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ELECTION OF EDITORS TO TECHNIQUE 1920 BOARD NOW COMPLETED

Competitions Now Under Way For The Election of Sophomore and Freshman Assistant Editors

ART COMPETITION TO START MONDAY

The TECHNIQUE 1920 Board has started on its work of publishing their book with a grand rush. The election of its editors [duplicate] ishing their book with a grand rush. The election of its editors omore and Freshman Assistant Editors, and Sophomore Business Managers.—and announcement has been made of the competition to be started for one Junior and three Sophomore Assistant Art Editors.

The completed Board consists of Norris G. Abbott, Jr., Editor in Chief; George Burt, Business Manager; Malcolm Burroughs, Treasurer; Kenneth Akers, Societies Editor; Warren Cofren, Faculty Editor; Kenneth Roman, Statistician; M. V. Freeman, Photographic Editor; David Fiske, Portfolio Editor; Bob Pender, Athletic Editor; Jack Coyle, Grinds Editor; L. D. Wilson, Associate Business Manager; Teodoric Quiros, Art Editor; and C. T. Wilson, Assistant Art Editor. Of these, Pender, Coyle, Fiske, Quiros, and C. T. Wilson were elected by the Board to fill vacancies left in the Board as elected last year by the Electoral Committee.

TECHNIQUE 1920 will be published at noon on May 29th and its cost is estimated to exceed $6500. In spite of this, however, the price of the book is to remain the same as of previous editions. This will be possible because the Board feels sure that with the increased registration the circulation will be at least 50 per cent. more than former editions.

The Technique Board has decided to make two new positions on the Board of Editors, namely a Sophomore and Freshman Editor. Each of these will

DAVID FISKE '20

have four assistants and will be responsible for obtaining a fair representation of his class in the book. These men are to be chosen from the competitions now under way and since this fact was not known when the competitions started, any new men who wish to enter may report at the Technique Office and enter at this time. From the Business Competition the Business Manager,

R. PENDER '20

Treasurer and the two Associate Business Managers for TECHNIQUE 1920

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WRESTLERS PICKED

Varsity Squad Has Two Veterans, Capt. Freeman and Wood

The composition of the varsity wrestling squad was announced Thursday and although only tentative, gives a general idea of the calibre of the team. Prospects are very bright for a successful season, although of the squad of fourteen, only two have appeared in varsity bouts for Technology. Those chosen in the different classes are: 119 lb. Class—Harris, George P. Schumacher '22; 125 lb. Class—Bowman '22, Noyes; 135 lb. Class—Schumacher '22, W. R. Barker '21, and Stacy B. Robison '22; 145 lb. Class—George H. Butler '22, Gordon and Bowles '22; 158 lb. Class—Jack Wood '22, and Herbert W. Rheinard '21; 175 lb. Class—George Dateo '21, and Evert W. Freeman '20.

Capt. Freeman and "Jack" Wood form the nucleus around which a successful team will be built. Capt. Freeman is gardually rounding into shape and by the time of the first match will be in conditoin to continue his successes of last year and the splendid work which he has done for Technology. The other veteran "Jack" Wood who has returned after a year and a half in the Air Service was a member of the team of 1915, the Intercollegiate Champions. This alone is enough to prove his value on the mat.

Among others whose work is promising are Dateo, captain of last year's freshman team and Gordon of the same organization. Of the new men Bowman, Noyes, Bowles and Robison, have had previous experience at Andover and Lt. Schumacher at Annapolis.

Due to the unsettled conditions, some difficulty has been experienced in arranging a complete schedule. Manager

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M. E. SOCIETY ELECTIONS

A business meeting of the Mechanical Engineering Society was held Wednesday afternoon in room 10-250 with Mr. Wells presiding. Davidson was elected Chairman; Spooner, Secretary; Brown as Treasurer; and Gee, Knox, and Roman as members of the governing boards. It is requested by the society at this time that all students in the Junior and Sophomore classes of Course II become members in order to receive the benefits of the meetings and trips to take place shortly.

ACTIVITIES NOTICE

There will be a regular meeting of the Activities Committee at 5 05 o'clock Wednesday January 29th in Room 10-275 Every activity at the Institute is entitled to send two representatives to this meeting. The matters pertaining to undergraduate files and the general publicity of the various Activities will be considered.

CIVIL ENGINEERING SOCIETY ELECTIONS HELD IN NEW WAY

Last Wednesday afternoon the Civil Engineering Society held its election of officers for the remaining part of the year. A novel scheme of voting was used, by means of which a representative of each course was placed in charge of the voting in his course. In this way a number of men were reached who would otherwise have failed to vote, and at the same time the personal touch was added which was necessary to get the men to signify their intentions of supporting the society.

A formal meeting will soon be held at which the newly elected officers will outine their program, and tell about the future activities of the society. At the same time, the members will have a chance to become acquainted with each other.

The results of the elections were as follows:President. Edwin B. Murdough '20; Vice-President. Nowell A. Grover '20; Secretary, Homer V. Howes '20; Treasurer, Heland J. Green '20; Assistant Treasurer, Charles H. Reed '20; Executive Committee, Alfred T. Glasset '20.

PROF. AYDELOTTE SPEAKS TO COSMOPOLITAN CLUB

At a meeting of the Cosmopolitan Club on Thursday evening, January 23, Cleofan was entertained. President Dumas introduced Professor Aydelotte, the speaker of the evening, who gave a very interesting talk on the peace conference. In his talk he discussed the similarity of the present conference, and the Congress of Vienna. He gave a rapid sketch of the results of tne Congress of Vienna, and how they affected the present day issues. He then discussed the various problems of peace, under this head, he talked on Alsace-Lorraine, Poland, the problem of the Jugo-Slavs and Italians in Dalmatia, the expelling of the Turk from Europe, the autonomy of the Armenians, the possibility of the success of failure of the Zionistic movement, the disposition of the German colonies, and the clash between Great Britain and its colonies in this subject, and lastly, the important question of Bolshevism in Russia. He concluded his talk with a discussion of the League of Nations. He was followed by S. Sawamura '21, wha spoke on difficult problems of mathematics which might be solved easily. Refreshments were served at the end of the meeting.

M. I. T. A. A. ELECTS OFFICERS

At a meeting of the M. I. T. A. A. which was held Thursday the following officers were elected for the coming year: Max Unterssee '19, president; Paul Anderson '21, vice-president; R. McKay '21, treasurer; and Henry Pierce '20, secretary. R. H. Skinner '20, of the swimming team was awarded his numerals for work done on last year's swimming team.

A general discussion was held on basketball and it was voted to present the matter to the Advisory Council.

WATCH YOUR SMOKES!

Institute men riding on any of the Boston elevated company's cars on Saturday are warned to strictly obey all rules governing smoking. The company has issued a mandate saying special officers will be maintained on all lines during that day and that all infractions of the rules will be punished by arrest and fines.

WALKER MEMORIAL TO BE GIVEN OVER TO STUDENT BODY

President Maclaurin and Dean Burton to Speak at Biggest All-Technology Smoker Ever Held at the Institute

FREE DINNER FOR ALL

Next Friday evening will bring forth the biggest and best all-Technology smoker that the Institute has ever seen, the purpose being to turn over the Walker Memorial to the student body for their use as was originally intended. The smoker will start at 5.30 and will last until 10 o'clock in the evening. To begin with, a free dinner will be given to all present, and continuous entertainment will be furnished during the entire period of the smoker.

Since the Walker Memorial was built some two years ago, it has been used by the government as a barracks for the Naval Aviation school, so the undergraduates have never had the chance to take advantage of its opportunities. It promises to be the center of school life, where the students will have a place to go where they can exercise, lounge, dine, and where all the activities will be located.

The committee, which is composed of Scott Wells '20, chairman, George Burt '20, John Nash '20, Warren Cofren '20, William Freeman '20, Teodoric Quiros '20, Paul N. Anderson '21, Christopher C. Carvin '21, Merritt F. Farren '21, Reginald H. Smithwick '21, Thomas M. Taylor '22, and Thomas E. Shepherd '22, has arranged an interesting program for the evening. Among those who will speak are President Maclaurin, Dean Burton, Frank Kanaly and several alumnae. At 5.30 dinner will be served in the main dining room, after which speeches will be in order. Motion pictures pertaining to the different activities will be thrown on the screen in addition to several comic films. The wrestling and boxing bouts are to be staged in the gymnasium, and between the musical clubs and Tech Show a full evenings entertainment will be furnished.

The members of the S. A. T. C. will remember the smoker which was gipen in the mess hall in November when even military discipline could not drive the fellows into the barracks until they were sure that they would not miss anything. Judging by the spirit shown then this smoker is expected by the committee to instill a genuine spirit in the students.

Fraternities will not have dinner in their houses that evening and this will give everybody an opportunity to attend. In order that the committee may know how many men will be present at the smoker, tickets will be given out free of charge in the main lobby and Information Office on Monday, Tuesday and Wednesday of next week. The posters with the red curtains will show all developments and further notices about the smoker.

CREW COACH ENGAGED

"Pat" Manning of B. A. A. Retained — Work on Machines To Start

With over seventy-five freshmen reporting regularly for practice, it is the opinion of many that crew bids fair to become a prominent sport of the class of 1922. It must be remembered however, that most of them are substituting it for physical training. The enthusiasm of the upper classmen for this branch of the sport is not so great, but a fair number are working earnestly. The management urges the upper classmen, especially the sophomores to begin their training now. The latter should remember that their victory over more experienced crews in last year's Spring Regatta, was due entirely to the hard and faithful training of the oarsmen. Numerals are awarded to the winning crew and its manager in this race.

It is expected that, with the engagement of "Pat" Manning of the Boston Athletic Association as coach, especially good crews will be turned out this year. With the large number of men practicing in the freshmen class, among them many good oarsmen, a strong crew from this class is expected. An attractive schedule, which is being arranged, will be announced in the near future.

Plans are under way to have at least three crews from the freshmen class, and more, if the material should warrant their formation. Besides the first eight of this class, there will be a first four, separate and distinct from the eight, as well as a second eight. If the four is of sufficiently good caliber, it will be raced against the fours of the Boston Latin, Huntington, Brookline High, and similar schols. The first crews of these schools are fours, and of such quality, according to their supporters, to furnish competition for anything we can put on the water.

(Continued on Page 3)

CHEMICAL SOCIETY HELD ITS ANNUAL ELECTIONS THURSDAY

Last Thursday the Chemical Society held their annual elections; 133 votes were polled from a membership of 200. Arthur C. Atwater '20, was elected president; Henry R. Couch '20, vice president; Howorth C. Collins '20, secretary; Warren L. Cofren '20, treasurer; Program committee, Erskine D. Lord '20 and Robert L. Turner '20. Usually the elections are held about the middle of February but in view of the fact that some of the old officers of the society are not back at the Institute it was thought best to hold the elections early this year. The Chemical Society at present is as large as it has ever been and has the largest enrollment of any of the professional societies at the Institute.

RIFLE CLUB HOLDS ITS FIRST MEETING OF YEAR

The first meeting of the Rifle club was held yesterday afternoon. Among the new members were a number of men who have been in the rifle clubs of other schools and this new talent combined with that of the old men back points toward an excellent team for this year.

Only three old officers of the club, however. These are A. C. Atwater '20, president; W. N. Morrison '20, secretary; and J. R. Perkins, Jr. '20, captain. New officers appointed to complete the term are J. F. Pierce '21, vice-president and R. H. Skinner '21, treasurer.

Practice will be held every afternoon starting next week in the Cambridge Armory continuing there until the range in the Walker Memorial is completed.

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IN CHARGE OF THIS ISSUE

R. H. Smithwick '21 ..... Night Editor
Henry C. Gayley '22 ..... Asst. Night Editor

SATURDEY, JAN. 25, 1919

THE ALL-TECHNOLOGY SMOKER

THERE will be an All-Technology Smoker held in Walker Memorial on next Friday evening. It will start with a dinner followed by varied forms of entertainment given by members of the Musical Clubs and Tech Show. There will be short talks by members of the Faculty and the heads of the student activities. The whole building will be open for inspection. Such an announcement should be of vital interest to every Technology man.

The Walker Memorial is a Technology necessity. It is the pride of the Alumni who are responsible for its existence. During the War the students were glad to turn it over to the government for military use but now that this is no longer necessary, it is to be put to the use for which it was built.

The Smoker will be the formal opening of the Memorial to the student body and it is only fitting that such an occasion should be marked by a big celebration. The Institute Committee and the Alumni are doing their part. A relatively small attendance is the only thing which could mar its success. There are over nineteen hundred undergraduates enrolled at the Institute. Why not every student make it a point to see that over nineteen hundred attend the Smoker?

WITH RESPECT TO THE MUSICAL ORGANIZATIONS

THE Technology Orchestra, strange to say, is in no way connected with the combined musical clubs. This is the only musical organization at the Institute which is not included in the combination. There is no reason why a combination of the musical clubs with the orchestra would not benefit both organizations. There is always difficulty of arranging a program composed of only orchestral selections which alone will hold an audience whereas a combination of the two would permit much more variety and hence receive better appreciation from the audience. It is not too late for the clubs to get together and consider the matter. A trial concert at the Franklin Square House would certainly be the best way to see how such a combination would pan out.

DORMITORY DANCES THE RIGHT IDEA

THE system of dormitory dances held last year were a great success. They were the only informal Institute affairs of their kind and this is probably the secret of their popularity. There is need however, of extending the matter so as to include the whole Institute and to start a system of ALL TECHNOLOGY DANCES instead of limiting them to dormitory men and their friends.

REGISTRATION INCREASES

Communication Discusses Coming Problem of Institute

The following communication, discussing the problems caused by the expected increase of registration at the Institute, has just been received by THE TECH.

"It is with pride that President Richard C. Maclaurin of the Massachusetts Institute of Technology can say that the registration of the Institute is today the largest in its history, but at the same time he is obliged to present the horns of the dilemma which confront Technology in consequence thereof. There is the alternative of limiting registration or providing immediately for additions to the existing structures. One of these would be unfortunate for reasons presently to be stated; the other demands a surplus in funds which the Institute does not possess.

"As a result of the war, when most other colleges are bemoaning their diminished numbers, the Institute has within its walls today more regular students than it has ever had before at this time of year, and only a dozen less than the maximum registration at any time in the past. The precise number is 1944, and this it is to be remembered is in the absence of practically the whole of the senior class which normally numbers about three hundred. The young men who comprised the class of 1919, by dint of special courses through two summers, received their degrees and placed themselves at the service of the nation before the armistice was declared.

"This plethoric condition is truly extraordinary, but it has its foundations in excellent reasons. In the first place while the importance of a thorough technical education has been more and more evident in the industrial world, the emergencies of war, being so largely along lines of engineering work, have shown to everybody the necessity of attention to engineering training by any nation that is to holds its own.

"One of the most striking facts in the relationships of colleges to the war has been in the numerous and varied demands which the Government has made upon the Institute which at one time was caring for seven or eight different kinds of schools. Another is the record of Technology graduates who were in the war. Fifty-five per cent. of its known living alumni were in military service or in industries closely allied to war, and the numbers were fairly evenly divided between the two lines of duty.

"A second factor to the unwonted and unexpected registration has been the number of young men of the army or navy who have come after attending the special schools of aviation, mechanical engineering and the S. A. T. C. The number of such men, whose lodging places were the drafting rooms of the department of Civil Engineering or the halls of the Walker Memorial has been thousands in all, and many of them were heard to say that when the war was over, they would come to the Institutet to continue the studies of which they had had merely a taste. With every camp that demobilizes and every group of men that is mustered out, some come to Tech to register. This is the reason why one hundred men have placed their names on the rolls during the past ten days, and why ther are more coming.

"Another reason is that more students are coming from foreign countries than ever before. For them the German technical schools are closed and others in Europe temporarily out of commission, so that they turn to the schools of the United States. It is furthermore true that experience has shown that once a country begins sending its young men here, it will long continue the practice.

"Then again, there is the tremendous freshman class, which numbers 864 against a previous maximum of 524. It is of course common experience that there is great 'mortality' in the freshman class. It is natural, since this is generally a period when the methods of instruction change, when the bubble of any easy higher education is burst, but at Technology, it has been found that men from other colleges enter the upper classes in numbers that quite make up for the loss in the first year.

"Judging from past experience, the number of students at the M. I. T. next year will be 2500 and the figure 3000 is in plain sight. The question before President Maclaurin and his associates is plainly, 'What is the Institute to do with them?'

"To understand better the nature of this problem, there should be understood the present capacity of the buildings to care for students. At the time of the planning of the new buildings in Cambridge the registration of students was about 1500. It was the tendency of opinion in those days that rather than make great increases in this number, it would be better to raise the grade; in other words, to turn out engineers more highly finished in smaller numbers. The New Technology was planned therefore for a maximum of about two thousand students. This limit has been reached in what is evidently an upward curve in registration.

"The circumstances of the war make it evident that the training at the Institute is effective, they support the validiiy of the philosophy of the great founder of Technology, Professor Willia Barton Rogers, who set up a new kind of school which in his own words 'is to teach young men by making them do things.' The kind of education has proven successful and there is a demand for it by young men who are assured of this fact. Would it be right to limit the number of students when there are so many to be benefited by it This question is the more urgent since it is upon these men and men of similar training that will rest much of the work of construction and reconstruction in the near future.

"On the other hand, if the Institute is to care for continually increasing numbers of students, it must have more buildings, and more buildings mean today substantial sums of money with which to construct and maintain them.

"Some will be found who will think that the existing buildings are quite large enough even for an increased number of young men. They are however not well informed about the space-demands of modern technical education.

"There are certain subjects, of course, where the professor lectures and the students jot down in unison their notes on it, where a thousand or two thousand might be cared for at once as is the audience at a symphony concert or popular lecture. If the speaker illustrates his talk with experiments, the practical limit of a company that can come within the proper distance for observation is at the utmost maximum about five hundred. If it is question of steam engine work, perhaps ten or a dozen can crowd about an instructor and see him take an indicator diagram, but if the students are young chemists or physicists or taking the courses in biology and public health, each must have his microscope or apparatus, his own sink, perhaps and at all events his own desk and lockers. It is true, therefore, that with increase in students a technical school must have proportionate increase in laboratory space. Thus it is that the Technology buildings, erected for 2,000 students will be crowded with 2,500 and unable to care for 3000, numbers which as has been said are really in sight.

"There are undoubtedly some who will argue that with the village of wooden buildings erected for the army and navy, there ought to be accommodations for more students. It must be remembered that these are at best temporary structures for specific military purposes, and that to attempt to maintain them for permanent work would be costly and unfortunate.

"This, therefore, is Technology's problem. It has expended its funds, those furnished by the mysterious "Mr. Smith," in a fashion that elicits the approbation of every one who visits the Institute. With the funds of three other donors it has established its spacious and practical mining laboratories, a revelation to all who have visited them. It will build the Pratt School of Naval Architecture when conditions and the price of materials will permit.

"Till now the needs of the Institute have been cared for by "Mr. Smith" and the generous alumni and Technology has made no public appeal. Today, however, it has shown to the citizens of the state and the nation its worth. It has demonstrated where it stands as a prime force in engineering education, not of this country alone, but of the world. It is not entitled now to that measure of support from the public which will enable it to continue its fundamental work of giving to young men that well-tried kind of training which has to our country in its emergencies proved to be a tower of strength."

MEMBERS OF CLASS OF 1905 DINE AT BOSTON CITY CLUB

Thirty members of the Class of 1905 dined together at the Boston City Club last Saturday night. Professor Warren K. Lewis of the Institute, who has recently returned from France, was the principal speaker. Professor Lewis gave a very interesting talk on the offensive and defensive use of gas in modern warfare.

Among the other speakers, was Lieutenant Henry H. W. Keith, who told of his work at the Boston Navy Yard. Ensign Francis Hartley, who was at the Technology aviation school told of his experiences here and across. He was followed by Commander Tower who gave an interesting talk on the naval work which is going on at the Institute.

Lieutenant "Billy" Green '06 spoke on the use of mustard gas, and "Hub" Kenway '05, gave a very interesting account of the war work of the United Shoe Machinery Company.

"Ross" Davis '05 was toastmaster. Charles W. Hawkes '05 presided, and Andrew Fisher '05 was in charge of arrangements.

PERSONAL

Lieutenant Donald D. Warner of 175 Humphrey street, Swampscott, Massachusetts and late of the 95th Aero Equadron, has just been awarded the Distinguished Service Cross for his bravery against the enemy in the air, while fighting in France. According to the citation accompanying his decoration, Lieut. Warner, who is 23 years old, "While on a bombing expedition with other planes from his squadron, he engaged in a running fight over hostile territory with a superior number of enemy battle planes from Frauville to Luneville. During the combat his right thigh was badly shattered. In spite of his injuries he continued to operate his machine guns until the hostile formation had been driven off and one plane driven down burning." Lt. Warner was in a hospital abroad for some time, and is now at the Parker Hill Hospital, reported as doing well. Lieutenant Warner graduated from the U. S. A. School of Military Aeronautics at Technology in Squadron 14.

ATKINSON-RUNKLE HOCKEY GAME

The unusually warm weather and the condition of the ice on the Charles River, made it impossible to hold the much heralded Atkinson-Runkle hockey game. If conditions warrant it, the game will be held at one-thirty the same time it was scheduled for last week, this afternoon. The preceding warmth and rain lately, however, make it very unlikely that the game will be played.

TECHNIQUE 1920

(Continued from page 1)

will be elected from the winners of the present Sophomore Business competition.

An Art Competition will be started Monday for one Junior and three Sophomore Assistant Art Editors. The competitions will be held by T. Otiros, the Art Editor, and they will consist of "two" headings" and one full page. The Headings are for the pages "Former Editors of Technique" and "Swimming."

J. H. COYLE '20

The full page is to be "Officers of the Institute." The size of the headings is to be 2x9 inches and the full page is to be 16x12 inches. Both headings and full page are to be in black and white monotone wash. The drawings are due on Monday, February 10th at the TECHNIQUE office or at Rogers Building.

CREW COACH ENGAGED

(Continued from page 1)

It has been learned that there is a movement under way at Tufts to start rowing again. If this materializes, as it probably will, a Technology-Tufts race will offer a splendid opportunity for the start of varsity rowing both here and at Tufts.

Work on the rowing machines will start about the first of February. The machines will be placed in the building next to the track house, which is at present being used for boxing. As soon as Walker Memorial opens, the boxers will move in there, and the machines will be installed. At present, the work consists in running around the track a certain number of times a week.

Announcement is made that "Scoop" Mosserop has been appointed assistant manager of the Technology Rowing Association. Mosserop was formerly manager of the 1920 class crew, and this position is at present open for competition to members of the class. Candidates should report to Manager Daube

Six freshmen have been retained in the competition for second assistant manager of the Technology Rowing Association, as well as for manager of the freshmen crew. These men are Roswell H. Baker '22, Herbert D. Allec '22, George W. Potter '22, Elmer W. Hammond '22, Everett W. Vilett '22, and George P. Anderson '22. At the beginning of the spring, three of these men will be eliminated. The remaining three will compete for second assistant manager of the association, and manager of the freshmen crew.

TENTATIVE VARSITY SQUAD PICKED FOR WRESTLING TEAM

(Continued from page 1)

Dyette has made attempts to secure matches with Brown and Dartmouth among others, but war conditions have prevented the foundation of teams in those colleges. The present schedule includes Andover on Feb. 1st: Boston Y. M. C. A. on Feb. 5th and Clapp Memorial on the 27th of the same month. Several other dates are as yet uncertain.

The team's first public appearance will be at the All-Technology Smoker on next Friday night. Several exhibition bouts will be staged. Captain Freeman stated that more men are wanted for the light weights and over 175 lbs. Anyone who has had experience in wrestling or could conform to these classes should come out and help bring Technology to the fore again on the mat. This applies especially to the upper classmen who would form the basis for a wining combination in 1920.

PROFESSOR FRANKLIN LECTURES TO E. F| SOCIETY

The student branch of the A. I. E. E. held the first meeting of the year last Wednesday evening. President Deal announced the plans of the new officers ad then W. H. Costelloe, '18, who was president of the Society last year, explained some of the aims of the organization. During the winter of 1917-1918 there were nearly 160 members and a reputation of being one of the real live activities of the Institute was attained.

Prof. Franklin of the Institute faculty gave a talk on "Mechanical Analogues of Electrical Phenomena." This lecture was one radically different from the general run of electrical talks which the Society has heard because of the unique manner in which the subject under discussion was brought out by the speaker. The chief manner in which the points of the lecture were made evident was by mechanical devices of several sorts which gave those present a clear view of the various phenomena which take place in and between circuits.

The comparisons which Professor Franklin carried on throughout the lecture were between the properties of eletrical circuits and those of mechanical apparatus. Among these, inductance was represented by inertia, electromotive force by mechanical force, and capacity by elasticity. Those formulae which are used in mechanical work are thus found accurately applicable to electrical measuration of all types. This possibility of the interchangeablity of mechanical and electrical formulae has made feasible the solution of many practical problems which have been considered impossible mathematically. One example of this may be seen in the manipulation of triple circuit formulae, a feat hitherto considered mathematically impossible, but which Professor Franklin has made simple by the direct transference of mechanical observations to electrical figuration.

One very astonishing experiment carried out by the lecturer was the practical demonstration of the current lag and advance affected by the introduction of inductances and capacities into a circuit. A telephone conversation and the transmission of a telegraph message may be affected over the same wire at the same time by means of a parallel connection of a telephone receiver in series with a capacity, and a telegraph sounder in series with an inductance. This feat is made possible because there are sent over the single wire two non-interfering cururents, a high frequency high voltage one, audible only in the telephonoe circuit, and a low frequency low voltage one, affecting only the telegraph circuit. Professor Franklin illustrated this feat by a mechanical device having springs in the place of capacity, weights in the place of inductance, and the force exerted by his arm in the place of the electromotive force. By varying the tension on the springs nd the amounts of the weights, and by exerting the force in a steady or jerky motion to illustrate the frequency, the vibration on different parts of the apparatus could be altered at will. This method of communication is used at present on the Pennsylvania Railroad with great success.

The principle of the transformer was also brought out very strikingly by a long metal rod with a fixed iron weight near to one end. One of the men of the society held the end of theshorter lever thus formed while Professor Franklin held the end of the longer lever. Putting but very little force upon the long lever while swinging it through a large arc, Professor Franklin showed how the weight acted as a fulcrum due to its inertia, and caused the short lever to be moved in a very short arc but with considerable force, enough to even twist the student from his balance. The length of the arc portrayed the poltage and the force of the twist on the end of the lever showed the current. When the load was removed, that is to say when the short lever was held stationary, the end of the long lever could be swung through only a very small arc with great difficulty, corresponding to the slight current consumed to magnetize the transformer.

Other mechanical analogues of electrical circuits, as these devices are called, illustrated the variation of inductance and capacity to obtain resonance, the transference of energy in coupled circuits and the action of the quenched spark gap in wireless telegraphy. The last is a very practical device, much used in commercial wireless communication, and proved to be of great interest.

At the conclusion of Prof. Franklin's talk President Deal again urged all men present to get their classmates in Courses VI, XIV, and XV-2 to join the society and go to the meetings and on the trips. After the meeting refreshments were served.

INTERFRATERNITY BOWLING

The Alpha Tau Omega bowling team started a successful season by defeating the elta Upsilon team by the score of 3-1, the systee of scoring being through three team strings and the high team total. As an initial performance, the match was very well bowled and the team gives promise of being very successful in future interfraternity competition.

It is hoped that interest can be aroused among the other fraternities and the Alpha Tau Omega team issues a challenge to any fraternity team. All teams accepting this challenge should immediately get in touch with Manager Butler '22.

ENGINEERS DURING THE WAR AND AFTER THE WAR

Col. R. E. B. Crompton, in his recent presidential address to the Junior Institution of Engineers in London, England, discussed "What the War Has Done for Engineers, and the Part Engineers Have to Play in Reconstruction." He said that the war demands had greatly improved the status of the engineer in every department, whether it had been in the designing of new forms and of the organization of the manufacture of munitions, or their transport and utilization in the fighting line; in all of these the engineer had more than held his own. One year of war showed that nine-tenths of the work was essentially the work of the engineer. In every department of Government work, engineers found themselves forced to the top, their advice eagerly taken, and in all the great branches of engineering the natural leaders of engineering took their proper position as administrative heads of departments. The status of engineers in regard to the body politic had reached a point which it would have taken many years to reach if it had not been for the war. The war had been the crucial test between the workers and the talkers, and here, at any rate, the workers had won.

In considering the work to be done in connection with reconstruction, Colonel Crompton placed first in order of importance road construction, and this led on to the vehicles using the roads. He referred to the saving that could be effected by using road trains on the Renard principle, if and when the Government extended the electric supply to the whole of the rural districts. If and when road vehicles could be driven by power derived from a side wire by a trolley pole, very great economy and low dead weight of the propelling vehicles could be obtained, as the weight of the electric motor and its gearing was much less than that of the gasoline engine with its supply of fuel and cooling water, or in the case of the steam unit of the boiler and steam engine.

Colonel Crompton said his cost advanced idea was that it would be wise to develop the use of electrically driven road trains each train consisting of four three-axle vehicles. It would be possible to load each of these axles to eight tons, or a total moving weight of train close on 100 tons, without the road crust being stressed in excess of what was now the case when a motor truck, with back axles loaded to eight tons, passed over it at the same speed. The speaker said that he did not propose to avail himself of such extreme figures, but he thought that the subject of road trains, combined with electric driving merited careful consideration.

NOVELTY ACTS CHOSEN.

"Charlie" Parsons '19, and Others to Give Specialties.

The Combined Musical Clubs have shown considerable activity this term, and if they keep it up, will be in fine shape for their first concert, on February 1st. The Banjo, Mandolin, and Glee Clubs have been practicing twice a week from five to six, and it is to the credit of the members that very few have missed the rehearsals.

Last year the Banjo Club was considered excellent, and it is the opinion of many that this year's body is even better than last year's. The management is very pleased with the manner in which the members have settled down to work.

The Club's season starts off this year with the Franklin square concert. The program will consist of two numbers from each of the different divisions of the Club. In addition to this there will be specialty acts of excellent quality. Lawrence W. Conant, '21, last year's reader will put on two novelty acts one of which is to be a costumed impersonation of Harry Lauder. The services of Charlie Parsons, '19, of Tech show fame, C. L. Eksergian '20, W. T. Hedlund '20, and W. B. Purington '20, have been secured for specialty acts that are to be staged during the season.

Regarding the business side of the matter, there are six men left in the competition for assistant manager. The decision will be made and the successful candidate announced before the annual Spring Concert which is the big event of the Club's year.

USE OF SPECIFICATIONS IN PURCHASING OF COAL

Engineers differ as to the specification to be used in purchasing coal. Some favor a system of bonus and penalty on ash basis only; others favor a system on B. t. u. basis only. Much can be said on both sides, but undoubtedly the safest system is a combination of the two. With such a system, a proposal is made by the contractor, stating price, B. t. u. and ash content. Samples are taken each day of the coal furnished and a bonus is paid for B. t. u. content exceeding stipulation, the bonus being the same percentage of contract price that the excess B. t. u. is of the specification value. A corresponding deduction is made for coal falling below the specifications and in some cases a lower limit is set below which the coal may be refused at the purchaser's option, with the further stipulation that continued failure to supply coal within the specification limits will forfeit the contract.

For each per cent which ash falls below analysis a bonus is allowed. Generally an increase of 2 per cent in ash content is allowed without penalty, above 2 per cent a penalty is deducted according to a sliding scale.

It is only possible to be sure that the coal is being bought of fairly uniform charateristics by making an analysis of it as delivered. Two carloads of coal may look alike but the same may vary 10 per cent or more in B. t. u. and a difference of 10 per cent makes a difference of from 8 to 10 per cent in the value of the coal.

All those power plant operators not in a position to make an analysis of the coal themselves have to do is to put an empty barrel in the boiler room and have the fireman throw in a part of a shovel of coal four or five times a day. At the end of a week or a month this coal should be taken out, mixed thoroughly, quartered, mixed again and quartered, until reduced to a size suitable to forward to the nearest testing laboratory. By mixing it, a representative sample, which will indicate pretty accurately the grade of coal that has been burned, will be obtained, and from this the efficiency of the boilers can be determined.

In entering upon a contract it should be remembered that the important items to be considered in the specifications are:

(1) A statement of the amount and character of the coal desired.

(2) Conditions for delivery.

(3) Disposition to be made of the coal in case it is outside the limits specified.

(4) Correction in price for variation in heating value and in moisture and ash content.

(5) Method of sampling.

(6) By whom analyses are to be made.

In conclusion, it is not easy to select the proper coal for any given plant. But there is no factor in power plant operation which will so well repay proper attention.

REFRACTORY MATERIAL FROM BAUXITE

At the Sheffield meeting of the Refractory Material Section of the Ceramic Society, a paper was read by Dr. A. Bgot on "Corindite" which is described as a new refractory and abrasive material. Corindite is obtained by heating a mixture of bauxite and anthracite in a cupola, the heat developed by the reaction being such that the mass fuses in successive layers. The point of fusion of corindite from French white bauxite taken from the War Department is 1950 degrees C, a point higher than the melting point of the bauxite. The crushed corindite, according to the Chem. Trade Journal, 62 (1918), 431, is mixed with refractory binders, finely pulverized, such as bauxite, kaolinic clay, etc. Binding of the material with such bases as lime, magnesia, and calcined dolomite must be avoided as these lower the fusing point of the mixture. The corindite can be suitably moistened and mechanically mixed and is then employed as an ordinary refractory mixture for making firebricks. The dried bricks are baked between 1350 degrees C. and 1400 degrees C. and undergo no shrinkage. Between 1700 and 1730 degrees C. they lengthen by about 0.5 per cent. Above 1750 degrees C. they begin to undergo a shrinkage attaining 3 per cent at 1850 degrees C. The porosity depends on the mechanical composition of the mixture and on the compression it varies from 9 to 12 per cent. The product is said to be three and a half times more resistant to wear than good magnesia bricks. Refractory products based on fused bauxite are attacked by slag and scoria in the same way as refractory matter made from iron-fused bauxite. The action of slag and scoria is being investigated but results are not yet completed. Tests have been carried out with white bauxite from Ireland and these seem to give as good results as the French bauxite in many respects, but refractory power is a little less, due to a smaller proportion of alumina in the Irish bauxite.

THE FIFTH LIBERTY LOAN.

President Wilson, in his message to Congress on December 2, pointed out the necessity for another government loan.

He said that an immediate rapid decline in the expenses of the government is not to be looked for; that contracts for war supplies will be rapidly canceled and liquidated, but their immediate liquidation will make heavy drians on the treasury; that the maintenance of our forces in Europe is still necessary; a considerable proportion must remain there during the period of occupation and the transportation and demobilization of the others will be a heavy expense.

As Secretary McAdoo stated months ago, peace must be financed as well as war. Bringing back our soldiers from Europe at the rate of 300,000 a month will mean many months of maintenance of them at great expense. We know something of the cost of mobilizing an army of millions. Demobilizing such an army is also an expensive process.

Although peace is here, we are far from living in ordinary times and the nation faces and must meet extraordinary financial and other demands. The revenue of the nation from taxation will not be sufficient to meet these demands, large as those revenues will be. Once more the people of the nation must finance the nation with a loan.

The whole world is in process of rebuilding. Nations must be reconstructed as well as cities and villages rebuilt. The duties we owe ourselves and our associates in the war against Germany must be performed. The new conditions must be met by the United States government as well as by the individuals of the nation.

SUBSTITUTE FOR SHELLAC

According to the Z. angew. Chem. it has been found that naphthol resin can be used as a substitute for shellac and that the products of condensation of a and b-naphthol have a number of characteristics in common with shellac, such as capacity for taking a polish and suitability for use as an alcohol varnish, and as an insulating material. The substitutes are particularly useful if the residues are cleaned by filtering from an alcoholic solution, the alcohol being distilled from the filtrate.

CHEMICAL WARFARE RESEARCH.

The Bureau of Mines started a research laboratory in gas warfare about a year and a half ago. On July first, 1918, that was taken over by the War Department, but the organization as it stands at present is practically the same as that developed by the Bureau of Mines. The outward signs of the change are that Major General Sibert is the official head instead of Mr. Manning, and that Mr. G. A. Burrell is now Colonel Burrell. On the other hand, Dr. E. P. Kohler, who had charge of all the offense problems, holds the same position in the new organization without having put on a uniform.

The term "war gas" is a flexible one. The substance may be a liquid, a solid, a vapor, or a true gas. However, it must have some pretty striking characteristics; it must be poisonous; or produce tears (lachrymatory); or must give rise to nausea, sneezing, or blisters: have a foul smell, though otherwise harmless; or be a smoke with obscuring powers. Of course it may have any or all of these properties combined. Under any of these circumstances we call it a war gas. It must also have certain other characteristics. It must be pretty good in its class. Nowadays no one would consider as a toxic substance anything which did not kill dogs in thirty minutes at a concentration of 1 mg. per liter. It is that effective concentration which is overlooked by people who suggest new gases or methods of using old ones. In the case of lachrymatory substances they should be effective at concentrations as low as 0.01 mg. per liter. The best are much better than that.

Another determining factor in the use of any gas is the availability of raw materials. Where thousands of tons may be needed, there is no use in considering a substance of which the available output per year is a gram, a ton, or a hundred tons.

A good method of manufacture should be at hand. If the substance is good enough, it will be made by any method, however wasteful; but this is not true in most cases. I could cite an instance where a substance would be used if a good method of manufacture were available. The present method of making this substance is so wasteful that its good qualifications do not counterbalance the disadvantages, and it is not used either by our Allies or by ourselves.

A substance must be stable, or fairly stable. It must not polymerize rapidly, hydrolyze too rapidly, be too inflammable, or go to pieces on detonation. Our problem is different from that of the Allies because the Allies can use their material within 2 or 3 months after loading the shells, whereas in our case shell loading here must take place from 3 to 6 months before firing, and consequently our limits as to stability against polymerization must be more rigid than those of the British and French; and as a matter of fact the French are using certain substances which we shall not use, just because of those conditions.

How do we start with any given substance. We may take a substance already used by the Germans or the Allies, or we may get a suggestion from outside, or the staff may think up something from a search of the literature, from analogy, or from pure inspiration. Then steps are taken to see whether it can be considered as a toxic substance. First, the Offense Research Section, under Dr. Lauder Jones, makes the substance. If it is a solid, it is sent to the Dispersoid Division, Dr. R. C. Tolman in charge, and they work out methods of disintegrating it.

When this is done, or if it is a liquid or vapor, it is sent to the Toxicological Section, Dr. A. S. Loevenhart, and tested to determine degree of toxicity, concentration producing lachrymation, or any other of the delightful characteristics. If their report is favorable, the substance is turned over to a number of different sections.

The Offense Research Laboratory works to improve the laboratory method of making. After they have worked this out on a laboratory scale, the substance is turned over to the Chemical Production Section, Mr. W. S. Rowland, and they work it out on a larger scale, from 50 pounds to a ton, depending entirely on the nature of the substance. It then goes outside of the Research Division, either to Large Scale Production (Colonel Dorsey) for further development, or direct to Colonel Walker, at Edgewood, for commercial production either there or to be assigned to some manufacturer somewhere in the country. While the Offense Research Section is working out an improved laboratory method, the substance is sent to the Analytical Section, under the charge of Mr. A. C. Fieldner. They develop methods for determining its purity. They also analyze mixtures in air. It is sometimes difficult to determine substances at the dilution in use. They also make tests to find out whether the canisters will stop the substance.

It is also sent to the Pyrotechnic Section under Mr. G. A. Richter to determine stability when fired in shells, that is, whether it goes to pieces under the detonating charge.

At the same time the Defense Research Section, under Dr. A. B. Lamb, is working to determine whether any change in the ingredients put in the canister is necessary. If the substance is not absorbed, some new mixture or compound must be developed which will stop it. This Section also takes up the question of methods of detecting toxic substances in the field. That might be considered to be a problem for the Analytical Section, but our whole system is pretty flexible, and as a matter of fact that work has been done by the Defense Research Section, of course working in cooperaion with the Analytical Section. The Defense Research Section also develops ointments to protect against the effect of the action of the toxic or blistering gases of the skin.

At the same time the substance will be referred to the Mechanical Research Section under Mr. Fogler, because a change in the ingredients may make it necessary to change the type of canister. That becomes important if dealing with smokes instead of vapors. The question of protective clothing may have to be taken up.

The defensive results are then transmitted by Dr. W. K. Lewis, of the Institute in charge of all defense problems to the Gas Defense Division, which is not a part of our Division, but is under Colonel Dewey, and has charge of the commercial production of all defense materials.

While all this is being done, the same substance is sent to the Pharmacological Research Section under Dr. E. K. Marshall, and they study the question of the effect produced and the general question of susceptibility. Certain men may be 100 times as susceptible as are other men. It is very desirable to make preliminary tests, and to keep out of the factory men who are extremely susceptible, because they are sure to be casualties.

The substance is also studied by the Pathological Section under Dr. Wintern-itz, and they go into painful details as to the way in which the various organs are attacked by war gases.

At the same time it is sent to the Therapeutic Section under Dr. Underhill, of Yale, and they take up the desirable but very difficult task of finding methods of treatment to revive men who have been gassed more or less severely.

While all this is going on, all these various sections are making reports twice a month on all the substances that they are working with, so that there is an enormous amount of pseudo-literary material piling up. All of this material comes to the Editorial Section, of which Lt. Col. Bancroft is in charge. They condense it as much as possible, and get out semi-monthly reports, which are sent to a selected list of people in this country and abroad. These reports deal with many different topics, and if someone wanted to look up about a certain substance he would have a fearful task ahead of him. Consequently, as fast as possible we are writing monographs on each particular gas, canister ingredient, etc., which shall contain everything that is known in the literature, everything that we have been able to get from the Allies or from captured German reports, and everything that has been done in this country. We hand out the desired monograph to the inquirer, and tell him to read it. Of course he does not do it, but the thing is indexed pretty thoroughly, and he can look over the various sections which interest him more particularly, and thereby post himself on what is known in regard to that substance in a relatively short time. In this way the information in our files is made fairly accessible.

Now this whole system of handling toxic substances is a very flexible one. Whenever necessary we increase or decrease the number of sections. At one time Dr. J. F. Norris was in charge of all the chemical research. That grew to be more than one man could possibly handle. The Offense Research was left under Dr. Norris, and the Defense Research was given to Dr. Lamb. Since other sections were interested in the offensive work, it became necessary to tie things together again, and Kohler was put in charge of all the problems of Offense.

We began with one Physiological Section. Now there are Pharmacological, Pathological, and Therapeutic Sections, and the Pharmacological Section has recently been subdivided into testing and research.

The Mechanical Work was split into two sections. When conditions changed, this work was put back into one section. Any section can be changed or rearranged in any way desirable to get results, and this has worked well in practice.