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286 Main Street, Opp. Bay State House.
The ninth volume of the W P I. now passes into history. With the modesty inherent in all literary periodicals of the day we would fain look in retrospection at the results of our labor during the past year. Commencing our career with an incomplete board of editors, the work was especially arduous, as it must needs be done by a few. But increasing in numbers as well as in ability, the labor became more and more easy as the volume, number by number, gradually approached completion. We wish now to express our heartfelt gratitude to those who have contributed articles or who have in other ways given us aid.

To all interested in Tech affairs, the volume will be well worth saving. Social, athletic, and scientific events, as well as notices of general interest, have been reported as correctly as possible, and it will be found that these subjects are more numerous and of greater importance than in previous years. The Junior Promenade, the Burlesque, Ninety-Five's Half-Way Thro', are among the social events of more than ordinary interest. The double number containing the complete account of Ninety-Three's graduation is one of the masterpieces of the Ninety-Four board. The accounts of the meetings of the Washburn Mechanical Engineering Society are especially instructive, and efforts have been made to give them in detail. Other articles on different subjects from outside reliable sources are also to be mentioned, as attracting much interest.

With regard to athletics, we think that is a subject more easily brought to mind. Accurate reports of the base-ball games played in the spring, by the best team that the Tech ever boasted, are to be found in this past volume. In the fall, the successes and misfortunes of one of the best foot-ball teams ever at the Institute were carefully reported. Tennis, too, got its share, and we do not hesitate to say that the accounts of the tournament games were the fullest and most critical ever published in the W P I. In general athletics, there have been numerous matters which received consideration.

Concerning Institute management we have chronicled the abolition of the old excuse system, and the institution of the ten per cent. system. We have seen the establishment of new shop rules and the formation of a conference committee. These are but few of the many subjects which volume nine contains.

During the past week the attendance at the rink for training has fallen off too much. The enthusiasm when the rink was obtained was very great, and it was expected that
many new men would be developed. Several have started in well and made rapid advancement, and we hope that the present falling off is only a temporary one.

There are several men who have done well in previous years, and who have been doing little training or athletic work during the winter, who should at once commence to get "into shape." The Intercollegiate sports are less than two months distant and it is necessary that all participants should get a little preliminary work previous to the time for hard training. A little work in the rink will make it much easier when out-door training is commenced, and will give a chance to get into condition more gradually, rather than putting all the work into one short space of time, as in previous years.

The lack of enthusiasm in base-ball matters among the Freshmen is indeed deplorable and unprecedented in the history of the Institute. It is generally accepted as an undisputed fact that Freshmen will make valiant boasts and grand attempts on the base-ball field, but the class this year is evidently of a different temperament from other classes. Whether it is a sign of their superiority, or of their innate disinclination to publicity or sociability, is a question for them to answer.

We hope that this unparalleled modesty of the Freshman class will not keep any prospective base-ball players in the background. The college teams of to-day draw their best material from Freshman classes, and it is true at this Institute as well as at other colleges. For several years, in the past, the Institute team has been composed chiefly of Freshmen, or Preps as they were then. This year there seems to be no desire among Freshmen to show their ability, and as a result the baseball team has a paucity of new applicants.

It surely cannot be said that among the whole Freshman class there is no one who has ever engaged in the invigorating sport of base-ball. There are many, we are sure, who should be out on the diamond, trying for places in the Institute team. There are plenty of positions in doubt, and there is a need of many substitutes, as it is highly probable that the men selected first for some positions will not retain them throughout the season.

Freshmen, you have acquired the reputation of being slow to such a degree that by some you have been called dead. You have at last made several successful attempts to shake off the spell which has overpowered you, and we feel certain you are now on the right road. Here is a chance to take another step toward the goal you wish to reach. Get your ball players out on the field; organize a team of your own, as your predecessors have done to their own satisfaction and glory. Help supply the athletic teams of the Institute, in order that they may become more proficient and that you may participate as you ought in their successes.

W. M. E. S.

The eleventh regular meeting of the Washburn Mechanical Engineering Society was held in the Salisbury Laboratories, Monday evening, March 19th. Fully two hundred people listened to some of the most interesting papers ever presented before the society.

The meeting was called to order by President Burdick, and after the reading of the minutes of the previous meeting by Secretary Alden, the following men were admitted to membership: E. S. Wood, '93, E. P. Smith, '94, and H. B. DaCruz, '94.

The first paper of the evening was presented by Mr. Watkins. His paper was on the "Modern methods of time-keeping in shops."

Mr. Watkins introduced Mr. Bundy, of the Bundy Manufacturing Co. This gentleman gave a comprehensive discourse upon the system in vogue in his establishment. Mr. Bundy in turn introduced Mr. Truesdell, who illustrated the several advantages of this system. He also gave some interesting instances showing the time-saving properties of time recorders. Mr. Watkins introduced Mr. John C. English, President of the Columbian Time Recorder Manufacturing Co. He explained the causes that
made him investigate this subject. He said that every establishment must have some form of inspection, they must save the five and ten minutes. The machine he preferred could register 120 per minute. The registration is made by simply dropping in a check which passes through an operation very similar to dropping a nickel in the slot, only in this case the check comes out. The check is a small die, each person having his own die. In passing a certain point this die stamps its mark, opposite the time, on a continuous slip of paper.

Mr. Watkins next introduced Mr. A. G. Morse. He advocated his machine, and gave an explanation of its mechanism. This mechanism sorts, numbers of the men in order, thus assisting the bookkeeper in making the record. The workman registers by turning a crank until it is opposite his number. By pressing the crank, which is furnished with a pointer, his time is registered. Next, Mr. Watkins explained the working of a machine designed especially for the Heywood Bros. & Co. The registration is made upon a sheet, rolled upon a cylinder. He thinks such machines are of great advantage to employer and employee.

Prof. Bird proposed that a time test be made of the several machines. Therefore ten men were selected as operators. These were furnished with keys and checks, and with Prof. Bird, Sinclair, '93, and Vaill, '93, as timekeepers, the circus began. The watches were not stopwatches, and the men inexperienced, but we are safe in saying that all those present were fully convinced of the time-saving properties of these machines, and if they ever have occasion to purchase one they will find that the information obtained at this meeting will be of service to them.

Owing to the lateness of the hour, Mr. Edwards deferred his paper until the next regular meeting, which will take place May seventh.

MODERN METHODS OF TIME KEEPING IN MANUFACTURING ESTABLISHMENTS.

By E. G. Watkins, '86.

Delivered before the W. M. E. S.

Ours is a day of sharp competition in manufacturing. Business is run on close margins. The successful business firm is an exception rather than the general rule, and the avenues of success seem to be constantly narrowing. The aim of the manufacturer is to put upon the market the best article for the least money. If he makes many of the same kind, and can sell each at a small profit, success awaits him.

I have observed in a pumping station where it is not usual for them to pump at night, that on cold winter nights the pumps had to be started, and I said, how is this you are running the pumps at night when nobody is using water? The engineer replied "People are afraid the water will freeze and burst the pipes, so they leave it running and we have to pump to supply the leak." Figuratively speaking this is true of some manufacturing concerns. In a greater or less degree a part of their running time is consumed in supplying an unobserved leak. The firm whose business is safe is that firm which has such a system of bookkeeping that it is able with dispatch and certainty to locate the leakages. To ascertain reliable figures for the cost of production of a manufactured article is one of the prime requisites for the ideal system. There are two factors to be considered, viz.:—labor and material. How to note the time of the former and make a reliable record of the same, with the view of its further use in the estimate of costs is the subject before us for discussion this evening. We must seek to adopt a system in which the working people have confidence and in which they themselves co-operate. Figuratively speaking it must cost less to operate than it does to run the pumps and supply the leaks. In short, the system must be simple, reliable, impartial, and inexpensive.

Desiring to approach the subject and view it from a thoroughly practical standpoint, I have sought by correspondence and personal interview the practices of some of the most progressive New England firms. Extracts from the information thus gained are here submitted. Where a time-recording mechanism has been employed, the maker's name has been ascertained; and in each case by the kindness of the manufacturers, they are here this evening to show and explain their own machines. I take this opportunity to publicly express my thanks and appreciation of their courtesy. Almost invariably large factories are enclosed by a fence; no person can enter or leave the works without passing through a central gateway. Sometimes record of entry and departure is made at this point, but usually the workmen are allowed to enter the central gate and pass to their several departments for registration.

Here is an example of such a system. Each employee on entering the department to which he belongs is obliged to pass the department time-clerk's desk; the time clerk gives him a metal check bearing the number by which he is known. These checks have been previously consecutively arranged on a board kept for the purpose. When the whistle blows to begin
work, the time clerk looks at the board on which the checks hang, and by the absence or presence of a check, notes respectively the presence or absence of the person represented by the check number. On leaving his work the employé deposits his check through a slot into a box near the exit, where they are collected by the time clerk and again arranged in order. No person is allowed to leave work at an irregular time unless provided with a permit signed by his foreman. Persons coming late are recorded on a special book kept for the purpose. The pay-roll is made up at the main office from the record made by the different time-clerks, which record is checked by a statement slip submitted weekly by the employés. This system requires the constant attendance of a time-clerk at his post.

This system employed at the Pratt & Whitney Co.'s works at Hartford, Conn., is similar to the one just cited, but it is so complete in every detail that it may be well to consider it. Each man on entering the works in the morning receives a time card to be filled out by him, giving his name and that of his foreman. Any man presenting himself before seven o'clock in the morning, receives a clean card, form No. 3. If the man is late, the time of his entry is stamped on the card by means of an automatic time stamp. The time clerk also stamps a duplicate memorandum, which he keeps, thus proving beyond a question when a man enters the works. At one o'clock the same method is pursued, except that no time cards are given out, the time clerk merely taking a memorandum of those who are late, as they pass through the office. Of course, no man is allowed to leave the works during working hours except by passing through the time-keeper's office, where he must leave a pass showing the time of going out. At night these individual cards are examined by the foreman or contractor, who after entering them in his time book sends them to the main office.

These time cards then serve a double purpose, the pay-roll and the cost accounts being made up from them. To obtain the latter, the time cards are copied every morning for the day previous on form No. 4, shown on the chart. This is done by one of the cost clerks, whose duty it then is to see each workman and record the number of the piece he has worked on and place his time in the column headed by the operation which has been performed on said piece. These forms (No. 4) are then assorted in machine number groups and pigeon-holed; another clerk copies this time to form No. 5, using one of the forms for each operation on every piece, bunching the forms in operation groups, and keeping them in numerical order.

The number of hours is placed in the column headed "time charged" and the value of the time in dollars and cents is placed in the column headed "actual cost." If a man operates more than one machine, full time is allowed to each machine doing work, and is placed in the column headed "machines run" and the value of such time is placed in the column headed "actual cost"—see form No. 5. This time is kept for reference only. When the lot of machines is finished the columns on form No. 5 are summed up, and the sum of the actual cost column with its time is carried over to form No. 6, one of which will be used for every piece on the machine. Form No. 7, when properly filled out, is placed on top of a group of No. 6 forms and is a general summary of the cost of labor, the material, the shop expenses, and when work is done by contract shows the profit and percentage of each contractor, thereby showing the actual cost of a lot of machines or a single machine.

This system seems to be complete in every detail. Why the company do not substitute a timerecording mechanism for the time clerks, I am unable to say.

At the W. A. Harris Engine Co.'s Works, Providence, R. I., each employé is required to pass through the office to enter the shop. At the entrance to the shop stands a clock, and by means of a key each employé records his own time. This is the system of the Bundy Mfg. Co.

To Mr. Rice, the Superintendent in charge at the Harris works, I put this question: Is this system perfect. His reply was, "It gives very good satisfaction, but our greatest trouble is that men walk right by the clock and neglect to ring it, and although we dock each man half an hour every time he forgets, we are not able to put a stop to it." Mr. Rice suggests that the perfect system for their needs would have a turn-style attached so that no one could get in or out without actually ringing the clock, and thus releasing the turn-style.

FRESHMAN BANQUET.

One of the leading magazines lately contained an article on "Socialism," in which socialism was defined as being diametrically opposite to the old adage, "Every man for himself, and the Devil take the hindermost." Since its admission to the Institute, last September, the Freshman class has been drifting along in a manner which the abovementioned proverb fittingly describes, but the supper held at the Commonwealth Hotel, Monday evening, March 19, was a decided advance in the direction of socialism.
How the supper came about, can be explained in a few words and may perhaps be interesting.

About a month ago some patriotic Freshman conceived the idea that '97 was "dead slow," and accordingly called a class meeting to see if something might not be done to stir up the class. Nearly all members were in favor of some sort of entertainment, but they knew not what. A committee was appointed, and a week later two plans were reported. One a sleigh-ride and supper, the other a supper only. It took the class but a moment to dispatch the sleigh-ride question, and a banquet was in order.

A committee consisting of L. J. Davis, H. S. Lancaster and H. E. Wheeler was appointed to make all arrangements.

It was expected that other classes at the Institute would have just a little fun with the innocent Freshmen on this occasion, so the date was kept quiet.

At eight o'clock, on the appointed evening, the Freshmen commenced to assemble at the Commonwealth Hotel, and at nine, when seated at the tables, forty-three men were present.

An excellent supper was served according to the following menu:

<table>
<thead>
<tr>
<th>Consomme, a la Royal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Queen Olives</td>
</tr>
<tr>
<td>Baked stuffed Bluedish a la Maitre d' Hotel</td>
</tr>
<tr>
<td>Radishes</td>
</tr>
<tr>
<td>Pommes de Terre Brunes</td>
</tr>
<tr>
<td>Dish Gravy</td>
</tr>
<tr>
<td>Cold Tongue</td>
</tr>
<tr>
<td>Roast Young Turkey---Giblet Dressing---Cranberry Sauce</td>
</tr>
<tr>
<td>Chicken Croquettes---Madeira Sauce</td>
</tr>
<tr>
<td>Oyster Patties---Sauce Soubise</td>
</tr>
<tr>
<td>Orange Fritters, Glace</td>
</tr>
<tr>
<td>Boiled Potatoes</td>
</tr>
<tr>
<td>Squash</td>
</tr>
<tr>
<td>Lima Beans</td>
</tr>
<tr>
<td>French Rolls</td>
</tr>
<tr>
<td>Vanilla Ice Cream</td>
</tr>
<tr>
<td>Grape Jelly</td>
</tr>
<tr>
<td>Almond Cake</td>
</tr>
<tr>
<td>Fruit Cake</td>
</tr>
<tr>
<td>Charlotte Russe</td>
</tr>
<tr>
<td>Angel Cake</td>
</tr>
<tr>
<td>Oranges Malaga Grapes</td>
</tr>
<tr>
<td>Layer Raisins Cheese</td>
</tr>
<tr>
<td>Crackers</td>
</tr>
<tr>
<td>Coffee.</td>
</tr>
</tbody>
</table>

**THE TOASTS.**

The supper finished, Mr. G. W. Throop introduced himself as Toastmaster. In his opening remarks, he commended the committee for their judgment in omitting wines from the bill of fare. He then introduced Mr. Eames, who responded to "The Class of '97."

He said that all had doubtless considered the different scientific schools and colleges, and come to the conclusion that the W. P. I. was the best. He said that '97 was notable, in that it was the first class to try the four years' course at the Institute.

The Mechanics and Electrics were pleased when he said that four years hence the Mechanical and Electrical Engineers would be holding good positions, while the Civils would be wading through swamps. He then closed his remarks with the best of wishes to '97.

The '97 orchestra, revived for the occasion by Mr. W. S. Dana, then gave a selection. The orchestra comprised, Messrs. Dana, Kelley and Merchant, violins; C. M. Whitney, flute; and B. E. Eames, piano.

Mr. Barnard then gave a toast on the Faculty. He said that in all colleges the Faculty were the prey of jokers, and he proceeded to spring grinds on the W. P. I. Faculty.

The toastmaster said all were, more or less, susceptible to the charms of the fair sex, and, in selecting Mr. Lancaster, he had selected the most susceptible. Mr. Lancaster was equal to the occasion, and said that he was reminded of a gentleman who was continually "trooping" about with the ladies. He then responded to "The Fair Sex."

The next number on the programme was a song by Mr. C. B. Dana, which was heartily applauded.

Mr. Lundgren then gave an account of '97's athletic career, and in closing said that the athletic field was a much better place to become acquainted with one another than the banquet hall.

H. H. Morse then gave a description of a '97 "sport." He said that among other qualifications, he must "walk the beat," do everything that was against the rules, smoke, be seen at the Bay State, go to the Musee, frequently go to White's, and be in with the gang; never be caught studying, yet he must be well up in the class, and lastly must be in it" with the ladies. He said that it was a favorite pastime of his to hunt quail and partridge, but '97 may frequently be seen hunting "chippies."

After another selection by the orchestra, W. D. Edwards read an original poem on the class of '97.

Mr. Durand gave an interesting talk on Ethics and Hygiene, which did not agree altogether with the lessons taught last term by Dr. Fuller.

After another well rendered song by Mr. Dana, Mr. Benchley gave a few words of advice, which, while they could not be taken literally, were very instructive.

A selection by the orchestra completed the programme, and the next hour was spent singing "Tech" and college songs.

At 1:30 a cheer for the Commonwealth was given, and, under the guidance of Messrs. Throop and Lancaster, the party marched to Professor Gladwin's, and, after reciting class and Tech yells, proceeded to Professor Cutler's and Doctor Fuller's.

At Doctor Fuller's the class was determined
to have a speech, and a somewhat longer siege was held, but to no purpose. Instructor Beale was the next to be called up, but being a good sleeper, he did not get the benefits of '97's serenading. After waking Professor Kinnicutt, who it is said was not altogether pleased, the class disbanded, and their first social event was complete, an excellent time having been enjoyed by all.

Thursday noon Dr. Fuller called the class into Room 19 and explained why a speech was not given at the early hour Tuesday morning. He then invited the class to his house the following Tuesday evening, saying he would then make the speech which he had failed to make.

**SENIOR CLASS MEETING.**

At a meeting of the Senior Class held Friday, March 22d, action was taken concerning the parts for Class Day. At a previous meeting, the class wisely decided to authorize the President to appoint committees of three members, each to have charge of the Class Day exercises, the Graduation Banquet, and the Reception. The following committees were appointed: Class Day, E. W. Davenport, L. A. Howland, and H. S. Whitney; Banquet, H. N. Smith, A. L. Clark, and S. B. Palmer; Reception, G. W. Heald, C. H. Dwin nell, and H. P. Linnell. The Class Day Committee presented a report recommending that the class choose five speakers for Class Day, that an informal ballot be taken, and that definite action be deferred until a later meeting, in order to give the class opportunity to judge of the relative merits of the leading candidates. The balloting resulted as follows: Class Orator, —Gallagher, 6; Peck, 5; Perry, 3; Dwin nell, 4; Burdick, 3; Linnell, 3; Eastman, 2. Chambers, Clark, Cobb, and Pope, 1. Humorous Selection,—Clark, 13; H. N. Smith, 4; Eastman, 2; Harris, 2; Cobb, Davenport, Gall lager, Howland, Linnell, Palmer, and Soars, 1. Historian,—Cobb, 9; Palmer, 4; Gallagher, Harris, and Linnell, 3; Burdick, Clark, Daven port, and H. N. Smith, 2; Chambers and Perry, 1. Statistician,—H. N. Smith, 6; Chambers and Eastman, 3; Clark, Cobb, Harris, How land, and Linnell, 2; Bickford, Bishop, McFar land, Perry, and Pope, 1. Undergraduate Orator, —Burdick and Perry, 5; Peck, 4; Eastman and Palmer, 3; Davenport and Linnell, 2; Bishop, Chase, Dwin nell, Harris, F. E. Killam, and Knight, 1. The class adopted this method at the last election of officers, and it has given general satisfaction, as men are more likely to be elected on their merits than if they were nominated from the floor and voted upon immediately. The parts for Class Day, though not yet definitely decided upon, will undoubtedly be nearly if not quite the same as those indicated above.

At the meeting the following Monday, these officers were chosen: Class orator, J. M. Gallagher; humorist or prophet, A. L. Clark; class historian, L. A. Howland; statistician, E. W. Peck; valedictorian, S. B. Palmer.

**AN APPOINTMENT TO WEST POINT.**

On Thursday evening last, Edmund N. Benchley, '97, received a letter from United States Adjutant General Ruggles informing him of his appointment as a Cadet at West Point.

Mr. Benchley, son of Mayor's Secretary, Charles H. Benchley, took the preliminary examination a year ago in Superintendent Marble's office, and two weeks ago, the final examination at Fort Adams, Newport, R. I., both tests being satisfactorily passed.

Mr. Benchley was born in this city, attended the public schools, and completed his preparation for the Institute at the English High School. He entered the Institute last fall with the Freshman class, taking the General Scientific Course. He has been universally popular among his classmates who, although congratulating him upon his success, regret very much that he is not to complete his course at the Institute.

**THE BASE-BALL SEASON.**

The following is a schedule of games up to date, as arranged by Manager Gordon. As will be seen from this schedule, there are six home games arranged, and, of the open dates, the games of the morning of May 23, and of June 16 and 23 will be in the city.

<table>
<thead>
<tr>
<th>Date</th>
<th>Opponent</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 7</td>
<td>M. I. T.,</td>
<td>Boston</td>
</tr>
<tr>
<td>10</td>
<td>Holy Cross,</td>
<td>Holy Cross Grounds</td>
</tr>
<tr>
<td>14</td>
<td>Open</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Amherst Aggie,</td>
<td>Amherst</td>
</tr>
<tr>
<td>28</td>
<td>Worcester Academy,</td>
<td>Oval</td>
</tr>
<tr>
<td>May 5</td>
<td>No game on account of Field Day.</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Amherst Aggie,</td>
<td>Oval</td>
</tr>
<tr>
<td>19</td>
<td>Open</td>
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<td>Clinton-Lancaster Athletic Club,</td>
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<td>June 2</td>
<td>Boston University,</td>
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<td>Worcester Academy,</td>
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The candidates for the team are now practising regularly, and, in a few days, the team will be picked, that it may begin its team work. The men trying for positions are as follows: Catcher, Fisher, Leland, Ware; pitcher, J. C. Abbott, Stone, Lamson, Martin; 1st base, Zader, Lamson, Ware; 2d base, Bunker, Cul-
T H E  W P I.


GLEE CLUB.

The Glee Club is fast getting into shape for its first concert, which is to be given a short time after vacation. Arrangements have been made for several out of town trips before the concert in Worcester. Rehearsals have been held three times a week under the direction of Mr. Rice, and when the Institute closes for the recess a good start will have been made on all the pieces. After the vacation rehearsals will be held four times a week and the finishing touches put on. The pieces have all been chosen with much care, many of them having been arranged especially for the club.

BANJO CLUB.

The banjo club made its first public appearance Tuesday evening, March 13th, under its reorganization. It is saying a good deal for the club, to disband, reorganize, train new members, and fulfill engagements in a week. They played among others, the "Happy Coon" and the "W. P. I. March." The latter was arranged especially for them by Professor Fisher. The entertainment was given by the Y. P. S. C. E. of Plymouth Church. The club may be congratulated upon its success.

TENNIS CLUB.

The W. P. I. Tennis Club, although a comparatively young organization, has always been in a prosperous condition, and the members are already discussing plans for spring. A large number of members believe that an open tournament will best advance the interests of the club, and, although nothing definite has been done as yet, it is probable that such a tournament will be held, and several prominent tennis players outside of the Institute have expressed their willingness to enter. The four dirt courts are undoubtedly the finest in the city, and, if the weather permits, they will be in condition for use at the end of the spring recess.

Y. M. C. A. ELECTION.

On Tuesday last the following officers of the W. P. I. Y. M. C. A. were elected: President, F. J. Bryant, '95; vice-president, R. S. Riley, '95; secretary, E. H. Wilmarth, '97; corresponding secretary, J. W. Higgins, '96; treasurer, J. B. Mayo, '96.

THE AFTERMATH OF '94.

The Senior's class-book, the Aftermath of '94, is now ready for distribution. The editors make no idle boast when they say that it is the best class-book ever published at the Tech, and that the illustrations are better than those of any other college book. The business manager has received numerous orders for books during the past two weeks, and it is hoped that all parties who wish copies will order them at once, as it is the desire of the editors to disappoint no one. Send all orders to F. E. Killam, the business manager of the book.

N. E. I. A. A.

A short, unimportant meeting of the executive committee of the N. E. I. A. A. was held at 11 o'clock Saturday morning, March 25th, at the Quincy House, Boston. The meeting was called to order by Mr. Ames, of Dartmouth, president of the association.

Mr. Hanford, of Amherst, was elected secretary of the committee.

Emblems were talked over, but nothing definite was done, although several designs were submitted. A mail vote of the colleges will be taken to see if the association shall adopt the rules in regard to hammer throwing which the American Intercollegiate Athletic Association adopted. The offer of Wright & Ditson to furnish a cup for competition was accepted.

CONCERNING ATHLETICS.

With the approach of the Intercollegiate contest, it would be well to remind the students that if we are to make any sort of a showing, there must be some sort of systematic training. A few weeks ago the Rink was full of enthusiasts, who apparently have lost all interest, as now there are barely a half dozen men who run at the Rink with any sort of regularity. This is an old theme, and many will say that it has been worn out by generation after generation of Tech writers, but until the great body of students awake to the fact that one week of training is not sufficient for the Intercollegiate Meet, it is a subject well worth harping upon. Men can now be named, who expected to be entered last spring, who had made no pretense whatever of training, and actually felt injured to find that their entries had not been sent. That we have good undeveloped material in the Institute is shown by the number of really good runners who are found every year among the new men in our cross-country runs, and it is more than probable that we could develop a winning team if every man would try. But the majority of
students will not even make a simple attempt to do anything; a great number scarcely know that there is to be an Intercollegiate Field Day, and others, who do nothing themselves, find amusement in guying the men who compete, and declaring that “the Techs can not do anything in athletics anyway.”

When '94 shall have left the Institute, the Tech will lose two or three runners of marked ability. It is for the interest of the lower classes to replace these men if possible. There is time, in two or three years, to develop Intercollegiate winners, and ’96 and ’97, for their own credit and that of the Institute, should leave no stone unturned to bring forward every man who has even a possibility of becoming an athlete. Except in rare cases, an athlete is not developed in two months, and no man should feel discouraged if he finds that he cannot hold his own with competitors of years of experience and training. Let him settle down to solid work through the fall and winter in the Y. M. C. A. gymnasium and, when spring comes, let him make use of every advantage which the Athletic Association offers in the way of training, and he will find that his efforts have not been in vain.

Right here a word may be said in regard to the Y. M. C. A. gymnasium. It is true that we have no gymnasium of our own and that the Y. M. C. A. building is some distance from the Tech, but the gymnasium is one of the best fitted for all-round work in this part of the country. Its track is not so good as an out-of-door track, but it serves for exercise, so that when a man steps on the cinder track he will not have before him the task of hardening his muscles, when he should be ready to begin real work. Many men forget that the whole body should be developed, and that other parts should not be neglected in the endeavor to perfect the special muscles which come into play in the event for which they are training. This is what the gymnasium does for a man who goes at his work in a systematic manner and makes use of all his opportunities. We often hear men lamenting because we have no track, athletic field, or gymnasium. If we make use of everything which we have and show a disposition to take advantage of everything which lies in our way, we feel sure that the authorities will be more likely to make concessions to us.

HISTORY OF IRON MAKING.

Iron was used before history was written. The stone records of Egypt and the brick books of Nineveh mention it. Genesis (ix. 22) refers to Tubal-cain as “an instructor of every arti-

feicer in brass and iron,” and in Deuteronomy (iii. 11) the bedstead of the giant Og was “a bedstead of iron.” The galleys of Tyre and Sidon traded in this metal; Chinese records ascribed to 2000 B. C. refer to it; Homer speaks of it as superior to bronze. The bronze age came before the iron age, because copper, found as a nearly pure metal, easily fuses, and with another soft metal—tin or zinc—alloys into hard bronze; while iron, found only as an ore, must have the impurities burnt and hammered out by great heat and force before it can be made into a tool. The word sometimes translated “steel” in our English Bible really means bronze or brass, but steel was distinctively known to the later ancients. Pliny the elder wrote in the first century of our era: “Howbeit as many kinds of iron as there be, none shall match in goodness the steel that comes from the Seres (Chinese), for this commodity also, as hard ware as it is, they send and sell with their soft silks and fine furs. In a second degree of goodness is the Parthian iron.” Asia probably made more iron and steel thirty centuries ago than it does to-day. About the time of the first Olympiad, 776 B. C., there is authentic record of the use of iron in Greece, and Lycurgus used it for the money of Sparta. Iron and steel weapons of war begun to displace those of bronze before the battle of Marathon. The Romans learned iron making from the Greeks and the Etruscans, their mysterious and highly civilized neighbors, and obtained iron largely from Corsica, where the mines had been worked from the prehistoric period. The Roman legionaries found in Spain steel weapons of the finest temper, and Diodorus says that the weapons of the Celtiberians were so keen that there is no helmet or shield which cannot be cut through by them. Toletum (now Toledo) was then as famous for its sword blades as afterward in the Middle Ages. Cesar found the painted Britons fighting with spear-heads of bronze, but wearing armlets of iron; and remains of pre-Roman forges are still found in England and Wales. The Germans knew the art of sword-forging, and their legends of dwarfs and trolls with magic swords point to an earlier people, adepts in mining and metallurgy.—Harper’s Magazine.

THE FIRST INCANDESCENT LAMP.

It has been shown recently that Edison is not the real inventor of the incandescent lamp, but that it was devised thirty years ago by a man, until now unknown to fame, who used it in the form of a toy to attract people to a telescope which operated in the streets.

There came to America in 1848 a German named Henry Goebel. He was of a mechanical
turn of mind, skilful with his fingers, and he had been trained as a watchmaker and optician in Germany.

When Goebel came to New York he set up an odd little shop in Monroe street, where he did tinkering and repairing for more than twenty years. In the early fifties Goebel made a number of lamps of glass bulbs, air tight, having filaments of carbonized bamboos. He also made a little battery, by which he supplied electric current, and he put up a number of these lamps in his shop.

Goebel, now seventy-five years of age, was recently discovered in New York. In order to test his capacity as a mechanic he was taken to Stevens' Institute of Technology in Hoboken, and asked to make an incandescent lamp as he used to. On his way there he stopped and bought a bamboo fishing-pole. He also procured some hollow glass tubes. When he was in the laboratory he went to work, and he seemed filled with enthusiasm. First of all he shaved to almost infinite fineness some inner filaments of the bamboo, and then carbonized it and bent it into the shape of a hair-pin. Then by means of mercury he exhausted the air from the hollow glass globes which had been prepared by heating the glass tubing, then fused them in the carbon filament, which he had attached to platinum wire with no other instrument than his fingers, doing the work with delicacy, and when completed submitted them to the two electrical experts, one of whom had seen him make his lamp.

These men united in the opinion that this lamp contained all the essential principles of the Edison.

ALUMNI NOTES.

'71. Everett J. Bardwell is partner in the firm of Cutting & Bardwell, building contractors, who have recently opened an office in this city.

'74. Edwin S. Painter is practising medicine in Redlands, Cal.

'82. John H. Mason is a professor in the Teachers' College of New York.

'83. Arthur W. Burnham is pursuing an advanced course in Electrical Engineering here at the Institute.

'84. Arthur L. Stone, a graduate of the chemistry course, is at present editor of The Anaconda Standard, of Missoula, Montana.

'85. W. O. Emery is connected with the bacteriological department of the American Brewing Academy of Chicago, Ill.

'86. W. E. Drake has accepted the position of Professor of Mechanical Engineering at the R. I. College of Mech. Arts.

Frank A. Higgins is the assistant superintendent of the Boston City Hospital.

'87. Frank Harvey has received the degree of M.D. at the N. Y. Homeopathic College, and is a practising physician of Clinton, Mass.

'88. J. Brace Chittenden is Instructor of Mathematics at Princeton.

'92. L. C. Smith is Fourth Assistant Examiner in the U. S. Patent Office; he examines the class of Fire-Escapes and Ladders.

'93. A. C. Comins, a former editor of the WPI and at present taking a graduate course at Harvard, was recently elected a member of the Harvard Union.

'93. C. E. Goodrich is draughting at the Knowles Steam Pump Works, Warren, Mass.

REMARKS OF CRITICUS.

Spring is at hand. On every side, evidences of the fact are manifest. Yea, the signs and harbingers of spring are many. But Criticus finds himself unconsciously wandering into the land of poetry and imagination, a region with which he has little acquaintance. He has to face the stern realities here so often that he has little time or opportunity for soaring thither. But what is the purport of the above? It is just this. One of the signs of spring is the base-ball subscription paper which makes its appearance as regularly as do the bluebird and the robin. The latter are more welcomed visitors than the much abused subscription paper, which, however, is none the less essential to the Institute's welfare than the feathered bipeds.

There is no organization connected with the Institute that does not need money to keep in existence, and especially is this true of one already so handicapped by debt as is the Base-ball Association. Not many years ago Criticus had the task imposed upon him of soliciting subscriptions for one of our athletic teams, although it was no easy matter to get the student's name down on paper, yet it was a snap compared with collecting those same subscriptions a month or so later. After one has subscribed he should consider it his duty to pay his subscription when requested so to do, or as soon after as possible; don't keep promising the "collector" that you will pay it in a few days, until finally vacation comes and the subscription is not paid.

Just think over these facts and when the paper comes around don't give it a cold shoulder but "ante up" as much as possible, and place the Base Ball Association once more upon a sound financial basis.

The class of '97 is to be congratulated upon the success of her supper held last week. This
class has established a precedent which coming classes will do well to follow. Hitherto the Half-Way Thro' has had a monopoly in the way of class suppers and other events of like nature. But does not the class derive more pleasure and benefit from annually holding a supper like the recent one than from having a grand "blow-out" once during the course? Such occasions do more towards bringing the members of the class in closer contact with each other and furthering common interests than appear at first sight. Criticus sincerely hopes that, in coming years, annual class-suppers will supersede the Half-Way Thro', which has already lost some of its significance, owing to the changes that have lately been made in the length of our course here at the Institute.

* * *

There is a good story going the rounds here at Tech about a certain member of the Freshman troupe, who was desirous that cigars be furnished for the supper by the class. But the class voted otherwise and so the certain member collected a subscription on his own account from many of the Freshmen, in order that those who desired to indulge and were willing to share the expense might do so. After the supper was over, the cigars were brought forth and accidentally passed to all the members, few of whom refused. The man who had collected the money and had paid for the cigars did not propose to be outdone, and so quietly kept a record of all those who took cigars without having previously subscribed toward the cost of the same. Since then he has been trying to collect his bills, but with rather indifferent success. Criticus came across him a day or so ago just as he was trying to induce a freshman to settle for two cigars he had taken, although he had not subscribed anything for the cigars. In the course of the discussion the certain member disclosed the fact that there were yet ten cigars unaccounted for and consequently he would have to stand the loss.

This little incident only shows how easy it is to accept of the generosity of others.

**SCIENTIFIC NOTES.**

Joseph Scheissner, of Oakland, Cal. thinks he has solved the problem of Arctic travel by means of a device which puts a petroleum engine on a sled and makes the engine drive a series of spurs which take hold of the ice and force the sled forward.

An aluminum violin has been constructed by a musician of Cincinnati and has been tried in concert as well as in private. It cannot be distinguished by its tone from the wooden instru-

ment. It is claimed that it is superior to wood in durability, freedom from accident, and susceptibility to moisture. It is too early in the history of the new industry to tell of its comparative cost.

Pneumatic tires are being used on the wheels of an omnibus belonging to the Glasgow Tramway Company. The tires, which are about 3½ inches in diameter, can withstand a pressure of 187 pounds to the square inch, and are protected against any risk of being punctured by sharp stones or otherwise by several plies of canvas, with a covering of wire woven netting. The omnibus carries twelve passengers inside and fourteen outside, and is said to be a very comfortable vehicle to ride in, the inside seats being mounted on springs, which further adds to the comfort. An electric lamp is fixed on the roof, and supplied by a box which is fixed under one of the seats, and contains a sufficient storage of electricity for twenty-four hours. This is the most "up-to-date" omnibus we have heard of as yet.

Notwithstanding the fact that the Western Union Telegraph Company has over 739,000 miles of wire and nearly 21,000 offices, it opens an average of 600 new offices yearly.

A novel use of electricity as an illuminant is an electric bicycle lamp, which is said to give a brilliant, intense and steady light. The lamp is connected to the battery by a cord with a plug at the end, which fits into the terminals of the cells. The accumulator is contained in a leather bag, secured in place by straps. The light can be turned on or off while the bicycle is at full speed by means of a switch at the bottom of the lantern. The lamp is so arranged that it can be detached in a short time, and without much trouble.

Policemen in certain parts of London have recently been supplied with incandescent lamps, instead of the clumsy and dirty dark lantern.

Moisseeu, the French chemist, has succeeded in making diamonds out of the ordinary carbon, but they are so small as to be visible only through the microscope.

The smallest holes pierced by modern machinery are 1-1000 part of an inch in diameter. They are bored through sapphires, rubies and diamonds, by a machine invented by one John Wennstrom, which machine makes 22,000 revolutions a minute.

The world has a large part of its wealth invested in 325,690 fixed and 107,150 locomotive engines.

A solution which gums a letter indissolubly is that of copper oxide in ammonia. When applied
to paper it dissolves the cellulose and causes two surfaces to adhere closely.

Cycle manufacturers in this country employ over 25,000 persons.

The membership of the League of American Wheelmen is about 40,000.

COLLEGE NOTES.

Princeton has 1092 students.

An archery club has been formed at Stanford.

Thirty women are enrolled in the Yale post-graduate department.

At the last meeting of Dartmouth's faculty, it was decided to make all Senior students elective.

The Cornell Glee and Banjo club will make a trip to Europe this summer.

The Williams ball teams play thirty-two games this spring, nineteen of which are away from home.

Walter Camp has sent letters to old American foot-ball players in order to gather statistics of injuries received in the game since it was introduced in the U. S.

The oldest college graduate in America is James Kitchens of Philadelphia. This gentleman was in the class of 1819 at the University of Penn.

Cornell is to have what is known as a Students' Tribunal, corresponding in general to the Amherst Senate. Its primary object is to eradicate the frauds practised in examinations there.

"Dartmouth Athletics," a complete history of athletic sports at Dartmouth, has just been published by members of the Senior class. The book is copiously illustrated with cuts of teams and athletes.

Captain Case of the Yale base-ball nine announces that the custom of playing a series of games for the class championship will be established there this year.

The subscription for the Phillips Brooks house at Harvard is rapidly nearing the hundred thousand mark. The house will be a great under-graduate club, where students, tutors and professors may meet on a common level.

Eighteen colleges were represented at the annual meeting of the Intercollegiate Association of Amateur Athletes held in New York recently. It was voted to allow a seven-foot run in the hammer throwing, to hold the preliminary heats of the field events and the 440-yards run in the morning, and to adopt new rules to govern the bicycle races. The treasurer reported a balance of $15,000 in the treasury.

TECHNICALITIES.

Wanted.—Some new and strange person for Sudder to bore.

A Senior electrical engineer was recently heard inquiring what "edward currents" were.

Nearly all the Seniors have begun their theses, and some already have them well in hand.

The Intercollegiate Meet is less than two months distant.

Buck has discovered that it requires no mor-11ant to bind nitric acid to woolen goods.

Owing to illness among the Senior Chemists, two members had the exclusive attention of the professor at a recent quiz in Organic.

F-will was recently seen to be in a hurry, and a large throng earnestly watched him speed up the stairways in the laboratories, two steps at a time.

The Senior and Junior Chemists will put in the usual sixty hours of practice during the alleged vacation. The Freshman Chemists will wait until June before beginning their extra work.

The annual epidemic of moustaches has struck the Senior Class, and many members are suffering severely, as a consequence. It is thought that most of the victims will recover by graduation.

That gentle Spring is here is evident from the fact that Mr. Chamberlain has begun to distribute about the Institute grounds the annual accumulations of ashes—probably to make up for erosion during the past winter.

It is matter of current report that one Senior daily ruins a pair of trousers, and that, in order to secure his trade, several clothing firms in the city have sent in bids for his patronage and have offered large discounts.

The Freshman Civics have been turned loose on the adjacent fields and streets, and Boynton Street and Institute road will again be the scene of the labors of the enthusiastic kindergarten, assisted by the dignified K. P.

One of the Senior Chemists was recently asked if, when doing quantitative work, he weighed himself before and after going into the laboratory, in order to make proper correction for loss. It is needless to say that any such surmise is absolutely without foundation.

At a recent class meeting of '96, C. R. Harris was elected Athletic Captain, and action was taken in regard to the "Half-way Thro" celebration. It was decided to assess each member fifty cents a month, beginning now, and thus avoid a good deal of "kicking" which might ensue if the assessment were deferred and larger amounts per month required.
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