round end. Brigham gets the ball and takes four yards with it. Zaeder gains ten yards. Allen makes twenty yards round the end. Game is delayed again by a man hurt. At the next play Arnold makes a touchdown and Allen kicks the goal.

Score, W. P. I. 6; Amherst Aggies, 0.

Amherst has the ball and gains six yards by a flying V. Again one and one-half, then four yards gain. First down, one and one-half to gain. Harris tackles well and downs his man. No gain. Worcester holds in fine style. Ware tackles well but Amherst gains five yards, then eight more. Durand gets the ball and Tech gains four through the centre. Brigham makes seven by a rush around the centre. Then Worcester gains five more. Zaeder makes twelve yards round the end. Arnold gains twenty through the centre. Brigham makes six. Worcester man fumbles but Ware drops on it. Five yards are lost by this. Zaeder makes six yards. Arnold goes round end for three yards. Amherst gets ball on four downs. Harris tackles well but Amherst gains four. First down, one yard to gain. Second down, one yard to gain.

Aggie makes seven by Gifford, then four by Tooie. Second down, one yard to gain. Amherst loses four yards on a tackle back of their line by Chase. Worcester gets the ball. Allen runs thirty-five yards and makes a touchdown while Zaeder blocks him perfectly. Goal is kicked.

Score, 12—0, in Worcester's favor.

Amherst gains only a little on a flying V. Tech gets ball on four downs. Durand makes twelve yards, then two more is made. Second down, three to gain. Brigham makes two. Two, six and seven are gained in three consecutive downs. Arnold makes six yards by climbing up and jumping over a pile of men who were in his way. Again Worcester gains nine, and at the next play Allen makes a touchdown. No goal. Score 16 to 0.

Amherst makes four yards. Six and one-half minutes more to play. Aggie gains five yards. First down. Marshall makes four yards round the end, and Harris tackles well. The required five yards are not gained and Tech takes the ball. Allen gains ten yards. Durand and Zaeder gain five and six, respectively. Then four more are made. Allen gains thirty. Durand four, and Arnold three.

Time is called, and the score is 16 to 0 in favor of W. P. I.

The blocking of Amherst's backs and end men was noticeably fine.

It was also noticeable that Worcester's centre managed to get through the line at almost every line-up.

Worcester's playing was first-class, and deserves much praise for every position.

---

TECH vs. BROWN.

The third game of the season, on Saturday, Oct. 7, proved to be the kind that Brown always plays when she has a lighter team than her own to play against. Besides having a team averaging at least fifteen pounds more than Worcester's, the climax was completely capped by the judgments of the Brown referee and umpire, thrown in for the Providence eleven, of course. It was a clear case of robbery, which principle came up by jerks all through the game.

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Game began at 3.30, with Tech behind the ball. Allen took the back out of the V and made a touchdown but it did no good as the ball was not in play. At the next trial the ball goes five yards into Brown territory. Then, one, three, two and four yards are gained. Zaeder takes the ball and makes two yards. First down. At the fourth down Brown takes the ball and gains six yards, then three. Again Brown wins seven by Millard, who is stopped by Allen. Arnold takes the ball and makes twenty-five yards. Here one of the numerous cases of Brown comes in and by a few sharp plays and boosts from the referee they carry the ball to within five yards of Worcester's goal-line and directly after make a touchdown. No good results. Score 4 to 0.

At the following V Worcester does not get to the middle line. In two downs Allen makes four and one-half. Zaeder makes one yard, then Allen five. Tech gains five, then one-half and loses one. Ball goes outside, but Tech keeps it. Worcester loses, then gains two by Allen. Ball goes to Brown on four downs. Zaeder tackles well. Brown is given five yards, then gains five more. A criss-cross between Millard and Hopkins results in twenty-eight yards for Brown by the latter who runs out. At the next scrimmage Brown makes four and Ware tackles well. Third down, seven to gain is the next exciting place. Ware and Nelson make a double tackle and Tech gets the ball. Allen makes three yards, then two more. Arnold punts for twenty yards. Millard gets the ball but is nervous, apparently, and drops it. Brown makes three and then a touchdown. Goal kicked! Score 10 to 0.


Second down. One minute to play. Millard makes two, and Robinson follows with a touchdown. No goal. Score 14 to 0.

At the next starting V Zaeder makes five yards, but time is called. Score 14 to 0 for Brown.

Brown's ball. Worcester pushes it back so that Brown loses eight yards. Chase runs away with a Brown giant over his shoulder. Brown makes seven yards, then two. No gain. Next it is second down, four and one-half to gain. Colby makes eight. Then four and three are made in quick succession. Allen tackles twice, and the second time the Brown man comes to earth the worse for wear. Brown makes four, then three. Time is called for Brooks. Robinson makes touchdown. Colby is nervous and does not kick within six yards of the goal post although he kicked from the fifteen-yard line.

Score 18 to 0.

Zaeder makes fourteen but loses the ball. No gain for Brown. Then one yard is made. Millard runs twenty yards but is brought down by Zaeder. Hopkins gains five yards. Millard makes eleven but is stopped by Allen and Ware. Then another touchdown is made, and a goal kicked! Score 24 to 0.

At the V Tech makes ten yards. Then Allen makes eight. No gain. Allen makes twelve, and Arnold three. First down. Brown gets the ball. Durand throws his opponent around like a rag baby. Harris tackles well. Second down. Brown makes four, then Tech pushes them back four. Millard makes three. Mayo takes Arnold's place. Worcester has the ball and gains seven, then Brown takes it and makes four, then three, and Zaeder stops his man. At this point the Brown captain tried a game of bluff, but Mr. Rice proved too much for him. No gain. Hastings makes four. No gain. Brown makes eight but Allen stops him. Twice there is no gain, then they make four. Mayo gets through and tackles behind the line, so that Brown loses one. Then they make a touchdown. Goal kicked! (Twice in succession.) Score 30 to 0.

Worcester's V makes five. No gain. One yard gained. Third down, Allen punts. Millard appears to be weak and drops the ball when he sees Harris coming. Robinson makes six. Two and then one are made. Durand tackles well. Hopkins makes one yard. No gain. Two, one and five are made. Allen and Mayo bring Smith down. Brigham gets through Smith and stops the ball behind Brown's line. Hopkins makes three. Mayo stops the next man after he has gained one yard. Tech's ball, Allen makes two, Mayo four and Brooks eleven. No gain. Zaeder gains three. Allen punts
and Tech drops on the ball. Shortly after, Allen punts again, Millard runs with the ball but Nelson tackles and downs him. Harris runs into and spills a local reporter. Hopkins punts and Allen gets the ball. Time is called. Score, 30 to 0, in Brown's favor.

The Providence team had a small army of goal-kickers, but none of them could kick the goal except by great good fortune. We are welcomed, and the company began to break up. About two hundred were present in all, not so many as on previous occasions, but enough to give the laboratories an appearance of life which they do not have oftener than two or three times a year. It is to be regretted that the students do not turn out in larger numbers to the few social events in Tech life. For with the incessant plodding in the winter months, the oscillation between Tech and boarding-house becomes at times dreary, and anything of this sort should be enjoyed while at hand.

Among those present were President and Mrs. H. T. Fuller, Prof. and Mrs. John E. Sinclair, Prof. and Mrs. U. W. Cutler, Mr. and Mrs. G. H. Whitcomb, Prof. and Mrs. M. P. Higgins, Profs. Haynes, Kendrick, Gladwin, and Instructors Beals, Badger, and Mitchell. Miss Edith Barton, Miss Vina Badger, Miss Sinclair, Miss Helen Sinclair, Miss Virginia Mellen, Miss Florence Eastman, Miss Jessie Walker, Miss Sarah Brown, Miss Burbank, Miss Prouty, Miss Fuller, Miss Kimball, Miss Estabrook, Miss Eames, Miss Grout, Miss Dodge, and Miss Olney were among the young ladies present.

Y. M. C. A. MEETING.

On Tuesday noon, Oct. 3, the special meeting of the Y. M. C. A. was very interesting as well as instructive.

Mr. Upham spoke on the helpful influence exerted by Paul wherever he happened to be. Although only a fifteen-minute meeting it was one from which much could be stored up and carried away. About twenty were present. Two class-meetings took some of the men away. The next meeting will have for its subject "Paul's Business Principles." All are cordially invited.

A delegate will be sent to Fitchburg this week Saturday to the Y. M. C. A. convention.

Rev. W. W. LOCKE, '77.

The New York Voice for October 5th, devotes a column and a half to the work of the Barnard Memorial of Boston.

Rev. William W. Locke, the superintendent of this Institution, is, thus far, the only W. P. I. graduate who has become a clergyman.

Mr. Locke graduated with the class of '77.
TENNIS TOURNAMENT.

At the beginning of the fall term, the prospects of the Tennis Club were not particularly bright. Many good players, as well as others, who had taken a lively interest in the Club, had left school. There was some doubt as to the advisability of the Club's holding a tournament this fall, owing to the lack of interest shown by members. A few men, however, were anxious for something to enliven the Club, and pushed the matter through. The result was that there was a ready response, and sixteen men entered for the tournament. A number of new men joined, the courts began to get worn down in good earnest, and the Club is now in a far more prosperous condition than at the beginning of the season.

The first match played was that between Fay and Bicknell, on Wednesday, Oct. 4th. The first set was long drawn out, but finally went to Bicknell, 10-8. Fay's service was quite swift, in fact, almost too swift on the second serve for accuracy, making double faults rather too often. Bicknell played a steadier game than Fay, although he did not have much speed and frequently missed easy ones.

In the next set both men improved and did not send so many returns into the net. With the score, four games all, Fay won one and then Bicknell took his turn at it, and made it five all. The next game went to Fay on a swift return, and was again in the lead. In the first set, Bicknell ran the score up to 40-0, and it looked like his game, but Fay made a brace and pulled out the game and set, 7-5. The first game of the last set was Fay's, and then Bicknell took five straight. Fay got one more and that was all. Bicknell won set and match, 10-8, 5-7, 6-2.

Whitney and Dwinnell started in to play the same day and finished one set, which went to Dwinnell, 6-0. The day was very unfavorable to good playing, as a fine mist was falling, and the ground and grass were very damp. Whitney was not up to his usual form, and was evidently a little afraid of Dwinnell. On account of the weather, the match was postponed till the next day. Whitney seemed to recover from the spell and put up a creditable game, getting three games from his classmate. Many of the games were deuce, and the play was closer than the score shows.

Bishop and Dana also played their match on Thursday afternoon. The day was cloudy and the sun did not bother the men at all. Dana started in serving and took two games. Bishop then took two, principally due to Dana's lobbing out of court. Dana again got two games, returning rather swifter than his opponent, but often inaccurate. Bishop was perceptibly nervous, and did not do himself justice. The seventh game was a regular see-saw, first one man securing vantage then the other. The game finally went to Bishop on a double fault and lob out of court by Dana. Bishop also took the ninth game, but Dana won the set 6-4. In the second set, Bishop regained confidence in himself and played a stronger game. Dana took the first game and that was all. Bishop won the set, 6-1. Dana was not able to play his best game, as his feet were so tender that he could scarcely walk after the match.

Bishop took the last set and match, allowing Dana to get only two games from him. Both played almost entirely a back court game, though Dana ran to the net at times for a smash.

Abbott and Burt had a three set match later in the afternoon. Both men were off form and showed lack of practice. Burt played faster and ran to the net often, but was not steady. Abbott took the set, 6-4. In the second set, Burt ran to the net and often out-placed Abbott. Abbott lobbed repeatedly and kept his opponent on the run, but was unable to get the set. The third and decisive set went to Abbott easily. Burt was evidently scared as the score was run up against him, and could not get a game. Abbott won 6-4, 4-6, 6-0.

Goodrich and Eastman played at 4.30 Thursday and only two sets were necessary. Eastman had a lead of three in the first set, but Goodrich won by steady lobbing, 6-4. Goodrich's service was weak, but his tossing into the back court won him the second set and match, 6-3.

Kelley beat Fuller at the same time, 6-0, 7-5. Fuller showed lack of practice in the first set, and only partially recovered it in the second. In both of these matches, the players could scarcely see the balls in the last set on account of darkness.

Gehr played Sanford Friday afternoon, and although the match was interesting, had no great difficulty in winning. Sanford made most of his points by lobbing, while Gehr played at the net when opportunity offered. Score, 5-7, 6-2, 6-3.

A. W. Howe also played W. S. B. Dana the same day and won in two sets. The score was 6-4, 6-2.

The first match in the first round was between Dwinnell and Gehr, and although the former
was expected to win, he played a very fast
game winning in two sets, 6-0, 6-1. Both sets
were finished in half an hour. Dwin nell ran to
the net on every serve and smashed at every
chance. The probabilities are that he and
Abbott will meet in the finals.

Tuesday another match in the first round was
played between Howe and Bishop. Howe won
the first set, 6-3, and had Bishop, 5-1, in the
second. Bishop then braced up temporarily
and got another game, and in the last game
kept Howe working for every point. As in his
match against Dana, Bishop’s nervousness
counted against him. Howe, like many others
who have played in the tournament, did not ob­
serve this year’s rule to keep back of the line
when serving.

Wednesday was a good day for tennis and
three matches were finished and a fourth begun.
Abbott defeated Kelley, 6-2 and 7-5. Goodrich
defeated Bicknell, 6-1, 6-0. Dwin nell and
Howe played the first match in the semi-finals,
the former winning, although he played a little
carelessly at times, making three double faults
in one game. Howe placed well and made
several good drives across court which Dwin nell
could not get. The scores were 6-0 and 6-2.
This places Dwin nell in the finals. J. J. Coburn,
’95, the present holder of the Landsing cup, will
win the player of the tournament on Saturday
afternoon.

CROSS COUNTRY RUNS.

The athletic directors have decided to hold
the usual cross country runs this fall. The first
run will be held Oct. 19th, from the boat-house
in Institute Park to Barber’s Crossing and
return. The start will be promptly at 4.45.
The second run will start Oct. 27th at the corner
of Highland and West streets, and will be to
the watering trough at Coe’s Square and return.
This run will also start at 4.45. The third and
last run will be from the junction of Highland
and West to the post-office at Tatnuck and
return. The start will be at 3, Nov. 4th.
Badges will be given the first six men on each
run, and gold, silver, and bronze medals will be
given the men scoring the greatest number of
points. The first 20 men in score, the first man
counting 20 points, the second 19, etc. A
banner will be given the class scoring the most
points on the three runs.

’96 CLASS ELECTION.

The Sophomores have elected the following
officers for the half year: Pres., M. Percival
Whittall; Vice-Pres., R. S. Riley; Sec., Frank
E. Congdon; Treas., John C. Tilton; Athletic
Director, William H. Cunningham.

ALUMNI NOTES.

Frank T. Harvey and Alice M. Rathbun. At
home in Clinton after Nov. 1.

’92. F. A. Morse is pursuing an advanced
course in chemistry at the Massachusetts Insti­
tute of Technology. He is paying consider­
able attention to electricity also.

’93. W. H. Parker is engaged on the State
Board of Health on Metropolitan Water Supply
Commission.

A. D. Flinn is engaged on the Rapid Transit
Commission.

COLLEGE NOTES.

The University of Michigan graduated the
largest class ever sent from an American college,
this year. It numbered 731, 32 more than the
class of ’92.

Kentucky Universities have forbidden all college
sports on account of the alleged gambling
connected with them.

The Universities of Pennsylvania and Har­
vard have agreed to meet on the foot-ball field
for two successive years.

Garfield, half-back of last year’s team at
Williams, will enter Harvard Law School this
fall.

The University of Pennsylvania will offer
among the college courses this year, one designed
to prepare students for newspaper work.

Seven of Harvard’s last year’s eleven returned
to college this fall.

The Freshman class at Amherst numbers 150,
the largest in the history of the college.

Thirty-five men handed in their names as
candidates for the Harvard Freshman eleven.

Columbia college began her 140th year this
fall, with 1500 students enrolled.

There will be no Exeter-Andover foot-ball
game this fall.

Forty men are now in training for Princeton’s
foot-ball eleven.

The faculty at Yale has ordered electric lights
to be placed on the campus.

The University of Michigan has a Japanese
Students’ Association with a membership of
thirteen.

Four hundred and fifty students are enrolled
at Vassar this year. Many applicants were
refused owing to lack of accommodation.

The faculty of Princeton have suspended the
president and seven other members of the
sophomore class for the participation in the
hazing of a man who had incurred the enmity
of the foot-ball men.
TECHNICALITIES.

The Senior chemists have begun milk analysis. Several Tech Y. M. C. A. men took a "bus at the City Y. M. C. A. and rode out to Tatnneck, Sunday evening. Here they lead the meeting in the chapel. It proved very interesting and they would like to see more men willing to assist in this kind of work.

Classes in Mineralogy have begun a series of expeditions in connection with their school work. On Thursday, Oct. 5, a division of Seniors accompanied by Dr. Fuller, took an outing to Millstone Hill and much valuable information was gathered. A few days later a division of Juniors set out on a similar expedition, and the principal occupation on this trip was the collection of specimens for work during the winter. Some of the students were so desirous of obtaining rare pieces that they even searched for them at the bottom of the pond in the ledge.

During the past fortnight the Senior chemists have been engaged in analysis of beer, whiskey, et cetera. A Y. M. C. A. man was sent down street for a quart of lager, whether by chance or to ensure the safe arrival of the commodity is left to the reader. After two men had been working on the analysis, another student needed some and it was not to be had, whereupon the following conversation was heard:

Prof.—"That beer all gone?"
Student.—"Yes, sir."
Prof.—"Well, I don't understand this. You men can't account for more than 500 c.c. and there were surely 800 c.c. in that bottle."
Student.—"We are all temperance men, Doctor."
Prof. (Suspiciously).—"H'm. I don't know about these temperance men." Exit.

A COMEDY IN TWO SCENES.

Scene 1. Recitation room with window closed.
Student (reciting). Auf den Bänken in dem Garten.
(Gang of urchins pass by and gaze into window).
1st Ur. Get onto Ph-lp-t. Hey Phil, You ain't got your lesson.
2d Ur. Dere's a foot-ball player. Hello skinny legs.
3rd Ur. Get onto four eyes.
Prof. Class excused. (Dashes to window, opens it, jumps out, closely followed by Ph-lp-t, and several others).

Scene 2. Tennis courts. Prof. chastising urchin. Enter Ph-lp-t running. Others follow later.
Ph-lp-t. Here, in the presence of all, counselled and influenced by no one, of my own free will and desire, I hereby resign my title of champion 220-yard dasher of the W. P. I. And the band plays, the balloon makes a slow ascension as all walk slowly and sadly away.—[Curtain.

MRIOUS.

She frowned on him and called him Mr.
Because in fun he'd merely Kr.
And then in spite,
The following night,
The naughty Mr. Kr. Sr.

—Life.
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