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Vol. XVII JUNE, 1908 No. 9

THE ROSE TECHNIC

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THERE have been recently brought to our notice, certain transactions by the Alumni at their annual business meeting with reference to THE TECHNIC. It is certainly with genuine pleasure that we note any increase of interest displayed by the Alumni in THE TECHNIC for, to be candid, we do not think that they have overdone their part of late years.

At the last TECHNIC business meeting of the past year, when the staff for the coming year was chosen, there was quite a discussion in regard to making a change in the general style of the paper. For various financial reasons this was deemed inadvisable by a majority of the staff, so the matter was dropped. Later, we have learned that the Alumni also, are against any such change.

For the benefit of many of the Alumni who are probably not very familiar with the conditions in school at the present time we would like to bring a few of the following points to their notice.

In a school of the character and class of Rose, one, in which all stress is laid on purely technical subjects, one in which no attempt is made to direct the student's mind towards any thing not strictly allied with his own course, we believe that an effort should be made through the school proper, if no where else, to interest the student along lines that are not essentially those taught in school. The technical character of the paper need not be left out entirely but only sufficiently to produce some change between the students school interests and outside interests. You immediately say that an engineer's school and outside interests should be identical, but when this becomes true the engineer becomes a very one-sided character, indeed.

The Alumni say that we must not let THE TECHNIC lose its value as a scientific journal, yet I fail utterly to see why we should attempt to trespass on a field that is already covered by the many and excellent engineering publications of the present day. Would it not be much better to publish a paper devoted to such school interests as athletics, Y. M. C. A., orchestra and others chool affairs. Retain a Reviews Department to serve as a guide to the current periodicals if you would not drop the technical part of your paper entirely. From the standpoint of a student, I am certain that such a paper would be vastly more popular throughout the school than THE TECHNIC is at present.

Last year there were about one hundred Alumni that paid in subscriptions at the rate of one dollar each, whereas there were some two hundred and twenty student subscriptions paid from the student's fund at one dollar and a half a piece. Of course we will admit that we receive the money from the students themselves, whether they like the paper or not, and that the Alumni will not respond with subscriptions if they do not like the paper, but it does not seem to me to be a square deal to publish a paper for the Alumni at the expense of the student body.

HIGHER EDUCATION FOR UTILITY AND CULTURE.

By CALVIN M. WOODWARD.

Commencement Address delivered before the Class of 1908.

THE early Universities came into being as a part of the grand revival which prevailed in Italy, Germany, France and England in the 14th and 15th centuries. They were the joint product of Protestantism and the art of printing. The former declared it the privilege of all to read the New Testament and the Fathers in the original Greek and Latin. The art of printing laid open to the world all the treasures of ancient learning.

Oxford and Cambridge sprang into notice about the year 1300, and for some four centuries they were the recipients of repeated gifts and benefactions from the rulers and the nobility of England. As the Universities grew the course of study slowly expanded. In the beginning they were largely Latin Grammar Schools for monks aud priests. Even in Queen Elizabeth's time Oxford was little more than a Divinity School. Undergraduates were 14 or 15 years of age, and often younger. The *Trivium* leading to the degree of Bachelor of Arts consisted of Latin Grammar, Logic and Rhetoric. There was no Greek until the time of Erasmus, in 1511. Even a Latin version of Aristotle's Logic was used.

Having completed three years in the study and practice of Dialectics, the student became a Bachelor of Arts and "incepted" or "commenced" the four years of study of the *Quadrivium* which led to the degree of Master of Arts. The ceremony of Commencement took place naturally at the beginning of the fourth year, when the student received his first degree and entered upon the higher course of study. The Master's degree was conferred at the end of the 7th year. You will observe that we have ratained the name "Commencement" to mark the termination of the first course, and not at all to signify the beginning of the Master's course; and that the ceremony is held at the beginning of the summer vacation instead of at the end, as formerly.

The *Quadrivium* included: 1. arithmetic, or the science of numbers (there was for three hundred years afterward no algebra, no trigonometry, no analytic geometry, no calculus); 2. geometry, i. e. Euclid and maps, which included all the geography that was known; 3. music; 4. astronomy, as taught by Ptolemy.

No poets or orators were studied at Cambridge until the early part of the 16th century. Their introduction was due to Erasmus, who came to St. John's in 1511. During the Chancellorship of Thomas Cromwell in the reign of Henry VIII, it was ordered that undergraduates should be instructed in Logic, Rhetoric, Arithmetic, Geography, Music and Aristotle.

In 1549 the *Trivium* was changed to Mathematics, Dialectics and Philosophy; the *Quadrivium* to more Philosophy, Perspective Drawing, Astronomy and Greek.

Such was the course of study, that for centuries constituted the education of the generous youth of England who were destined to fill the places in the church, to become barristers, physicians, or gentlemen of leisure. For such and such only was education supposed to be necessary.

In his famous Tractate on Education, written 24 years after the landing of the Pilgrims on Plymouth Rock, Milton wrote only for the rich and those of noble birth. He advised the study of the Poets, Orators, Historians, and Philosophers of Greece and Rome. There was little else for them to study. There was no Science, for the speculations of Aristotle in regard to Physics and the constitution of matter were unworthy of the name of Science, though they blocked all scientific progress for over a thousand years. English literature did not exist. Modern Mathematics is the product of the last 200 years. Milton himself followed in the tracks of Virgil, as Virgil has followed in the tracks of Homer. "Paradise Lost" was modelled after the "Aeneid," and "Lycidas" closely resembles one of the "Bucolics" of Virgil.

Milton wrote and sang for the few. The great

bulk of the English people, the farmers, the sailors, the tradesmen, the manufacturers, the builders of houses and ships, had no education and they were supposed to need none. Popular, universal education, as we understand the term, is less than 40 years old in England. During all these years while England has been growing immeasureably great, Cambridge and Oxford built on the lines I have described. They had a monopoly of the education of the English ruling and property classes. No men trained differently were brought into competition with them, and hence the claim that is often made, that the greatness of England's great men is due to the fact that their training was classical rather than scientific is extremely illogical. No one denies great intellectual value to ancient as well as to modern classics, but we have learned that men may be educated in more than one way; that tne old road is a long road, a comparatively dull and uninteresting road; a road blocked up by dead issues, ancient ruins, over the graves of extinct nations, and through an atmosphere redolent with the airs of antiquated myths. The classical period was a civilization of art and luxurious culture based on conquest and human slavery. And such as I have described was the old university, and such in a thousand institutions is the ideal today. But all such must be classed with the ancients. It is their glory to be old, as the age in itself was a virtue.

I visited an endowed school in Manchester, England, a few years ago. It was hundreds of years old. It had its ancient halls, its ancient studies, its impassable fence, and its locked gate. But gradually its style of household furniture had become transformed. A modern kitchen, a new dinner service, carpets and chairs reminded one of modern life. Then the craze for antiquity swept over the Board of Management and they decided to put the school back two hundred years and to return to the style of living in "the good old times." Out went the carpets, the cooking stove, the dining table; off went the table cloth and modern spoons and forks; modern chairs, napkins and plates. The pupils adopted again the ancient dress; they cooked on spits and behind tin ovens over open fires in huge fire places; they sat on benches without backs, at a rough oak table above a stone floor, and ate from pewter plates and drank from pewter mugs. Grace was said in Latin before and after meat. I assure you it seemed to me like a grand burlesque for the presentation of which a hundred little boys were being trained to act their parts.

In striking contrast with all this reminder and mockery of antiquity, was a modern manual training room with the best of modern tools and appliances. This latter was the gift of an enthusiastic friend who thus redeemed and modernized the entire school.

Up to 60 years ago honors at Cambridge were awarded only in Classics and Mathematics. In 1848 two new triposes were established, viz.: In Moral Science and Natural Science. Then came the Law Tripos in 1858, the Historical Tripos in 1872, the Theological Tripos in 1874, the Semitic Languages Tripos in 1878, the Indian Languages Tripos in 1879, and the Modern Languages Tripos in 1886.

The introduction of the study of Elasticity into physical and engineering problems marked a great advance. Up to the middle of the last century, teachers and writers reasoned about solids as though they were rigid bodies. The ultimate strength of a bar or a beam, was the only thing considered. The laws which pertain to internal stress were unknown and hence ignored. The distinction between external and internal forces in a structure or a mechanism strangely enough marked the difference between pure science and applied science or engineering. What would bridge engineering, mechanical and electrical engineering be without the doctrines of internal stress, and elastic limits?

During the last few years Mechanical and Electrical Engineering have gained a foothold in Cambridge and recently they have been placed on a permanent footing. A manual training shop has even secured recognition among the "modern side" people of Cambridge.

However, these novelties are not parts of any

of the constituent colleges; they are on independent foundations under the immediate wing of the University senate. The vast majority of the University work is still non-technical, and it is destined to remain so for many years to come.

Higher education in the United States started on a somewhat different plane and it has a very different development. When Harvard College was started 260 years ago, it was a feeble imitation of one of the Colleges of Cambridge University in England, and where John Harvard had been a student, but there was in every New England village a school where the rudiments of an education were accessible to all. In those days Harvard College was what would now be called a classical high school. It was pre-eminently a school for the preliminary training of ministers of the Gospel and for lawyers. It was Latin, Greek, Mathematics, Logic, Rhetoric, and Metaphysics from first to last. The course of study had not changed in character very much when I was a student there 50 years ago, but a wonderful transformation has now taken place.

With growth of cities has come a great change to new and more technical occupations. But these vast changes in the way we build our houses and furnish them with light, heat, and water; the way we travel and send messages; the way we send our products abroad, and bring to our doors food and clothing, books and works of art—all these have come about through the application of established scientific principles in the realms of mathematics, physics, chemistry, graphics and mechanics; and the popular demand is that these technical matters shall be introduced into our educational system.

The study of materials; the study of the laws of construction, the distribution of forces, the analysis and limits of internal stress, the transformation and utilization of energy; the study and use of exact methods and instruments of precision; the elements of drafting, shopwork, and essential features of prime movers;—all these studies have made this progress possible, and they promise yet greater progress, if the proper education is furnished.

We are at last beginning to understand that the education that is to be universal should be a very different thing from the education of a privileged few. The new education which dominates the modern colleges and universities aims to train men to high efficiency along all lines, practical, theoretical, as well as artistic and spiritual. The old procrustean bed on which all were stretched or trained to the same course of study has been banished, never to return. The characteriftic feature of the new University is freedom of choice and thoroughly practical treatment of the chosen branches.

I told you how the English Univerities had slowly extended their courses of study. We in America have advanced much faster. All the great universities offer hundreds of so-called "courses" constituting from 10 to 20 separate lines of study covering four years each, along the technical as well as literary lines. This victory for the technical branches has been won only by long and fierce fighting. The ancient traditions die hard. They have the prestige of age, glory and a vast following. They have enjoyed the right of possession from the time of Plato, who said that the practical arts were degrading.

According to Milton engineering antedates the creation of the world, for it existed even before the celestial revolution and the defeat of Satan on the plains of heaven. Memnon was the first chief engineer and architect. Hence we find Memnon among the fallen angels. Says Milton:

> "Memnon the last erected spirit that fell
> from heaven * * * * *

He constructed the masked battery of deep-mouthed cannon which mowed down the angelic squadrons by thousands, still he did not escape,

> "By all his engines, but was headlong sent
> with his industrious crew to build in hell."

The great characteristic of modern scholars is their mutual sympathy and respect. All true and thorough scholarship is noble, dignified and high, and all true scholars respect and recognize each other. One scholar reads the words and studies the ways of men who lived 2,500 years

ago. Another reads the books of nature and studies the ways of life as it exists on the face of the earth today, or he takes the "Testimony of the Rocks." Another reads the language of force and motion and imperishable energy, and studies the phenomena of physical action and reaction. Still another studies the arts and homes, and activities of modern life, and grasps the conditions and searches for the means of progress, and so promotes the advancement of social and individual welfare. Every one must respect every other one; we must encourage and foster all. So long as our aims are high and noble, so long as no motives are sordid or low, we can live together like brothers, and be companions in zeal.

Our best preparation for the future is a mastery of what has already been achieved. Our undergraduate period should be devoted to the study and mastery of established truths and accomplished facts, as embodied in language, literature, and the achievements in the arts and sciences. As Matthew Arnold put it: "The student should study the best that has been said and done in the world." I like Arnold's statement exceedingly, if I can only make it broad enough to include the wonderful results of applied science during the last 100 years. I am one of those who believe in progress, in the superiority of our own age; I regard the conquests over matter and force through intellectual processes of the highest order, as among the best things that have been done in the world, and I include what has been discovered and well established in the realm of natural history and applied art, as well as in the realm of ethnology and sociology. The world has been slow to accept the dignity of a scholarship for service. The old idea of culture was, not that which enables one to accomplish something for others, but that which was valued for what it was supposed to accomplish for one's self, — as Emerson puts it.

It is interesting to note how strong and enduring has been the prejudice against any scholarship that was suspected of being useful. Plato considered Geometry as degraded by being applied to any purpose of vulgar utility. He declared that the construction of machines on mathematical principles was reducing a noble intellectual exercise to a low craft, fit only for carpenters and wheel-wrights, i. e., for the white slaves of Athens. He held that the science of Mechanics was unworthy of the attention of a philosopher. For nearly 2000 years the brightest minds of Greece and Rome scorned utility, and they discouraged all studies which aimed "to add to the comfort or alleviate the calamities of the human race." Macaulay says (in his Essay on Bacon) that Seneca was indignant that Democritus was praised for having invented the arches which supported the roof of the temple. He maintained that Philosophy has nothing to do with teaching men to rear arched roofs over their heads. The true philosopher, he said, does not care whether he has an arched roof, or any roof. Philosophy has nothing to do with teaching men the use of metals. She teaches us to be independent of all material substances, of all mechanical contrivances. Instead of attempting to add to the physical comforts of his species, Seneca regretted that his lot was not cast in that golden age when the human race lived in caves and dressed only in the skins of animals. To impute to such a man any share in the invention or improvement of a plow, a ship, or a mill, is an insult. "In my time," says Seneca, "there have been inventions of this sort, transparent windows, tubes for diffusing warmth equally through all parts of a building, etc., but the invention of such things is drudgery for the lowest slaves. Philosophy lies deeper. It is not her office to teach men how to use their hands."

Bacon set out deliberately to overthrow the influence of Greek philosophy as regards usefulness, and with unequaled force and skill proclaimed the dignity and nobility of useful studies, and of service to humanity. I feel sure that the spirit of service through the discovery and presentation of scientific truth lives and thrives in this institution, and that nevermore will it be necessary, at least in America, for a man of science to apologize to the world for making his

discoveries and inventions useful to mankind.

It has taken many centuries for the world to discover that the great forces of nature are neither sacred nor profane, neither kind nor cruel, that they neither love nor hate, and that they are more unchangeable than the stars; that shrines and temples, priests and priestesses, tripods and oracles have been in vain except so far as they reacted upon the human heart and satisfied its natural craving for the worship of a superior Being. Instead of building a temple to the far-darting Apollo or to Zeus the Thunderer, we now stretch over our cities a net-work for artificial lighting; and all the winds that blow and all the waters that flow are made to furnish their tribute to our comfort and pleasure. We tap the sources of endless energy and transmit it through all the ramifications of our social order, relieving mankind from heavy burdens and creating hundreds of occupations hitherto all unknown.

"Out of this vast extension of the horizon of human activities, and this multiplication of occupations, has come an imperative demand for tecbnically educated men. In our industrial system the crying want has been, and is, for men who can both plan and execute. Hence a score of professions unthought of 100 years ago, have been called into being, and the standards of these new professions are intellectually not one whit lower or less humane than the old. This demand for trained men of action has been followed by only a partial supply.

"The first engineering course in the United States was organized at Troy, New York, in 1835. The Sheffield Scientific School of Yale was established in 1847, and the Lawrence Scientific School of Harvard in 1848. Both of these schools organized engineering courses a few years later. The Massachusetts Institute of Technology was opened in 1865. Courses of Civil and Mechanical Engineering in Washington University were inaugurated in the Undergraduate Department in 1869. Rose Polytechnic Institute with its five technical courses was opened in 1883. There are now engineering courses in every State in the Union with equipments and appointments of every grade and quality.

"I wish to say a few words about Archicture and Engineering, your most noble arts: 'The first dates back from beyond the Christian era; the others are the product of modern scientific progress, a union of mathematical analysis and intimate knowledge of the materials of construction and the laws of electricity. Architecture has always been regarded as one of the fine arts, and in ancient times skill in archicture and in sculpture were usually combined. The builder of the Parthenon, "the hand that rounded Peter's dome," and the architect of St. Sophia, have earned immortal fame for exquisite skill and refined taste.

"For centuries the only building materials were brick and stone, and the styles were limited to constructions which relied almost wholly upon compressive stresses. It was a daring innovation when in 1851 the gardener of the Duke of Devonshire was called upon to construct for the first World's Exposition a crystal palace of iron and glass. Since that time the introduction of material whose strength in tension and compression is practically the same, has added immensely to the scope and the possibilities of architure.

"This is the Age of Steel, and the demands upon the architect are something amazing. He must be both an artist and an engineer. I recently spent a morning inspecting a modern first-class hotel in New York under the guidance of the supervising architect. Before I got through I concluded that there was a liberal education embodied in that building. There seemed to be nothing which the architect must not know, and know well. He must know thoroughly the nature and limitations of his materials. He must be able to apply mechanical analysis to every detail of the structure, whether foundations, columns, arches, trusses or girders. His building must combine stability, comfort, fitness and grace. He must study the laws of light, heat, and the transmission of power. He must be familiar with the best usage as regards the supplies of water, gas and electri-

city, and the best methods of purification and drainage. A modern hotel kitchen is a wonder, and a hotel laundry is almost a work of art. The architect must be many kinds of an artist; and last but by no means least, he must be a man of refinement and literary culture.

Refined taste and good judgment come only from study and comparison. So our architect must be familiar with the ancient types, but he must not be their slave. The classic beauty of Greek temples, the awful grandeur of the English cathedrals, and the towering splendor of Cologne must serve but to lead him to the essential architectural features of an age which is more and more building in steel. The structure which shares with Notre Dama the admiration and wonder of every visitor to Paris today, is the steel tower of Monsieur Eiffel. Of course it breaks nearly every canon of the old masters, but it lays down some of the laws of a new style to which a new material gives timely birth. Gustave Eiffel was no accident, no sudden growth, no inspiration of the moment; he was already the most distinguished engineer in France. He had built hundreds of steel bridges before he set out to design the most remarkable architectural structure of the century.

"How naturally I have been carried over from architecture to engineering. How closely allied are the arts. I sometimes feel as though we ought to class engineering with the fine arts, its masterpieces are so well balanced, so luminous with human intelligence, so full of that splendor of truth which is said to be the essence of beauty. Study the great superstructures of the Eads Bridge, note in every detail those slender ribs and those deep piers with every necessary and sufficient provision for security under all possible loads, and the shocks of fields of ice, under all conditions of temperature, and you will find them not only beautiful but, like the pages of a book, full of human thought, of achievement through human experience. I can never stand by those majestic arches without seeing written all over the network of steel the names of James B. Eads and Henry Flad. It is a great privilege to teach young men to read such concrete books, and to draw inspiration from such names. We have been told that engineering studies and pursuits make men sordid and narrow. The statement is not true. It is true that such studies make one feel the weight of coming responsibilities, as well as the absolute necessity of mastering fundamental principles. Engineering students rarely feel at liberty to burn their old textbooks. They have been taught to be somewhat lacking in reverence, and unpoetical. I must confess they are generally not given to the worship of the Ancients, but they are not without poetic instincts.

"Do not for one moment suppose that all knowledge is contained in books, or that all art is to be found in Museums, or that all poetry is written with pens. To a mind filled with a sympathy that is born of intimate knowledge, there is in a mighty moving mechanism, and in the proportions and grandeur of a great superstructure that obeys all the laws of science, a beauty which delights the eye; a harmony and bond of thought, a rhythm and rhyme of reason that falls upon the inward ear like heavenly music.

"Twenty-two hundred years ago Archimedes was a famous engineer, and the marvelous mechanism by means of which he destroyed the enemy's ships in the harbor of Syracuse are called "engines" by the historians.

"Milton speaks of a rebellious angel as "Trailing his devilish enginery." Webster defines "engineering" with great accuracy as "The science and the art of utilizing the forces and materials of nature."

"Naturally the first engineers were military, as the earliest functions of organized society were those of attack and defence. But when nations began to learn the arts of peace and fixed public works because necessary, the civil engineer, as distinguished from the military and the naval engineer, came into being. During the last fifty years civil engineering has been differentiated and has thrown off as distinct departments, mining engineering, mechanical engineering, and electrical engineering. Still more

recently each one of these in actual practice has been subdivided many times, as the necessity has arisen, and as special lines of research and experience have been opened. At present it is the civil engineer who designs and constructs our railways, whether in our streets, underground, or overhead, across the prairies or among the mountains; he constructs our bridges and tunnels; our canals and locks; our lighthouses, break-waters and jetties; our dams, reservoirs and aqueducts; our highways, streets and sewers. It is the civil engineer who rescues our swamp lands from ruinous overflow and deadly miasma; who liberates our lowlands from the grasp of ocean; who by extensive irrigation converts a desert into a garden.

"It is the mechanical engineer who converts the energy stored in a lump of coal, a gallon of petroleum, or a waterfall into moving machinery, the work of which multiplies the comforts and luxuries of life, while it lightens the burdens and shortens the hours of labor or the toiling millions.

"It is the electrical engineer who reconverts the solar energy stored ages ago in the coal measures of the earth, or stored year by year on the uplands and slopes of the mountain torrents, back into lights and currents of electric energy.

"What boundless and attractive fields of human activity are here! Every one of these specialties calls up the names of men who have served humanity and helped build the civilization of today. When I mention canals, you will think of the early exploits of the English Brindley, and the Suez canal built by the great Frenchman, de Lesseps; you will recall the German ship-canal across Holstein, and you will stop only with the Panama Canal, the most stupendous ever undertaken. If I speak of redeeming lowlands, you think of parts of Holland recovered or soon to be recovered by fine engineering from the Zuyder Zee. The mention of dams brings up the great dam in Egypt to regulate the flow of the Nile, and the reservoir dams in New England, and in Old England, that store up pure water for the millions. The word "bridges" brings up a hundred names, from Telford and Robert Stephenson to James B. Eads, Sir Benjamin Baker and George S. Morrison. And so on without limit. These and others are engineers, and these are some of the achievements which give inspiration and direction and scope to the peculiar kind of higher education to be gained in this institution.

"Though greatly diversified in practice, all these special lines of engineering science and art require the same mastery of mathematics, the same knowledge of physics, the same graphical skill, the same familiarity with the theory and use of instruments of precision, the same readiness at analysis, and the same personal experience of the strength and elasticity of materials. Here in four years of study of these subjects, under expert direction and guidance, with opportunities for combining theories with practical tests, you have been trained to vigorous and courageous manhood, with minds so furnished and disciplined that, whatever be the calls made upon you, either in the strict lines of engineering, or in the varied responsibilties of industrial and commercial life, you will surely exhibit the incalculable value of a generous and liberal education.

. . . . . I pray thee then —
Write me as one who *serves* his fellow men.

I wish you personal success in a very high sense, and to that end I wish to impress upon you two things. I do not mean that you should study your work, go to the bottom of every problem you have to solve. You will do that any way, if you are made of sound material capable of intense stress and high elastic limit. The two things I emphasize are these:

1. An inflexible determination never to endorse what you believe to be bad engineering. Let the temptation be ever so great, the bribe ever so fascinating, stand like a rock. Let the wind blow! Let the rain descend! — stand your ground! Some years ago I wrote in an album a "Maxim for Conduct":

"In matters of sentiment, go with the stream; in matters of principle, stand like a Rock!" Carry that away with you.

2. Cultivate the graces and refinements of really good society. Acquire (unless you have it already) a perfect mastery of your mother tongue, and in your leisure hours make yourselves familiar with the masterpieces of literature and art. For ten or twelve years, the late Professor John B. Johnson and I were members of a Fortnight Club that studied the books which were well worth studying and discussing, from Homer to James Russell Lowell. Professor Johnson felt, and I feel, that those hours were full of greatest profit and the keenest pleasure. Your influence in the world and the pleasure of your life will depend partly upon your engineering skill, but more upon your manners, your speech, and your breadth of culture. Too often in the past the engineer has been associated in the popular mind with a smoky chimney, greasy machinery, and bad English. That was Sir Lester Deadlock's idea in Dickens' "Bleak House". Accordingly a recent writer in urging a more generous course of study for technical students, says: "It would be a sorry epitaph, that one was born a *man*, and died an engineer." Let your epitaph be: "Here lies one who was born a common man, and who died a great engineer."

One word more. You are to be not only engineers, and cultivated men, — you are to be citizens. As already hinted, you are to serve your fellow-men. You are to combine Utility and Culture in Service.

As many of you know, for forty years I have been preaching the doctrine of putting the whole boy to school. I have insisted that it is our chief duty. While mindful of all that the past has done and all that the past has been, we are to live the life of today; we are to study present conditions and make preparations for the responsibilities of the hour. We live in a new world, under the light of a new civilization. Our institutions are not founded upon or buttressed by human slavery, white or black; might no longer makes right; the burly robber of the Middle Ages is no longer our ideal of a good citizen. We are as certain of the Brotherhood of man as of the Fatherhood of God. All learning is not stored in books, all Art is not enshrined in museums and galleries, all nobility, high character and faithful service are not relegated to polite society. The prince of today is a man of wide sympathy, a man as familiar with affairs, with our industries, with our methods of trade and commerce and transportation, with the political organizations, municipal, state and national, as with the history and literature of earlier civilization.

Bloody war is being relegated to the past; our ideas of heroism and manly nobility are not to be found in the prize ring or in the arena; they are to be found in the performance of the many duties of citizenship. Fellowship and not warfare should be our motto. Co-operation rather than hostile competition should be our practice. It is a glorious thing to help solve problems in in such a way that every solution leads on to a higher civilization. Let us tear down the walls which separate nations one from the other; let us dismantle the forts, disband the army, and let us among ourselves lay aside warfare and adopt the methods of brotherhood, and let us teach our children to do so. That is education for citizenship. We have achieved much,—much remains. In the words of the poet Longfellow:

> "Look backward, how much has been won,
> Look round, how much is yet to win;
> The watches of the night are done,
> The watches of the day begin."

THE ENGINEER OF THE PAST AND HIS TRAINING FOR THE FUTURE.

By JOHN D. MACK, '87.

ONE hundred years ago engineers were divided in but two classes,—military engineers, and those engaged in the engineering of civil life, hence the civil engineers. The different lines of engineering activity have now been divided and subdivided, until we have an extensive classification. Probably any one can name a dozen different kinds of engineers, and new names to fit special lines of work are appearing at frequent intervals.

In this day of rush and high speed records of every description, it is well for the engineer, who is the primary cause of all the hurry, to take a brief survey of the works of his professional brethren of past ages.

About ten years ago Alfred Russell Wallace, a distinguished English scientist, wrote "The Wonderful Century," a review of scientific progress during the century then closing. He makes this statement: "We must compare it (the 19th century) not with any preceding century, or even with the last millenium, but with the whole historical period, perhaps with the whole period that has elapsed since the stone age."

He then devotes chapters to the wonderful transformation wrought by the steam engine, modern methods of transportation, the advances in medical science, and so on. It must be accepted by every one that the 19th century was an era of such incomparable development along many and widely varied lines, that no mind can grasp the changes which took place during its course. Different portions of it were known as the ages of iron, steel, steam and electricity, just as the present period may be known as the age of reinforced concrete.

The world awaits with impatience, and predicts in glowing terms the discoveries of tomorrow, accepts those of today as a matter of course, and regards those of yesterday as ancient history.

In the glamour of the all but infinite number of discoveries and inventions of the past one hundred and fifty years, and those which are constantly being brought forth, the one who does not look backward is likely to be led into believing that all knowledge of substantial nature is of recent growth, and that for all time prior to the wonderful 19th century, the world knew but little more of the material comforts, and of the elegancies of life, than our not always too truthful school histories tell us were enjoyed by the Pilgrim Fathers.

The question may be asked: "Why bother with the past?" when no one can do more than scan a small arc of the ever increasing circle of the present. Omitting many acknowledged advantages of historical study, the question may be answered thus: We study the past for the purpose of being able to predict the future, not in the sense used by the fortune teller or astrologer, but to reason, with the past history of an art as guide, the relations of cause and effect as tried in practice, and predict accordingly for the active needs of life. For example, the bridge engineer studies the forms, theories and history of the bridges, the methods of their preservation, the record of failures and their causes, so that he may design a structure and predict with accuracy its behavior under future stresses.

The lawyer studies cases similar to the one in hand, in order that he may have some degree of assurance as to the effect of his reasoning and argument before the court or jury. He does not read old legal works written on parchment, yet the law which he studies is the accumulated wisdom of unknown ages.

The physician investigates the former records of diseases and its remedies, that he may foretell the effect of his treatment in future cases.

The patent attorney studies the records of patents having possible bearing on the application he is to prepare, that he may draw it in as com-

prehensive form as possible, and in this research, anticipatory patents are frequently found decades before one would think they should appear; the record of the activity of some inventor who was working too far ahead of his time.

The designer of a proposed machine should make a thorough study of similar machines and their histories, and thus take advantage of the costly experimental development of these machines, so that he may repeat as few of the failures as possible.

Hundreds of similar instances illustrating the value to the progressive man pausing and looking backward could be noted, but as to just how far backward he should look, no one can draw a line applicable to all professions.

He who never hesitates nor looks backward in engineering may not be lost, but he will repeat many failures made long since by others. There is an old saying, that "history repeats itself," for the illustration of which, the history of engineering furnishes many illusirations.

The first steam engine recorded in history was of a rotary type. After century and a half of reciprocating engines, the turbine, a rotary type is now the approved form.

The first dynamos were alternators, but the first really successful commercial applications were made with direct current machines, which for time held the field, the alternator then being a laboratory curiosity. During the past fifteen years the alternator has driven the direct current type from certain fields, particularly in long distance transmission, but signs now point to a possible revival of the direct current transmission.

Among the earlier guns was the breech-loader, but constructive science had not advanced sufficiently to make this form serviceable, and it gave way to the more simple muzzle-loader, which, in turn, has been replaced by the breech-loader.

We are now in the midst of a change in the iron industries. Bessemer's invention of a cheap process for the manufacture of steel almost drove wrought iron out of manufacture, but following the usual cycle, many applications have been made of steel in which the material is inferior to wrought iron, and there is therefore some revival of the wrought iron industry.

Again, due to unexplainable failures with Bessemer steel, it has been largely replaced by steel made by the open hearth process. Without waiting for the Bessemer process to be swept away, investigators are making efforts to find the cause of the inferior character of Bessemer steel, in order that the cheaper process of manufacture may be preserved.

Water power was probably the first power other than man and animal power to be used for stationary development, but after passing through a long period of slow development, it is again finding wide application, as electricity furnishes the means for transmitting the energy to the desired point of operation.

We are likely to think of interchangeable construction as being a very recent development. This method of construction implies that a certain piece, for example, the needle bar of a sewing machine, can be placed in any machine of the same variety and size without further fitting, as distinguished from the system in which each bar would be fitted to a given machine.

There is no more beautiful example of the interchangeable idea than that of moveable type, to the construction of which this principle was applied over four hundred years ago. So far as known, the principle of interchangeable construction involving similar accuracy was not applied to the making of any other article for over three hundred years, when it was applied to the manufacture of gun locks.

The reason for this early development of a refined method of manufacture, was that interchangeability is necessary in accurate printing from movable type. The world then as now, got what it demanded, and during the revival of learning it demanded printing above all else.

Doubtless many early inventions failed because science of construction had not advanced sufficiently to insure their successful or economical manufacture. Another reason for failure was that there was no opening in the industrial field, to which these inventions could be applied.

Many were mere scientific or laboratory inventions, devised with no thought of application, but solely for the demonstration of abstract principles of science. Could even the genius of a Faraday, a Davy, an Oersted, or a Henry have foreseen the utilitarian value discoveries, which to them were researches in pure science? From this we draw the analogy that to ask of the research of pure science: "Of what value is it?" is a most foolish question. There is an unfortunate tendency among the practical school to belittle the researches of science, if a company cannot be immediately formed to exploit the results of the investigations.

The scientific journals of the earlier half of the past century have many suggestions to offer to the resourceful man of science and to the inventor, oftentimes as much suggestive information as the next week's or month's technical paper which we await with impatience.

In passing to a brief consideration of the older records, it need scarcely be expected that any information will be found regarding the design of an induction motor or an automatic lathe, yet many of the great problems of life were met and solved by nations of antiquity, and these problems are ever about the same.

The fields of creative activity of the human mind may be divided into literature, art, and science. Of these, science alone has made great strides during the past one hundred and fifty years. Although literary production has increased at an enormous rate during this period, still many of our models of literature date from hundreds to thousands of years ago. An often repeated quotation is in substance, "if we were to take from our literature Homer, the Bible and Shakespeare, it would lose its chief glories, and many of its common sayings and landmarks." The literary works of antiquity which have been preserved doubtless represent but a small fraction of contemporaneous works, and merely reflect the general culture and learning of the times in which they were written.

Many of the masterpieces of art were the works of the artists of Greece and Rome 2,000 to 3,000 years ago, and some even of the Egyptians and other nations, at a more remote period.

Architecture rests on a foundation of art, something the world is being slowly forced to realize, because of the many structures designed by those having neither art training nor artistic instinct.

No structure has been built which is more pleasing to the eye than those designed by the architects of Greece and Rome. Although these types are not applicable to many modern requirements, they show the thought given to this subject in ages past. Reasoning by analogy, it is possible that the beauty of these older designs was due to the fact that the designers had the proper training, and made a thorough study of the problems involved, that is, everything was carried to the last analysis, after which further study could result in no improvement. This principle of accurate, searching analysis produces the same results in the design of any work. The reason for the failure of many designs is that the analysis has been superficial, and the records of former practice not thoroughly investigated.

This brief outline merely calls attention to the standards of thought and general culture which were in existence centuries ago. It is doubtful whether science and engineering can advance beyond the general culture of a nation, although they may lag behind it for a period. In the development of a nation, there appears to be first an advance in general knowledge and culture, which creates the demand for the comforts and conveniences resulting from applied science.

The world is again demanding, in stronger terms each year, that the purely utilitarian is not always sufficient, especially when the work is in sight of the public. To this call engineers must give heed. The ugly bridge, the ungainly pole, the unsightly power plant or railway station, if in progressive communities, must go, or change their forms.

With work of a different class, another principle prevails, which has been aptly stated as "What is right, looks right." Ornamentation and curved lines, when straight lines will best

resist the stresses and are compatible with the design, are just as much out of place on a lathe, engine, or other machine, and jar the sense of fitness as greatly, as does the ugly bridge in the neighborhood of beautiful buildings.

Real progress in the mechanic arts probably began with the discovery and utilization of iron. The common use of iron and its compounds in the present day causes us to be somewhat unmindful regarding the value of this metal to the human race. It would entail no real hardship to dispense with gold and silver, as substitutes could be employed for most purposes, in fact, we might maintain our usual existence without any of the metals exeept iron, but were it swept out of existence, the fabric created by modern civilization would go to ruin.

Great quantities of copper implements are continually found in archaeological research. Many believe that the ancients were in possession of methods for the hardening of copper, not to the toughness produced by hammering, but to a hardness comparable with that of tempered steel.

According to newspaper accounts, the copper hardening process has been regularly rediscovered about every six months for many years, yet I have never been able to obtain a trace of first hand evidence that a piece of copper has been produced with a temper comparable to that of hardened steel. In ancient times iron must have been a most precious metal, but the fact that copper was more early obtained, resulted in the making of copper tools. Unless these tools had a hardness which has disappeared, their operation must have been most laborious.

Many tools have been discovered in archaeological research which bear a strong resemblance to modern forms, such as calipers, dividers, and other small tools. There is also ample evidence from markings on stone, that the Egyptians made use of tools resembling the modern diamond drill and saw, although nothing is know as to the character of the stone employed in these tools.

To the engineer, one of the most interesting works of antiquity was the quarrying and transportation of the great stone masses, for which the Egyptian engineers are best known. As an example, there is a colossal statue of one of the early kings, the so-called Vocal Memnon, which is 52 feet in height, the calculated weight being 887 tons. From the red granite of which it is formed, it is known to have been brought from quarries 130 miles distant, and over an intervening river.

There were obelisks wtthout number, Cleopatra's Needle in Central Park being one of them. It is 7 feet square at the base, of 70 feet in length. It was quarried 3500 years ago, transported 1600 miles and erected; later it was taken down, moved and set up in the location it occupied when removed to New York. Many of these obelisks were taken across the Mediterranean in ancient times, but this was probably the work of the Romans.

The artisans of Egypt excelled in many branches of handicraft, They wove cloth of cotton, wool and linen, worked in iron, steel, copper, gold, silver, glass, wood and leather. They constructed artistic furniture and other articles for household use and decoration, many of which were similar to modern forms. The people of this nation enjoyed a number of what are now common games and sports, which were doubtless practiced with great skill.

There were many fields of intellectual and industrial activity in past ages, which doubtless contributed to the grand total of knowledge, but the direct line of most interest to us passes through Greek and Roman history. The architects of Greece and Rome made great advances in building construction, and the engineers of both countries, particularly those of the latter, designed and executed great engineering works, measured even by the scale of today.

Of the records and remains of engineering works which have been preserved, those of chief interest to the engineer are the water supply systems of the cities of both nations, and the aqueducts and bridges of Rome, and of territory under Roman dominion. In Grecian practice the main supply channel was usually underground. One of these tunnels of a section eight feet square,

was cut 4200 feet through the rock of a hill, while in a second case the tunnel was carried under a river, and in a third, through a granite formation under an arm of the sea, one-half mile wide, to supply an island.

The Roman aqueducts were of far greater extent than those of Greece, and when crossing rivers or valleys, the duct was carried on arches, or on tiers of arches. The total length of aqueducts supplying ancient Rome was three hundred and sixty miles, fifty miles of this length being above ground. Many of these aqueducts must be classed as engineering works of the highest order, and some of them are still supplying cities with water 2000 years after construction. Three of the aqueducts supplying Rome at the present day follow the old lines, portions of the original structure being utilized.

Frontinus, a Roman soldier and engineer of the first century, was water commissioner of Rome, and wrote a report on its water supply system. The greater portion of this report has been preserved, a recent translation having been made under direction of Clemens Herschel. It reads like a report of today, dealing with service pipes, valves, repairs, improvements, etc.

It is sometimes said that the reason the Roman engineers carried the duct over the valleys on arches was that they did not know that the confined column of water would rise to the height of its head. This is an amusing explanation to say the least, after reading Frontinus' report on calculation of flow and its measurement, discrepancies in values due to leakage, water stealing, etc. The real reason probably was, that they knew of no method of construction of sufficient strength, so that the duct would withstand the hydrostatic pressure if it followed the contour of the ground.

The Roman engineers were the most skilled bridge builders of antiquity. One bridge worth nothing spanned the Tiber about 100 B. C. It was of stone, over 400 feet in length, 30 feet in width, some of the arch spans being 80 feet. The Romans made and used a cement formed of lime, brick dust and volcanic ash, which had hydraulic properties, and compared favorably with modern natural cement. They drove wooden piles for foundations when necessary, and from the present condition of these piles, we know that if a woaden pile is cut off below the water line, for all ordinary considerations it will last forever.

Both Greek and Roman artisans were skilled in the working of metals. During a period of four hundred years the Romans took great quantities of copper from the mines of Spain, which with tin probably obtained from Britain, they compounded various bronzes, which were cast into statuary and worked into other objects with masterly skill. Several small bronze water heaters have been discovered at Pompeii which possess an interest to the engineer, for while they are constructed entirely of bronze they anticipate in design the modern vertical water tube boiler. Some even have hollow grate bars for the water circulation, in order to increase the heating surface and prevent the destruction of the bars, a principle which has been reinvented many times during the past fifty years.

There were countless other fields of industrial activity in past ages. Among them may be mentioned Damascus, a great city and commercial center before the days of Abraham, which was famed for the excellence of its steel and textile products. Then there was Babylon, with its massive walls 40 miles in length. When Nebuchadnezzar was king of Babylon, the river of Euphrates was temporarily diverted from its course to allow the bed to be paved. Canals for irrigation were in extensive use during the Babylonian era. In India the industrial arts flourished long ago. India contains deposits of rich iron ore, and the metal has been used there for ages,

Probably of all the specimens of the metal working of the ancients which have been preserved, the most interesting to the engineer is the Iron Column of Delhi, in the Indian city of that name, Its date of construction is variously estimated between 800 B.C. and 600 A.D. It is 50 feet in length, the diameter varying from 16 inches to 12 inches, with a larger base and an

ornamental cap, the calculated weight being 17 tons. It is forged in one piece, of solid wrought iron.

The photographs show the base to be very rough, which is explained by the fact that it was used as an artillery target by the British army not many years ago, and yet we find fault with the unlettered Spaniards of four hundred years ago, for destroying Aztec records and monuments.

There is abundant evidence that there was a fair degree of civilization on this side of the Atlantic in ancient times, although the designs of the structures remaining appear rather crude and barbarous, as compared with those of the eastern nations. The Aztecs used a year of 365 days, with a calendar correction of 25 days every 104 years, which approximates a nearly exact value of the year over long periods of time, indicating a study of astronomy with practical results.

This brief statement of typical examples has been made to show the concept and execution of large problems by the engineers of antiquity. Of their methods of preparation, we unfortunately know nothing, but the lasting character of their works shows that their methods must have been thorough. The darker side of the picture displays the use of unknown millions of slaves and prisoners of war, in the execution of the larger and more admirable engineering works of antiquity.

From the fall of the Roman Empire to about one hundred years before the discovery of America, marks a period of approximately one thousand years, during which era general learning, and particularly scientific thought, reached the lowest ebb in recorded history.

It would appear that the civilized nations of antiquity attained the highest physical development which could be reached, without the assistance of a very few fundamental inventions of the past five hundred years. If these epoch-making inventions had appeared earlier in the world's history, they might possibly have perpetuated one or more of the ancient civilizations.

The revival of learning began in the fourteenth century, and the spread of knowledge was increased beyond the power of figures to compute by the invention of printing. The introduction of the Arabic system of notation to the western nations, and the improvements made in this system about the 15th century, gave to the scientist, and later to the engineer, a method of analysis carrying with it an almost infinite expansion of mental power.

The invention of the compass pointed the way to the mariner seeking foreign lands, and the invention of gun powder gave the civilized nations power over their predatory enemies.

As all the progress depends on the use of iron, so the modern engineering era may be clearly separated from the older by the use of one substance, namely, coal for the production of power.

The modern era therefore, began with the development of the steam engine, which, though of ancient origin, seems to have then been but little more than a scientific toy.

Although in 1763 the steam pumping engine had been in commercial use almost a century, it was not until that year that James Watt, who was following the mechanician's trade, applied to the crude inefficient machine the methods of reasoning of the trained scientist, and produced his improved engine, from which modern industrial progress dates. To repeat any of the story of this progress is but to call attention to the common objects about us, and to the methods of everyday life.

The schools of the so-called liberal arts have been in existence for centuries, training men for a few of the professions. The beginning of the modern era, therefore found the study of the humanities developed beyond that of the applied sciences, and the world again demanded the civilized comforts due to the research of science and its applications. The engineer of this modern era has credit allowed him for the part he has taken in its development, his work being now recognized as that of a profession. He has made a place for himself in the intellectual and commercial world which speaks for itself.

Many names stand out clearly in the roll of the engineering profession during the past one hun-

dredand fifty years, such as Watt, Telford, the Stephensons, the Siemens, Ericsson, Stevens, Bessemer, Holley, Kelvin and hosts of others. The earlier engineers of the modern era, Watt, Telford, and George Stephenson and others, were almost entirely self-taught. In their day there was no engineering literature, and but a small amount of scientific literature, to none of which they had access until they had achieved some success. There were no engineering schools, and few to teach even the meagre information of the time. The men of this early group had to clear their own path and blaze the way for others to follow.

The schools for the teaching of applied science and engineering have been more than a century in development. The older ones were usually started as a part of an established university or college, and the course of development is well illustrated by that which took place in many American universities, particularly in some of the western institutions, which were organized fifty to sixty years ago. The first subjects taught were usually of the older classic curriculum. General scientific studies were gradually added, followed by the introduction of laboratories for the purpose of illustrating the laws of pure science. The scientific work developed along the lines of applied science, and later into research.

Certain of the pure applied sciences and general studies, with additions to meet special demands, were first grouped as an engineering course. Additions to this course were made from time to time, and with further specialization different engineering courses were formed, the group becoming an engineering department. With increased growth and strength the department became a college, this complete development often taking place within a few years.

Due to the rapid changes, much of the old was swept away without realization of its potential possibilities, and we are therefore, now passing through an era of restoration, in which some of these former studies are being put back in their places.

We are told that this is an age of specialization, and that the specialization is becoming more narrow and more intense. This is doubtless true as applied to many of the trades. As applied to the professions it is also applicable in degree, but a system of professional education founded on the narrow specialization idea is wholly false. The product of this system has a trade and not a profession. This view does not imply that the professional education in a given line should consist of a smattering from all available fields of knowledge, for this results in nothing,

The most successful specialist is one who has been broadly trained, has had general experience in his profession, and who then confines his energies to a more limited field. He must have the resourcefulness to bring ideas from the broader field and then adapt them to the narrow one.

A medical specialist who knows nothing but the eye, will probably treat the eye in case of derangement, while with a broader medical experience he may discern that the seat of trouble lies elsewhere. The same principle applies to the lawyer who makes a specialty of one line of work, and also to the engineer. Many engineering graduates find that their professional work belongs to another line than that which they studied in college, and this is becoming a more common occurence every day in the diversified industries of the world. The electrical engineering graduate, for example, may find that his professional work falls along the lines which he knew in school as mechanical or civil engineering. The fact that engineering graduates so readilly adapt themselves to these changes is hopeful, in that it shows that with all our specialization, we have still been given a professional education.

Let us glance for a moment at the engineering courses of twenty-five years ago. They contained practically the same elements as today, English, foreign language, mathematics, mechanical drawing, shop work, surveying, chemistry, and certain advanced professional studies, such as steam engines, railway location, bridge design, etc. Could one then have foreseen the growth in the quarter of a century now closing, along the

lines of electrical and chemical engineering alone, for example, he would doubtless have thought it hopeless to provide a four or five year's engineering course which would care for future developments.

Have we not a right to look at the coming quarter of a century in the same light? Admitting this, and also the fact that the present engineering curriculum is already too crowded to give the best results, what is to be done about it? Increase the course to six, seven or ten years? and thus cause the student who advances normally through our educational system to have spent half his life in school at the age of forty-four? This will never do.

The principal objects of an engineering or other education should be: to teach the student to think and execute with precision, to reason, to investigate and find facts, to have confidence in his mental powers, and to be able to communicate his thoughts with clearness to others. Fundamental facts and principles should be taught and thoroughly learned, but beyond these, a large amount of ready-made information cannot be stored in the student's mind during his school days; this knowledge must be accumulated during his professional career.

The greatest fault to be found with the present educational system, from kindergarten to post graduate course, is superficiality, due to the attempt to teach too many subjects, and too much of each. Students would have a better education on completing their college course if during their entire school life they had studied fewer subjects, and mastered each of the lesser number. The generations before us studied more along this line, and no one can doubt but that this system produced results.

We delight in the humorous tales about the drill of the old village and country schoolmaster, but did any of you ever have your father or grandfather. trained under that system, help you over the hard places inarithmetic? Do you remember that although he had forgotten rules, he reasoned out the problem, checked the result, and made it so clear that you wondered why you did not understand it before?

We may make all the fun we please about the concentrated effort formerly put on the three R's, but the fact remains that students trained under that antiquated system could solve problems correctly and rapidly, read aloud intelligently without stumbling, and write so legibly that when we look over the old letters we do have to guess at words by the context, an educational foundation, the excellence of which has not been surpassed.

The necessity for a thorough foundation in professional education, built upon the mastery of the basic principles of the profession, applies with equal force to all, law, medicine, engineering and achitecture. These principles must be so thoroughly learned that they can be recognized in any disguise. The student in all professional schools is impatient to get through with the fundamental subjects, in order that he may take up the more utilitarian professional ones, often apparently fearing that if he does not have opportunity to take this or that special course, his case will be hopeless if he meets a problem belonging to one of them in his after career.

Probably of all professions, the lawyer is trained to the highest degree in the methods of elementary reasoning, and yet many law students make the common error of students in engineering and other professional schools, in thinking that professional education consists principally in the storing of facts, failing to realize the principle: "The mind should be trained as a workshop and not as a storehouse."

In every well maintained workshop the necessary stores are ultimately accumulated, and the shop can be used as a tool with which to create, but with the storehouse alone nothing can be created. As a lawyer recently expressed this sentiment to me, 'It is the duty of a lawyer to reduce a proposition to its essential elements, to many of which he can apply the fundamental test of law, is it common sense?'

It is not worth while to waste time in saying that no system of professional education can provide in advance for the solution of more than an infintesimal fraction of the problems its graduates are to meet. It is evident, therefore, that

training must be given in the analysis of typical problems, the reduction of each to its elements, and the solution and synthesis of these elements. This applies with the same force to the professional, as it does to the general studies. In the teaching of a professional subject, it is neither necessary nor desirable that the entire training and knowledge given the student be confined to the specialty under discussion.

The study of hydraulic motors for example, gives a certain training in the design and characteristics of machines of this type, but it also gives the teacher opportunity to illustrate the methods by which the engineer reasons, and these methods are equally applicable to problems of a different class.

No problem is complicated in itself, the apparent complexity often arising from the aggregation or combination of a group of elements, each of simple form. The man having a mind trained to tear the structure to pieces, and obtain its solution element by element, has a grasp of the situation which can never be attained by one who does not possess this power. To the person untrained in the science of mechanism, the linotype machine, which casts a solid line of type, is little less than a nightmare of complexity.

One trained in this science, however, sees but an orderly combination of shafts, cams, levers, frame, etc,, each element simple in itself, and performing its proper functions at the appointed time.

It is only the skilled and the really great in any profession who have this power of ultimate analysis, or possibly because they have developed this power they have become great. On no other basis than that of a thorough knowledge of principles and of the fundamental methods of reasoning, can the fact be explained that a lawyer may have been out of practice and given up the reading of law for years, and yet enter a trial and win a success. The skillful physician applies this power of analysis to his diagnosis and treatment, and the successful engineer to the project which he undertakes.

Two of the essential qualifications for the engineer are accuracy of thought, and precision in execution when a plan is finally determined. Training in accuracy of thought can be given by means of every statement which a student makes in his school work, and precision in execution can be taught in the laboratory, field and drafting room.

Another difficulty which often confronts the engineer is that he regards himself as a technical man, thinking in, and speaking with a different language than that used outside his narrow profession. If asked to explain a project to a board composed of laymen, such as, why one form of transmission, or type of engine should be used instead of another, his language will often be but little more intelligible than was Scotty's, in Mark Twain's story of Scotty's Visit to the Minister.''

The engineer thinks in a language of his own for economic reasons, and likewise speaks the technical language with his fellow engineers, but he must acquire the art of translating his thoughts into the layman's tongue.

The lawyer has continuous practice in plain speaking, as he has contact with many different fields of knowledge, frequently finding it necessary to make the most intricate technical problems clear to a jury. The engineer of the present day is being employed in many capacities, other than in the purely design and constructive branches of engineering. In fitting himself to take advantage of these opportunities, many of which lead to the prizes of the profession, he must lay the foundation for a broad education, so that he may meet and command respect among men from all the activities of life.

As has been pointed out, the purely utilitarian in construction will not always suffice where it is in sight of the public, so the purely technical will not lead to the highest results when in contact with the diversified minds of the modern commercial world. Engineering educators now realizing this fact, are making changes in the courses of study which will increase the breadth of view of the engineering student, and give him an insight into those studies which deal with the relations of men to one another.

It is not for the engineer and scientist to belittle the study of the humanities, nor to depreciate the efforts of those who devote their lives to this work, for the general culture of a nation is the solid foundation on which its superstructure rests. This has been true throughout history, and will doubtless maintain until the end.

COMMENCEMENT.

THE twenty-fourth annual commencement was held on June 11, in the gymnasium, and as usual, the exercises were well attended. Our own orchestra opened the exercises with a few selections from the "Red Mill," that were very well received. After a short prayer by the Reverend Father Ryves, the Glee Club sang, and received long applause. Dr. Mees then introduced J. D. Mack, class of '87, who gave the alumni address, reproduced in this issue. Following the address came a selection by the orchestra, which pleased so well that it had to be repeated. The address of the day, also appearing in this issue, was given by C. M. Woodward, dean of school of engineering of Washington University, St. Louis. Mr. Woodward's address was surely appreciated, and the throng which filled the spacious gym to the very doors was remarkably quiet until the last words had been spoken. The "Soldier's Chorus" was rendered by the Glee Club in their usual good style, and was followed by the "R. P. I. Song" as an encore. Seven seniors are members of the Glee Club, and they will be greatly missed when the club is reorganized next fall. Diplomas came next in the order of events, and of the thirty-five awarded, eighteen went to residents of Terre Haute.

In presenting the diplomas, William C. Ball said:

In St. Luke's gospel it is related that Jesus and his disciples entered into a certain village where a woman named Martha received him into her house. Martha's sister, Mary, seated herself at Jesus' feet to listen to his discourse, while Martha busied herself with the household duties incident to the entertainment of her numerous and unexpected guests. Needing Mary's assistance, for her duties pressed, Martha called her chief guest's attention to the fact and requested him to bid Mary help her. I now quote literally:

"Jesus answered and said unto her: 'Martha, Martha, Thou art careful and troubled about many things. But one thing is needful; and Mary hath chosen that good part which shall not be taken away from her,'"

Now it is no part of my present purpose to preach a sermon on these passages of scripture. Rudyard Kipling has used them as the theme of a poem entitled "The Sons of Martha," which has the sonorous swing for which he is famous.

The remarks I make on these occasions are entirely incidental to the presentation of the diplomas you young gentlemen have earned and I am to present to you in the name and on behalf of the faculty and board of managers. What I shall say will be partly on the poem of Kipling, expounding and interpreting in his own fashion the scripture already quoted. And first of all the poem. Let me quote:

THE SONS OF MARTHA.

The Sons of Mary seldom bother,
  For they have inherited that good part,
But the Sons of Martha favor their mother
  Of the careful soul and troubled heart,
And because she lost her temper once,
  And because she was rude to the Lord, her guest,
Her sons must wait upon Mary's sons
  World without end, reprieve or rest.

It is their care in all the ages
  To take the buffet and cushion the shock;
It is their care that the gear engages;
  It is their care that the switches lock;
It is their care that the wheels run truly;
  It is their care to embark and entrain,
Tally, transport and deliver duly
  The Sons of Mary by land and main.

They say to the mountains, "Be ye removed!"
  They say to the lesser floods, "Run dry!"
Under their rods are the rocks reproved—
  They are not afraid of that which is high.
Then do the hilltops shake to the summit;
  Then is the bed of the deep laid bare,
That the Sons of Mary may overcome it,
  Pleasantly sleeping and unaware.

They finger death at their gloves' end when
  They piece and repiece the living wires.
He rears against the gates they tend;
  They feed him hungry behind their fires.
Early at dawn ere men see clear,
  They stumble into his terrible stall,
And hale him forth like a haltered steer,
  And goad and turn him till even-fall.

To these from birth is belief forbidden;
  From these till death is relief afar,—
They are concerned with matters hidden,
  Under the earth line their altars are.
The secret fountains to follow up,

Waters withdrawn to restore to the mouth,—
Yea, and gather the floods as in a cup,
And pour them again at the city's drouth.

They do not preach that their God will rouse them
A little before the nuts work loose ;
They do not teach that His pity allows them
To leave their work whenever they choose.
As in the thronged and the lightened ways,
So in the dark and the desert they stand,
Wary and watchful all their days,
That their brethren's days may be long in the land.

Lift ye the stone, or cleave the wood,
To make a path more fair or flat,—
Lo ! it is black already with blood
Some Sons of Martha spilled for that.
Not as a ladder from earth to Heaven,
Not as an altar to any creed,
But simple service, simply given
To his own kind, in their common need.

And the Sons of Mary smile and are blessed—
They know the angels are on their side.
They know in them is the Grace Confessed,
And for them are the mercies multiplied.
They sit at the feet and hear the Word—
They know how truly the promise runs.
They have cast their burden upon the Lord,
And,—the Lord, he lays it upon Martha's Sons.

For all the world that poem sounds as if Kipling had written it fresh from reading a catalogue of Rose describing the course of studies laid down as its curriculum The things he represents the Sons of Martha as doing for the Sons of Mary, are the very things this institute teaches her students to do most efficieutly and thoroughly and quickly. He actually describes the courses of study here—physics, civil engineering, machine shop, field work, chemistry, electricity, etc.

It is therefore entirely proper for me, in presenting to you your diplomas, not only to pronounce you Sons of Rose but also to declare you Sons of Martha. This completes your intellectual parentage. Yes, you are Sons of Martha and proud of it. But this sonship carries with it heritages only one-half of which the British poet describes. You sons of Chauncey Rose and of the careful Martha are eager for the chance to move mountains, or tunnel or disembowel them in search of treasure. You are eager to build reservoirs and dig ditches to irrigate thirsty and barren lands ; to deepen and straighten and canalize rivers. Let us hope some one of you will do all of these things for our Wabash of the famous banks. To build and operate waterworks for towns. To construct and control steam or electric roads. To make travel cheaper, more expeditious and luxurious, and life, physically speaking, better worth the living. In a sentence, to do all tne things that Kipling describes as the appointed work of the Sons of Martha, and more—things architectural, chemical, electrical, etc., etc., to the end of chapters as yet undreamed of.

Yes, you are willing, nay eager to do all these things. Coming here to Rose was for that express purpose—to fit you to do them better. And you want to do them for Mary's sons or the sons of any other woman or man who has—note this—for any man who has the price. For if the Sons of Mary think that in this utilitarian age they are going to get these things done for them without money and without price then the sons of Mary have, in the vernacular of the street, another think coming.

Haul Mary's sons in luxuriously appointed limited trains? Certainly. Sons of Rose have done it and will, I trust, continue doing it and more as successive classes go out and catch their stride. Usually at the end of the best train carrying Mary's sons and daughters will be found the finest car of all—the private car of the general manager, or some other official—a son of Martha and sometimes also a son of Rose. Build houses for Mary's sons? Certainly. But the architect Son of Martha will probably live in the choicest creation of his skill as an architect. And so on and on in each and every kind of superior service the Sons of Rose and Martha will, I trust, be found able and ready to do their part and do it well, and doing it get their just share of the resultant product.

Next week I expect to visit my own Alma Mater, in a distant New England state, to attend a reunion of my class. For months the surviving members of the class have been looking forward to this meeting. And that there has been a deal of correspondence relating to it you may well believe. My recollection of the events of that day—that far off momentous day—when my class graduated, as your class of 1908 is graduating today, is as vivid as if they happened yesterday. The rare June day. The feminine interest in the cause of education as evidenced by their attendance, as now, on the exercises of commencement day. Commencement exercises then were conducted after the old fashion. The members of the graduating class themselves talked instead of being talked to ; gave the audience the benefit of their up-to-the-minute views on matters and things ancient and modern, and generally told them be of good cheer, for now that the members of the class of 1868 were about to put their shoulders to the wheel, the wagon of state, freighted with a world's hopes and fears, would be lifted out of the rut and be sent spinning along the highway of progress. The world, I think, is somewhat a loser by the change of fashion that eliminated the collegians themselves from commencement addresses.

I sometimes shudder when I think of what might have happened to this good old world if it had failed to receive the benefit of the good advice given to it by my class.

Yet, after all, we were just an eager-hearted lot of young chaps, you are a fair replica of what we were, straining at the leashes, sad at separating and sundering the strongest ties of friendship ever formed among men in this life. You will understand this better as the years pass. We were glad at the prospect of getting away and anxious to try our strength. A little fearful, too, about making the plunge, as even the most heedless are likely to be when the temperature of water, its depth and currents and distance to the farther shores are all unknown. I have only to shut my eyes to see with memory's clairvoyant vision what is in your minds at this minute—the hopes, the fears, the longings and regrets—all those things that enter into what is at once the gladdest and the saddest day of your lives.

A moment ago I was saying that in my day the members of the class did the talking. The exercises were hold in the village church—the largest auditorium obtainable,—bigger than the college chapel. The platform, somewhat larger and higher than this, was occupied by the faculty, trustees and a miscellaneous assortment of dignitaries. Flanking the rostrum, as we called the enlarged pulpit platform, and on a lower level—the level of the church floor—was a reserved space where the members were coralled, and this space, lighted by a large window at the end, was shut off from the view, or we thought it was, by a light chintz curtain. Here the final touches were given to the refractory hair and neckties were adjusted for the last time praparatory to monnting the rostrum for flights of oratory.

Those were days of plain living and, let us say, since there is no one here to contradict me, of high thinking. In a class of forty there were just three dress coats owned by members. But they sufficed, for they appeared often on the stage by means of rapid changes in the dressing room. As soon as the graduating exercises were over we scurried to the train just as you young men are goiug to do. You have the railroad time tables in your pockets or in your heads now.

Ten years later I attended the first reunion of my class. I sat in the same old village church witnessing the commencement exercises of the class of 1872. The order of exercises had been changed and the chintz curtain was no longer in use. With me was a sedate matron of the village. She was the mother of two boys then looking forward to going to college and who have since gone to and through it.

I may say in parenthesis that in my college days this lady, then a fair young miss, wore my secret society pin on gala occasions. I need not tell you what that meant, for it meant then just what it means now. Well, this matron told me how she and all in the ehurch enjoyed especially our graduating exercises ten years ago. She said it was one of the pleasantest commencements of the many she had ever attended.

I told her of the chintz curtain that screened off the space which we used as a dressing hall. It was a light fabric. Back of it and at the end of the church was a large window. The audience had the full benefit of our primping and coat changing. The addresses differed as one star differs from another star in glory. But the dress coats bore more than a remarkable resemblance.

And so, albeit it quite unwittingly, in graduating the class of 1868 did add to the gaiety of at least such portion of the nation as was represented by the people of one small New England town. We cheered them up as we stepped out on the stage of life, and, let me tell you this young men, you American beauties about to be plucked from the Rose bush, the man who can make two smiles come where only one was before is worthy to walk touching elbows and keeping step with him who makes two blades of grass grow where only one grew before.

We rather expect you to perform the grass feat. That is what this school is for. It will be expected of you as Sons of Rose and Martha to so dig and shovel and hammer and harness and change and control the matters and forces of this world as to enable the people, all people, yourselves as well as others, to have two or more desirable things where they have hitherto had only one. This is the two blades of grass in its larger meaning. And while you are doing this don't forget to wear a rose in your lapel and a smile on your lips. Fact is, the best way to keep a stiff upper lip is to fasten it stiff with a smile that won't wear off, for this is a pretty good old world and we want you to help make it better.

The honors for the year were awarded by Dr. Mees, Carl B. Andrews of Honolulu, H. I., taking the Hemingway gold medal for the highest standing throughout the course, and E. A. Mees of Columbus, O., the bronze medal for best work in the freshman class. Honorable mention in the senior class was given to H. D. Orth of Terre Haute, and in the sophomore class to H. W. Henry, Portsmouth, O., and W. L. Edwards of Indianapolis. The honor men of the freshman class were H. M. Kauffman, Terre Haute; E. E. Garst, Dayton, O.; and O. A. Ohmann, Louisville, Ky. After the benediction by Father Ryves the orchestra concluded the program with Sousa's "Diplomatic March."

TITLES OF THESES

For the Degree of Civil Engineer

Professional Record

CURTIS B. MEES, B. S., 1900

For the Degree of Mechanical Engineer

Professional Kecord

LUCIEN N. SULLIVAN, B. S., '86

For the Degree of Electrical Engineer

Professional Record

CARL J. KIEFER, B. S., '93; M. S., '05

Design of an Automatic Control System for Securing Uniform Distribution of Material Charged Into a Blast Furnace

JAY H. HALL, B. S., '97; M. S., '07

Design of an Electric Train Lighting System Using the Axle as Power Source

ROGER M. NEWBOLD, B. S., '97; M S., '07

For the Degree of Master of Science

The Synchronous Converter

CLAUDE E. ROBERTSON, B. S., '05

The Manufacture of Portland Cement

HARRY W. PALMER, B. S., '03

A Comparison of the Enriching value of Oil and Benzol for Gas

LEON J. WILLIEN, JR., B. S., '06

Design of 60-foot Span Concrete Steel Arch

ERNEST E. LARKINS, B. S., '05

For Degree of Bachelor of Science

A Further Study of The Gas Producing Qualities of Indiana Coals

PAUL B. HAMILTON, W. WALTER WILLISON

The Determination of The Cooking Power of Indiana Coals by a Comparative Method

GEORGE T. MCCORMICK

A Comparison of the Various Volumetric Methods for the Determination of Lead in Ores

H. EARL SCHMIDT

Experimental Redetermination of the Reactions in a Reinforced Concrete Arch

CARL B. ANDREWS, PAUL G. LINDEMAN

Tensile Strength of Concrete

A. STAFFORD HATHAWAY, E. BRADFORD HUNLEY

The Comparative Cost of a Reinforced Concrete and of a Steel Subway at Tenth Street and Wabash Avenue, Terre Haute, Ind.

Concrete: ORION L. STOCK, WALTER L. UHL.

Steel: JOHN E. BERNHARDT, HERBERT H. BOYD.

The Strength of Commercial Upset Ends and Loop Eyes on Soft Steel Bars

BYRON L. KELSO, ROY H. JACKSON

Design of a Sewerage System for Grayville, Ill.

ROSS M. STUBBS, CHARLES H. SIEVERS

Proposed Elevated Structure Through Terre Haute for the Frisco Belt Railroad

AUGUSTIN ZAMBRANO

Complete Test of a Direct Connected Steam Engine and Generator, Rose Polytechnic Shops

BERRIEN M. LINDSLEY, JOHN F. ROBBINS, HIRAM B. CANNON, LEO C. KERRICK

Test of a 100 K-W Curtiss Steam Turbine Generator Set at the Highland Iron and Steel Plant, Terre Haute

WILLIAM C. KNOPF, SAMUEL E. MITCHELL

Test of an Electrically Driven Vacuum Cleaner, Pneumatic Cash Carrier, Passenger and Freight Elevator System at Herz's Bazaar, Terre Haute.

GEORGE H. FREERS, CHARLES N. LAMMERS, FREDERIC H. REISS

The Investigation and Correction of the Defects in a Three Horse Power Single Phase Commutator Motor, Rose Polytechnic Shops

HERBERT D. ORTH, WOOD TOULSON

Design of a Constant Current Transformer

O. WOOD

Test of Various Nozzles in an Experimental Steam Turbine

DANIEL R. BOGRAN, FLOYD W. CORSON

Test of a Gas Engine and Electric Generator Set

HENRY W. HEIDENGER, J. HORACE JOHNSTON, E. PAUL WICKERSHAM

A Test of Hickory Buggy Spokes

EMIL J. FISCHER

Report of the Twenty-Second Annual Business Session of the Rose Polytechnic Alumni Association, Thursday, June 11, 1908.

THE meeting was called to order at 3:15 P.M., June 11, 1908, in the free-hand drawing room of the Institute, with President E. F. Folsom, '92, in the chair.

By consent the roll-call was deferred until later in the meeting.

The minutes of the previous meeting were read and approved. The following financial report was submitted by the Treasurer and approved:

ALUMNI FUND.

RECEIPTS.

Balance, June 11, 1907,		$170.56
Dues for 1907 since last report,	$ 48.00	
Dues for 1908,	192.00	240 00
Total,		$410.56

DISBURSEMENTS.

Election Committee.		
Bills not yet received.		
Executive Committee.		
Bills not yet received.		
Secretary—		
Wireless message to Dr. Mees,	$ 4.54	
Exchange, printing and postage,	30.72	
Flowers, cigars (motion McMeans),	7.00	
Rose Technic for annual reports,	11.30	
Printing, postage, etc., for Pres. Folsom,	28.87	
Clerk,	.60	
Total,		$ 83.03
Banquet Fund—		
10 guests at $2.00,		$ 20.00
Total,		$103 00
Balance on hand,		$307.53

BANQUET FUND.

RECEIPTS.

Cash at banquet,	$170.00	
From Alumni Fund for guests,	20.00	
Total,		$190.00

DISBURSEMENTS.

Janitor,	$ 2.00	
Menus,	12.00	
Flowers,	4.60	
Postage, etc.,	2.25	
J. N. Whonhart,	161.10	
Expressage on champagne,	2.20	
Total,		$184.15
Balance on hand,		$5.85

LOAN FUND.

Balance on hand at last report,	$350.70	
J. D. Galloway,	250.00	
Interest,	5.15	
Total on hand,		$605.85

SUMMARY OF MONEY ON HAND.

Alumni Fund in Indiana Nat'l Bank	$284.13	
Cash on hand,	23 40	$307.53
Banquet Fund—In Indiana State Bank,		5.85
Loan Fund—In Indiana Trust Co.		605.85
Total on hand,		$919.23

Following the approval of the Treasurer's report, the polls were closed and the election committee retired to count the ballots.

President Folsom reported orally as to the work of the Alumni endowment committee, stating that subscriptions totaling slightly over $15,000.00 had been received and that, with but one or two exceptions, payments were being made on these pledges as they came due. At the report President Folsom asked that the membership of the committee be released from further action, and the request was granted, by consent.

The Alumni advisory committee, appointed in accordance with the motion of Mr. Burk, '96, at the last meeting, was as follows:

Mr. W. E. Burk, '96, representing the Louisville Association; Mr. J. J. Kessler, '97, representing the St. Louis Association; Mr. F. N. Rumbley, '03, representing the Terre Haute Assiation; and Mr. G. H. Hall, '97, representing the Cleveland Association. Mr. Burk reported orally that the appointments to the committee at such late date that it had been unable to have any meeting until immediately prior to the an-

nual meeting; that it expected to organize and be ready for its duty in a short time, and expected to have a report at the next annual meeting.

After a full discussion, and after complimenting as a whole the "Modulus," published by the class of 1909, but criticising one or two faculty "hits" which were believed to be rather more in the spirit of criticism than fun, the following resolution was presented by Mr. Burk of '96:

Resolved, That the Alumni Association suggests to the undergraduates of the future that no statements should be made in student publications which reflect upon the personal integrity or ability of members of the faculty or instructors in charge of Institute work, on the ground that such expressious, either directly or indirectly, harmfully affect our Alma Mater and her traditions.

The motion was seconded by Mr. Wiley and passed by unanimous vote.

On roll call the following men were found to be present:

Class of '86,
Foltz
Parkhurst
Scott

Class of '87,
Mack

Class of '88,
Davis
Peddle
Weller

Class of '89,
Wiley

Class of '91,
McCormick
Mewhinney

Class of '92,
Folsom

Class of '93
Hood
Johonnott

Class of '94,
Frohman

Class of '95,
Crockwell

Class of '96,
Burk
McMeans
Sinks

Class of '97,
Kessler

Class of '98,
Brachmann
Fletcher
Pirtle
Wiley

Class of '99,
Froelich

Class of '00,
Mees

Class of '01,
Clay
Hammel
Riggs
Rochester
Schwartz

Class of '02,
Cox
Fishback
Paige

Class of '03,
Blair
Kiefer

Class of '04,
Noelke
Touzalin

Class of '05,
Bland
Cook
Daily
Everson
Greenleaf
Kadel
Reed
Robertson

Class of '06,
Hatch,
Hensgen
Johnson
Lee, E. P.
McComb
Modesitt
Thurman
Willien
Wischmeyer, C.
Wischmeyer, H. W.
Worthington

Class of '07,
Austin
Bogram, L.
Cash
Hall
Miner
Nantz
Routledge
Shickel, H. M.
Shickel, J. B.
Stalker
Taylor

Class of '08,
Stock
Jackson
Kelso
Lindeman
Berrhardt
Uhl
Reiss
Wood
Orth
Toulson
Willison
Hamilton
Hathaway
Bogran, D. R.
Wickersham
Robbins
Lindsley
McCormick

The report of the election committee was received and approved. The report showed that Mr. Burk, '96, and Mr. Mewhinney, '91, had been the nominees for Alumni representative and that on the final vote Mr. Burk received 129 votes, Mr. Mewhinney 68.

For president and vice president the vote stood

Mr. Aikman, '87	45	votes
Mr. Brownell, '86	44	"
Mr. Riggs, '01	36	"
Mr. Mack, '87	32	"
Mr. Schwartz, 01	24	"
Mr. Davis, '88	18	"

Mr. Aikman was thereupon declared President and Mr. Brownell, Vice President.

It was moved by Mr. Hatch, '06, and seconded by Mr. Worthtngton, '06: "That the annual alumni banquet of 1909, and those following it, shall be held at the Terre Haute House or at some equally suitable place, instead of in the Polytechnic Gymnasium, and that these affairs be strictly informal."

After discussion, the motion was put and lost by a decided majority.

On the motion of Mr. Blair, '03, seconded by Mr. Pirtle, '98, the present executive committee, and subsequent executive committees were instructed to invite representatives of the Press as guests at the annual banquet.

On motion of Mr. Schwartz, '01, seconded by Mr. Touzalin, '04, the need of cooperation of the Alumni with the "Technic", was presented and referred to a special committee of three to be appointed by the president with instructions to take such steps as might be deemed desirable to interest the Alumni and secure their subscriptions.

Mr. Burk, '96, seconded by Mr. Touzalin, '04, presented the following motion for consideration:

Resolved, that in preparing for future banquets the Executive Committee be instructed to invite the wives of members.

Mr. Pirtle, '98, seconded by Mr. Fletcher, '98, moved to change "wives" to "ladies" and the amendment was accepted. Thereupon after full discussion, the motion was put and lost by a decided majority.

Upon motion of Mr. Hatch, '06, seconded by Mr. Foltz, '86, the secretary was instructed to convey the thanks of the Association to Mrs. Adams, Mrs. Burton and Mr. McGibeney, for services rendered the Glee Club, the Association, and the Orchestra, respectively, the letters to be accompanied by the usual tokens of regard.

Upon motion of Mr. Johonnott, '93, seconded by Mr. Burk, '96, a vote of thanks to the Alumni orator, Mr. Mack, '87, was passed unanimously.

Nominations for Executive Committe were then made as follows:

Mr. Foltz, '86, Mr. Peddle, '88, Mr. Trowbridge, '05, whereupon the nominations were closed and the secretary instructed to cast the ballot, on motion of Mr. Burk, '96, seconded by Mr. Pirtle, '98.

The following nominations were then made for president and vice president, to be voted upon by letter ballot next Spring, to-wit: Messrs. Mewhinney, '91, Palmer, '03, Schwartz, '01, Froehlich, '99, Touzalin, '04, McMeans, '96, and Davis, '98.

Upon motion of Mr. Kadel, '05, seconded by Mr. Burk, '96, the class of 1908 was voted into membership of the association; whereupon the meeeing adjourned.

ALUMNI BANQUET.

At the close of the bu iness meeting all adjourned to the campus where time, until dinner was announced, was spent in renewing old acquaintances and making new ones.

The tables were arranged in four parallel arms connected at one end by a cross arm, and one hundred and twenty sat down, as follows; president Folsom being toastmaster and Dr. C. M. Woodward, dean of the engineering schools of Washingtan University, St. Louis, Mo., the guest of honor.

Arthur M. Hood, '93
C. A. Mees, '00
Tom Fletcher, '98
Fred C. Brachmann, '98
C. Pirtle, '98
B. Wiley, '98
W. C. Noelke, '04
H. A. Schwartz, '01
H. G. Clay, '01
J. R. Riggs, '01
Max J. Hammell, '01
Paul B. Hamilton, '08
George T. McCormick, '08
Walter W. Willison, '08
H. Earl Schmidt, '08
S. E. Mitchell, '08
F. H. Reiss, '08
J. E. Bernhardt, '08
George H. Freers, '08
B. M. Lindsley, '08
B. L. Kelso, '08
A. Zambrano, '08
William C. Knopf, '08
Carl B. Andrews, '08
Charles N. Lammers, '08
Charles H. Sievers, '08
H. D. Orth, '08
Herbert Foltz, '86
M. R. Reed, '05
R. C. Everson, '05
J. E. Daily, '05
J. O. Bland, '05
H. E. Shryer, '05
W. S. Hanley, '05
H. R. Kadel, '05
R. M. Stubbs, '08
L. J. Willien, '06
H. R. Canfield, '06
A. W. Worthington, '06
Carl Wischmeyer, '06
Howard C. Taylor, 07
H. W. Wischmeyer, '06
W. O. Hensgen, '06
Stafford Hathaway, '08
R. H. Jackson, '08
O. L. Stock, '08
W. L. Uhl, '08
P. G. Lindeman, '08
D. R. Bogran, '08
Ottiwell Wood, '08
C. E. Smith, '03
W. Toulson, '08
J. R. Curry, '06
G. F. Nicholson, '06
Fred. N. Hatch, '06
J. M. Johnson, '06
E. P. Lee, '06
H. McComb, '06
R. Thurman, '06
J. M. Rotz, '06
C. C. Modesitt, '06
J. J. Kessler, '97
E. Paul Wickersham, '08
John F. Robbins, '08
F. H. Froehlich, '99
Floyd W, Corson, '08
O. E. McMeans, '96
Clifton Brannon, '04
Marion W. Blair, '03
Henry C. Gilbert, Jr., '03

C. B. Cook, '05
Leon Goodman, '05
F. O. Reynolds, '05
E. S. Butler, '06
H. M. Shickel, '07
J. B. Shickel, '07
E. J. Miner, '07
R. A. Strecker, '07
F. H. Cash, '07
L. Bogran, '07
Frank Nantz, '07
H. L. Austin, '07
S. P. Hall, '07
Thos. E. Routledge, '07
Emil J. Fischer, '08
E. B. Hunley, '08
J. R. Stalker, '07
Frank W. Bennett (faculty)
Charles E. Scott, '86
E. S. Johonnott, '93
N. H. Williams (faculty)
E. H. Willmarth, Shop Supt.
R. L. McCormick, '91
L. S. Rose, '92
W. H. Harris, '91
Carl J. Kiefer, '03
Claude E. Cox, '02
Arthur J. Paige, '02
T. R Fishback, '02
Chas. Timothy Jewett (Star)
Omar C. Mewhinney, '91
L. A. Touzalin, '04
W. B. Wiley, '89
Edw. A. Weller, '88
Geo. M. Davis, '88
Jno. G. D. Mack, '87
Jno. B. Peddle, '88
John White, (faculty)
A. S Hathaway (faculty)
G. M. Crane (Board)
Edson F. Folsom, '92
C. Leo Mees (faculty pres.)
W. E. Burk, '96
E. D. Frohman, '94
F. F. Hildreth, '94
F. C. Wagner (faculty)
C. R. Crockwell, '95
J. A. Parkhurst '86
J. B. Aikman, '87

The menu follows:

Fruit Salad with Wine
Consomme Royal
Celery Wafers Olives
Baked Trout—Butter Sauce
Fried Spring Chicken
Mashed Potatoes Green Peas
Hot Rolls
Tomato with Mayonnaise
Ice Cream and Strawberries
Assorted Cakes
Coffee
Mint Wafers Salted Almonds
Cigars

Formal toasts were responded to by O. L. Stock, '08, "The Infant Class," Prof. Hathaway, "The Faculty," John A. Parkhurst, '86, "Yesterday," Dr. Mees "Today," Mr. Ball "Tomorrow," J. J. Kessler "How Old was Ann?" Omar Mewhinney, 91, "Tech Clubs".

In addition the Association was treated to a delightful talk by Dr. Woodward, whose years rest so lightly upon him that he is years young instead of years old.

Altogether the meeting was the most enthusiastic one had for a good many years.

ROSE, 7; WABASH, 5.

On May 2, those warriors from Wabash came here for the first game of the series and for the first one for Poly on their home grounds. Jones and his men were confident of a victory, but in the fourth inning with four runs from three bits we drove Shaffer to the tall and uncut. Erwin then went in, stopped our onslaught and we were only able to score one on him. The game was one of those spectacular kind with many long hits, Starbuck making the only home run of the season.

ROSE	A.B.	R.	H.	P.O.	A.	E.
Shook. ss	3	0	2	2	2	0
Hadley, 1b	3	0	1	12	0	0
Uhl, 2b.	4	0	0	3	4	0
Backman, p.	2	2	1	0	5	2
Webster, cf.	3	2	1	1	0	0
Abbett, rf	2	1	0	0	0	0
Schmidt, c.	4	2	1	7	0	0
Nicholson, lf	2	0	0	2	0	0
Heidenger, 3b	3	0	0	0	1	1
*Piggott	1	0	0	0	0	0
Totals	27	7	6	27	12	3

WABASH	H.B.	R.	H.	P.O.	A.	E.
Diddle, 2b	5	1	1	5	1	0
Lambert, ss.	5	1	1	1	3	1
Starbuck, cf	5	2	4	1	0	0
Sheller, 1b.	4	0	0	11	2	0
Bridge, rf	4	0	0	1	0	0
Adams, lf	4	1	0	1	0	0
Bowers, c	3	0	1	3	0	0
Faunce, 3b.	4	0	1	0	3	0
Shaffer, p.	2	0	0	1	6	0
Erwin, p.	2	0	0	0	0	0
Totals	38	5	8	24	15	1

* Batted for Nicholson 8th.

Score by innings:

Rose	0	2	0	4	1	0	0	*—7
Wabash	1	1	1	0	0	0	1	1—5

SUMMARIES—Bases on balls, off on Backman 1, off Shaffer 5, off Erwin 0. Struck out, by Backman 6, by Erwin 3. Two base hits, Schmidt, Backman. Three base hit, Diddle. Home run, Starbuck. Passed balls, Schmidt, Bowers. Sacrifice hits, Heidenger, Nicholson, Bowers. Stolen base, Lambert (2). Umpire, Nelson.

ROSE, 0; NOTRE DAME, 5.

On Saturday, May 9, Rose lost to Notre Dame at South Bend. Dubuc was in the box for the "Catholics" and seemed to have things his own way, only four hits being secured off of his delivery. Backman pitched a good game, but his opponents were too much for him, as they were able to bunch their hits when they were needed for runs.

ROSE	A.B.	R.	H.	P.O.	A.	E.
Shook, s.s	3	0	0	2	5	0
Hadley, 1b.,	4	0	2	15	2	1
Uhl, 2b.,	4	0	0	0	7	0
Backman, p.,	4	0	2	0	3	0
Schmidt, l. f.,	3	0	0	2	0	1
Barret, c. f.,	2	0	0	0	0	0
Abbett, c.,	3	0	0	3	0	0
Piggott, r. f.,	3	0	0	0	0	0
Heidenger, 3b.,	2	0	0	2	2	1
Webster, c. f.,	1	0	0	0	1	0
Totals	29	0	4	24	20	3

NOTRE DAME	A.B.	R.	H.	P.O.	A.	E.
Bonham, l. f.,	4	1	1	2	0	0
Brogan, 3b.,	3	0	0	1	4	0
Daniels, 1b.,	4	1	1	11	0	0
Cutshaw, 2b.,	4	0	1	3	4	0
Scanlon, c. f.,	4	0	0	0	0	0
Ruel, ss.,	4	1	1	0	1	0
Centlever, r. f.,	4	1	1	1	0	0
McDonough, c.,	4	1	3	9	5	0
Dubuc, p.,	4	0	1	0	2	0
Totals	35	5	9	27	16	0

Score by innings:

Notre Dame	0	0	0	0	2	0	2	1	*—5
Rose	0	0	0	0	0	0	0	0	0—0

SUMMARIES–Bases on balls, off Backman 1, off Dubuc 2. Struck out, by Backman 3, by Dubuc 9. Two base hits, McDonough. Stolen bases, Backman (2). Time 1:15.

ROSE, 0; WABASH, 2.

On May 19, we went to Crawfordsville for the second fray with Wabash, which proved to be a pitcher's battle between Erwin and Backman. We came off losers by the score 2 to 0. Erwin had 7 strikeouts to his credit while "Back" made 9 of the "Crimsonites" fan the ozone. Wabash got both of their runs in the first inning when, after Diddle had singled, Backman hit the next man up, and both scored on Sheller's sacrifice hit.

ROSE	A.B.	R.	H.	P.O.	A.	E
Shook, s. s	4	0	1	1	1	1
Hadley, 1b.	4	0	0	7	0	0
Backman, p.	4	0	1	3	4	0
Uhl, 2b.	3	0	0	0	1	0
Webster, c. f.	2	0	0	0	0	0
Piggott, r. f.	3	0	0	0	0	0
Abbett, c.	3	0	0	10	1	0
Barret, 1 f.	3	0	0	0	0	0
Heidenger, 3b.	3	0	1	3	1	0
Total	29	0	3	24	8	1

WABASH	A B.	R.	H.	P.O.	A.	E.
Diddle, s s.	4	1	3	2	1	0
Lambert, 2b	4	1	1	2	4	0
Starbuck, c. f.	4	0	0	0	0	0
Sheller, 1b.	3	0	0	9	1	0
Bowers, c.	3	0	0	7	2	0
Adams, l. f.	3	0	0	3	0	0
Bridge, r. f.	3	0	0	2	0	0
Dobbins, 3b.	3	0	1	0	0	0
Erwin, p.	2	0	0	2	1	0
Totals	29	2	5	27	9	0

Scores by inning:

Rose	0	0	0	0	0	0	0	0	0—0
Wabash	2	0	0	0	0	0	0	0	0—2

SUMMARIES—Bases on balls, off Backman, 1, off Erwin, 1. Struck out, by Backman. 9, by Erwin, 7. Sacrifice hits, Sheller, Lambert. Hit by pitcher, Lambert. Stolen bases, Diddle, 2, Lambert, Dobbins.

Umpire, Dr. May.

ROSE, 3; NORMAL, 1

On May 20, we annexed the second game with Normal very easily on the Poly Campus. Uhl pitched a masterful game for us and came very nearly making it a shut-out. This was Uhl's first game for the Varsity and he showed that he could deliver the goods as well as the best of them.

ROSE	A.B.	R.	H.	P.O.	A.	E.
Shook, s. s.	4	0	0	1	0	0
Hadley, 1b.	4	0	0	13	1	0
Backman, 2b.	2	0	0	3	1	0
Uhl, p.	3	0	1	2	7	1
Webster, c.f.	3	1	0	2	0	0
Schmidt, 1f.	3	1	1	1	0	0
Piggott, r. f.	1	1	0	0	0	0
Abbett, c.	2	0	0	4	4	0
Heidenger, 3b.	3	0	1	1	1	0
Total	25	3	3	27	14	0

NORMAL	A.B.	R.	H.	P.O.	A.	E.
Moye, 3b.	4	0	1	1	3	1
Cauble, c. f.	4	1	1	1	0	0
Spencer, 1b.	3	0	0	11	0	0
Schockel, c.	3	0	1	3	1	1
Reese, p.	4	0	1	2	4	1
Gearen, 1f.	3	0	0	3	0	0
Skeeter, s. s.	3	0	0	1	4	0
Pearson, p.	3	0	0	1	2	0
Fox, r. f.	3	0	0	1	1	0
Total	30	1	4	24	15	2

Score by innings:

Rose	0	1	0	0	0	2	0	0	*—3
Normal	0	0	0	0	0	0	0	0	0—1

SUMMARY—Bases on balls, off Uhl, 1, off Pearson, 3. Struck out, by Uhl 6, by Pearson 1. Hit by pitcher, Backman, Webster, Piggott (2). Two-base hits, Heidenger, Schmidt, Schockel. Stolen bases, Backman, Uhl, Webster, Schmidt. Umpire, Nelson. Time, 1:40.

ROSE, 6; DE PAUW, 7.

Things looked pretty blue for us on May 21, when we went to Greencastle for the first game of the season with De Pauw, as Uhl had just pitched the day before and Backman's arm was still sore from the Wabash game. Heidenger pitched three runnings and was then relieved by "Back," but we were unable to overcome the "Preachers" lead of 5 runs gotten in the first three sessions.

ROSE	A.B.	R.	H.	P.O.	A.	E.
Shook, s. s.	2	2	0	1	2	0
Hadley, 1b.	3	1	0	5	0	0
Backman, 3b. and p.	4	2	1	2	2	2
Uhl, 2b.	4	1	2	3	2	0
Webster, c. f.	4	0	0	2	0	0
Barret, l. f.	4	0	2	0	0	0
Abbett, c.	4	0	0	9	1	0
Nicholson, r. f.	4	0	0	1	0	0
Heidenger, p. and 3b	2	0	0	1	2	0
Totals	31	6	5	*26	9	2

DE PAUW	A.B.	R.	H.	P.O.	A.	E.
Bryant, s. s.	4	2	1	1	2	1
Tucker, c.	5	1	1	7	3	1
Rhoades, p.	4	2	2	1	2	1
Holderman, 1b.	4	0	1	10	1	0
Overman, c. f.	4	2	0	0	0	0
Jewett, rf.	4	0	1	1	0	0
Dee, 2b.	4	0	2	2	3	1
Lantz, 3b.	4	0	2	3	1	0
Collins, l. f.	4	0	0	1	0	1
Totals	37	7	10	27	12	5

* No one out when winning run was made.

Score by innings:

De Pauw	3	0	2	0	1	0	0	0	1—7
Rose	2	0	0	0	0	4	0	0	0—6

SUMMARIES—Bases on balls, off Rhoades 3, off Backman 2. Struck out, by Rhoades 5, by Backman 9. Two base hits, Backman, Uhl, Rhoades. Sacrifice hits, Hadley, Collins. Time 1:45. Umpire, Whitesides.

ROSE, 1; E. I. S. N. S., 2.

On May 23, Captain Heidenger took his band of warriors to Charleston, only to be defeated by the Eastern Illinois team in a pitchers battle, by the score of 2 to 1. Tarbell, working against Uhl, struck out 11 men while "Sandy" put out 10 in this way. The Normals' scores came in the first inning. With one out G. Tarbell was safe on Backman's error and scored when Ivy singled. Ivy scored on Gishard's hit, but the next two men were out in quick succession and this ended the scoring for them. The Polys' lone run also came in the first inning. Witn one down Hadley singled and scored on Uhl's hit. Backman and Webster struck out and the scoring was at an end.

ROSE	A.B.	R.	H.	P.O.	A.	E.
Shook, s.s,	4	0	1	1	0	0
Hadley, 1b.,	4	1	1	10	2	0
Backman, 2b.,	4	0	0	3	3	1
Uhl, p.,	4	0	2	0	3	0
Webster, c. f.,	2	0	0	0	0	0
Schmidt, 1f.,	3	0	0	0	0	0
Nicholson, r. f.,	3	0	0	0	0	0
Abbett, c.	3	0	0	9	3	0
Heidenger, 3b.,	3	0	1	1	2	0
Totals	30	1	5	24	13	1

E. I. S. N. S.	A.B.	R.	H.	P.O.	A.	E.
Vaughn, 2b.,	4	0	1	1	2	0
G. Tarbell, c.,	3	1	0	11	1	0
Ivy, s. s.,	3	1	2	2	1	0
W. Tarbell, p.	3	0	1	0	5	0
Gishard, 3b.,	3	0	1	0	2	1
Fleming, 1f.,	3	0	0	0	0	0
Corwind, 1b.,	3	0	0	11	0	0
Taylor, r. f.,	3	0	0	1	0	0
Willis, c. f.,	3	0	0	0	0	0
Totals	28	2	5	*26	11	1

Scores by innings:

Rose	1	0	0	0	0	0	0	0	0—1
E. I. S. N. S. . .	2	0	0	0	6	0	0	0	0—2

* Nicholson out, hit by batted ball.

SUMMARIES—Bases on balls, 0. Struck out, by Uhl 10, by Tarbell 11. Two base hit, Heidenger. Stolen bases, Hadley, Uhl, Ivy. Umpires, Scott and Goodman.

ROSE, 3; WABASH, 2.

On May 26, at Crawfordsville Rose turned the tables on Wabash, winning a fast game 3 to 2. Rose Poly's three runs came in the second inning with two down, and with two men on bases. Lambert muffed Barret's high foul, allowing him to crack out a two-bagger on the next ball pitched, scoring two men.

Heidenger followed with a single, scoring Barret. That ended the run getting for Rose. Wabash scored one in the third. Faunce walked, was sacrificed to the second by Irwin and scored on Lambert's out. In the fifth, with two men down, Diddle drew a pass, stole second and scored on Lambert's single to left.

ROSE	R.	H.	P.O.	A.	E.
Hadley, 1b.	0	0	7	2	0
Shook, s. s.	0	1	0	2	0
Uhl, 2b.,	0	0	5	1	0
Backman, p.	0	2	1	4	0
Johnston, c. f.,	1	0	1	0	0
Abbett, c.,	0	0	7	3	1
Stokes, r. f.,	1	1	0	0	1
Barret, l. f.,	1	2	3	1	0
Heidenger, 3b.,	0	1	3	2	1
Totals	3	7	27	15	3

WABASH	R.	H.	P.O.	A.	E.
Diddle, s s.,	1	0	2	5	0
Lambert, 2b.,	0	1	3	4	1
Starbuck, c. f.,	0	1	1	0	0
Sheller, 1b.,	0	1	12	1	1
Bridge, r. f ,	0	1	0	0	0
Adams, l. f.,	0	0	2	0	0
Bowers, c.,	0	1	5	1	0
Faunce, 3b.,	1	0	2	0	3
Irwin, p.,	0	0	0	2	0
Totals	2	5	27	13	5

Score by innings:

Rose	0	3	0	0	0	0	0	0	0—3
Wabash	0	0	1	0	1	0	0	0	0—2

SUMMARIES—Two-base hits, Starbuck, Barret. Sacrifice hits, Bridge, Adams, Irwin. Stolen base, Diddle. Left on bases, Wabash 5, Rose 6. Double plays, Diddle to Lambert to Sheller, Lambert to Faunce, Backman to Hadley to Heidenger. Struck out, by Irwin 4, by Backman 7. Bases on balls, off Irwin 3, off Backman 4. Wild pitch, Backman. Time 1:45. Umpire, Grim.

ROSE, 5; NORMAL, 1.

On May 27th, the Normals tried their best to get one out of the three by running in a new pitcher, Fortner, but although he was better than any other they had pitted against us, he was

not equal to the task, and we made it three straight from our old friends, the enemy.

ROSE	A.B.	R.	A	P.O.	A.	E.
Hadley, 1b.,	4	0	3	15	0	0
Shook, s. s.,	3	2	1	2	4	0
Uhl, p.,	4	1	0	1	6	1
Backman, 2b.,	4	1	3	3	4	0
Barret, c. f.,	4	0	0	1	0	0
Abbett, c.,	4	0	0	2	1	0
Nicholson, r f.,	4	0	0	0	0	0
Schmidt, l. f.,	3	0	0	0	0	0
Heidenger, 3b ,	3	1	2	3	4	0
Totals	33	5	9	27	19	1

NORMAL	A.B.	R.	A.	P.O.	A.	E
Moye, 3b.,	4	0	0	4	1	0
Cauble, c. f.,	3	0	0	1	0	1
Schockel, c.,	4	0	1	13	3	0
Spencer, 1b.,	4	0	0	6	0	0
Reese, 2b.,	3	0	0	1	2	0
Skeeter, s. s ,	3	0	0	0	3	1
Fox, r. f ,	3	0	1	0	0	0
Gearen, l f.,	3	1	2	2	0	0
Fortner, p.,	3	0	0	0	3	0
Totals	30	1	4	27	12	2

Score by innings:

Rose,	1	0	0	0	0	4	0	0	0—5
Normal,	0	0	0	0	0	0	0	1	0—1

SUMMARIES—Bases on balls, off Uhl, 1. Struck out, by Fortner, 10; by Uhl, 2. Two-base hits, Hadley 2, Backman, Gearen. Three base hits, Gearen, Fox. Hit by pitched ball, Shook. Passed ball, Schockel. Double play, Uhl to Backman to Kelley. Umpire, Nelson. Time, 1:50.

ROSE, 6; DE PAUW, 8.

On Decoration Day, the loyal fans of the school hied themselves to the Central League Park, only to see their favorites go down in defeat for the second time this season to the team from DePauw. The game was very ragged on both sides, while the "Preachers" had the best of the argument in the hitting line, getting seven to our four. One thing that was against our boys was the grass infield at the park. They had been practicing all season on a skinned diamond and were unable to judge the grounders that came to the infield. Four hits off of Backman in the fourth inning, coupled with several errors on our side, gave DePauw a lead that we could not overcome. In our half of the ninth, with the enemy three runs in the lead, it looked as if we could make enough tallies to at least insure an overtime game. With two down, Nicholton got to first on an error and scored on Piggott's hit, but Barret knocked a high foul which Tucker smothered, and the game was over.

ROSE	A.B.	R.	H.	P.O.	A.	E.
Hadley, 1b.,	4	1	0	9	2	1
Shook, s s.,	4	1	0	2	4	2
Uhl, 2b.,	5	2	2	3	1	3
Backman, p.,	4	0	0	5	4	0
Nicholson, c. f ,	4	1	0	0	0	0
Schmidt, l. f.,	3	0	0	0	0	0
Barret, l. f.,	5	0	0	1	0	0
Abbett, c.,	3	0	0	1	1	0
Heiddenger, 3b.,	4	1	1	5	1	2
Piggott, r. f.,	1	0	1	1	0	0
Totals	37	6	4	27	13	8

DE PAUW	A.B.	R.	H.	P.O.	A.	E.
Bryant, s. s.,	4	1	0	0	3	0
Tucker; c.,	4	3	0	10	1	0
Rhoades, p.,	4	0	1	2	3	3
Holderman, 1b ,	5	0	1	12	0	0
Overman, c f.,	5	0	0	0	0	0
Collins, l. f.,	5	0	0	1	0	0
Dee, 2b.,	5	3	2	2	1	3
Jewett, r. f.,	4	1	2	0	0	0
Lantz, 3b.,	3	0	1	0	5	1
Totals	39	8	7	27	13	7

Score by innings:

Rose,	0	2	0	0	3	0	0	0	1—6
DePauw,	0	1	0	4	1	0	2	0	0—8

SUMMARY — Bases on balls, off Backman, 1; off Rhoades, 4. Struck out, by Backman, 1; by Rhoades, 9. Wild pitch, Rhoades. Hit by pitcher, Abbett, Piggott, Rhoades, Lantz. Two-base hits, Jewett 2 Three-base hit, Rhoades. Sacrifice hit, Tucker. Umpire, Grim. Time, 1:50.

ROSE, 0; WABASH, 3.

Wabash came to Terre Haute June 6, with the intention of taking the last game and splitting even on the series, and they were able to do this by taking advantage of our errors in the eighth inning and pushing three men across the pan. Aside from this inning the game was a very spectacular one, being essentially a pitchers' battle between "Back" and Erwin.

ROSE	A.B.	R.	H.	P.O.	A.	E.
Hadley, 1b.	3	0	0	14	1	0
Shook, s. s.	4	0	1	0	2	1
Uhl, 2b.	4	0	1	1	2	2
Backman, p.	3	0	0	1	8	0
Barret, r. f.	3	0	0	0	0	0
Schmidt, l. f	2	0	1	0	0	1
Nicholson, c. f	4	0	1	1	0	0
Abbett,	4	0	0	9	2	0
Heidenger, 3b	4	0	0	1	1	0
Webster, l. f	1	0	0	0	0	0
Piggott, r. f	1	0	0	0	0	0
Totals	33	0	4	27	16	4

WABASH	A.B.	R.	H.	P.O.	A.	E.
Diddle, s. s.	3	1	0	2	3	1
Lambert, 2b	4	0	1	1	2	1
Starbuck, c. f.	4	1	1	3	0	0
Shaffer, l. f.	4	0	1	1	0	0
Bridge, r.f	4	0	0	3	0	0
Bowers, c	3	0	0	4	1	0
Faunce, 3b	4	0	0	1	3	0
Sheller, 1b	4	0	1	10	0	0
Erwin, p.	1	1	1	2	2	1
Totals	31	3	5	27	11	3

Score by innings:

Rose	0	0	0	0	0	0	0	0	0—0
Wabash	0	0	0	0	0	0	0	3	0—3

SUMMARIES—Bases on balls, off Backman 1, off Erwin 3. Struck out, by Backman 9, by Erwin 2. Two base hit, Starbuck. Sacrifice hits, Erwin, Bowers, Diddle. Stolen base, Heidenger. Passed ball, Abbett. Time 1:45. Umpire, Grim.

TENNIS.

During the few days before the I. C. A. L. meet, tennis held the eyes of every one. Young Hathaway and Uhl, victors in the doubles of last year, fell down in their play and Earlham got first place. In the finals for the singles Uhl won out over Beebe of Earlham in a very close match, so the I. C. A. L. Tennis Singles championship remains with us another year.

In the I. I. A. A. meet held at Bloomington the first week in June, Hath and Uhl went out early in the fight in the doubles, but in the singles Uhl fought his way to the finals. These he played off with Rose of Butler and was only beaten by a very close margin.

I. C. A. L. TRACK AND FIELD MEET.

The I. C. A. L. Track and Field meet held on Parson's field, May 16th, was a race for supremacy from the very start between Earlham and Wabash. The "Little Giants" finally winning out over the "Quakers" in the last two events. Five league records were broken in the meet, 440 yd. dash, discus hurl, shot put, high jump and 120 yd. hurdles. "Jimmie" Darst got the only first for us by throwing the hammer 115 feet. The final score was Wabash 56½, Earlham 45, Rose 11½, Normal 4.

SUMMARIES.

100-yard dash—Trial heats: First heat—Conrad, Earlham; Johnson, Wabash. Time, 10 1-5. Second heat—Blair, Wabash; Shaw, Rose. Time, 10 2-5. Final heat—Conrad, Earlham; Blair, Wabash; Johnson, Wabash. Time, 10 3-5.

220-yard dash—Trial heats: First heat—Conrad, Earlham; Deming, Wabash. Time, 23 1-5. Second heat—Benham, Normal; Blair, Wabash. Time, 24 2-5. Final heat—Blair, Wabash; Conrad, Earlham; Deming, Wabash. Time, 23 3-5.

440-yard dash—Deming, Wabash; Nanney, Earlham; White, Earlham. Time, 51 3-5. (State Record, 52 3-5.)

Half-mile run—Nanney, Earlham; Worsham, Rose; B. Patton, Wabash. Time, 2:07 2-5.

Mile run—Emanuel, Wabash; Furnas, Earlham. Hutton, Earlham. Time, 4:50 2-5.

120-yard hurdles—Trial heats: First heat—Belman, Wabash; White, Earlham. Time, 17. Second heat—Smith, Rose; Hesslar, Wabash. Time, 17. Final heat—White, Earlham; Belman, Wabash; Smith, Rose. Time, 16 3-5.

220-yard hurdles—White, Earlham; Belmont, Wabash; Stantz, Normal. Time, 26 2-5.

Discus hurl—Brown, Wabash; Walthal, Earlham; Standau, Rose. Distance, 110 ft., 7 in. (State record, 102 ft. ¼ in.

Shot put—Brown, Wabash; Bosson, Wabash; Standau, Rose. Distance, 42 ft. 8 in. (State record, 36 ft. 10 in.)

Hammer throw—Darst, Rose; Watson, Wabash; Green, Normal. Distance, 115 ft.

Running high jump—Bosson, Wabash; Conrad and Fishback. Earlham and Normal, tied for second place. Height, 5 ft. 10 in. (State record, 5 ft. 7 in.)

Running broad jump—Conrad, Earlham; Bosson, Wabash; Jones and Standau, Wabash and Rose, tied for third place. Distance, 21 ft. 4 in.

Pole vault—Hargrave, Wabash; Conrad, Earlham; Stantz, Normal. Height, 10 ft. 1¾ in.

ROSE-MILLIKEN DUAL MEET.

Coach Knight took his track men to Decatur for a meet with Milliken Universty on Decoration Day, but lost to the "Suckers" on a slow track. Poly took the lead early in the fight, but Milliken caught up with them, and after a neck and neck race came out with the long end of a 68½ to 60½ score. "Dick" Smith set a new school mark for the high hurdles, making the 120 yards in 16 1-5 seconds. Shaw and Templeton, new men, won their first "R's" in this meet. Darst broke his former record of 115 feet in the hammer throw, made at the state meet, by tossing the hammer 116 feet 2 inches. This was the last track event of the year, and although the season has not been like those we had with Turk in school, Coach Knight is proud of the fact that he has developed a nucleus for next

year out of comparativly green men, and he predicts that then, we will have one of the fastest teams that has ever donned the thin clothes for Old Rose.

SUMMARIES.

50-yard dash—McCormick, Rose; Smith, Rose; Gee, Milliken; Time, .05⅘.

Half-mile—Wallace, Milliken; Worsham, Rose; Poole, Milliken. Time, 2:10.

Shotput—Standau, Rose; Bennett, Milliken; Smith, Milliken. Distance, 37 feet 0 inches.

High jump—Viers, Milliken; Smith, Rose; Shumway, Milliken and Buckley, Rose, tied Height 5 feet 5 inches.

Low hurdles—W. Drake, Milliken; E. Drake, Milliken. Time, :28 3-5.

220-yd. dash — W. Drake, Milliken; Templeton, Rose; Shaw, Rose. Time, 24 3-5.

Discns—Bennett, Milliken; Smith, Rose; Hinds, Milliken. Distance, 97 feet 1 inch.

Mile run—Wallace, Milliken; Worsham, Rose; Tyler, Rose. Time, 4:57 3-5.

Hammer—Darst, Rose; Hinds, Mulliken; Standau, Rose. Distance, 116 feet 2 inches.

100-yard dash—E. Drake, Millikcn; Shaw, Rose; Smith, Rose. Time, :10 3-5.

120-yard high hurdle—Smith, Rose; Taylor, Milliken; no third. Time, :16 1-5.

Broad jump — Veirs, Milliken; Wilson, Milliken; Smith, Rose. Distance, 20 feet 5½ inches.

Pole vault—McCormick, Rose; Shumway, Milliken; Hinds; Milliken. Height, 9 feet 1 inch.

440-yard run—E. Drake, Milliken; McCormick, Rose; Templeton, Rose. Time, :54 1-5.

Half-mile relay—Won by Rose. Time, 1:32.

ATHLETIC SUMMARY FOR THE YEAR.

FOOT BALL.

Wabash	27	Rose	0
E. I. S. N. S.	0	Rose	0
Milliken	2	Rose	0
Butler	5	Rose	16
Vanderbilt	65	Rose	10

BASKET BALL.

Illinois	35	Rose	26
Butler	17	Rose	34
Wabash	32	Rose	13
DePauw	12	Rose	24
Normal	19	Rose	39
Indiana	30	Rose	11
New Albany Y. M. C. A.	37	Rose	20
Louisville Coliseum	20	Rose	22
Wabash	55	Rose	8
Earlham	33	Rose	47
Purdue	34	Rose	26
Indiana	33	Rose	19
DePauw	15	Rose	51
Earlham	30	Rose	25
Butler	13	Rose	30

BASE BALL.

Purdue	1	Rose	0
Normal	3	Rose	8
Wabash	5	Rose	7
Notre Dame	5	Rose	0
Wabash	2	Rose	0
Normal	1	Rose	3
DePauw	7	Rose	6
E. I. S. N. S	2	Rose	1
Wabash	2	Rose	3
Normal	1	Rose	5
DePauw	8	Rose	6
Wabash	3	Rose	0

TRACK.

Rose	61	Normal	56
Rose	60½	Milliken	68½

I. C. A. L.

Wabash	56½	Earlham	45
Rose	11½	Normal	4

M. E. P. DANCE.

The M. E. P. fraternity gave a dance on the evening of June 8th, at the Phoenix Club. The walls of the club were well decorated with college and fraternity pennants. About thirty couples were present and although the evening was a trifle warm, the time was enjoyably spent by those who attended.

Among the Alumni that returned for the dance and commencement were Roy W. Hill, '04, J. Edward Daily, '05, John O. Bland, '05, Carl Wischmeyer, '06, Henry Wischmeyer, '06, Arthur Worthington, '07 Harry R. Canfield, '06, Addison W. Lee, '06, Howard Taylor, '07, Harry D. Baylor. '07, James A. Stalker, '07.

The Rose Alumni of Schenectady met on Saturday, April 25th, at the Mohawk Club and organized the Rose Tech Club of Schenectady.

Supper was served and officers were then elected for the year, Mr. Thurman, '06, being elected president, and Geo. H. Pfeif, secretary.

Among those present were A. H. Moore and E. G. Waters, '88, E. E. Gilbert, '89, W. J. Davis, Jr., '92, H. E. McDermott, '93, E. P. Edwards, '99, W. H. Randall, '04, D. K. Atherton, George Benson, Jr., A. C. Gray, G. H. Pfeif, '05, C. W. Lawton, H. C. McComb, Roy Thurman, H. E. Wilkins, '06. W. P. Andrick, R. S. Sage, J. B. Shickel, O. G. Whitecotton, P. R. Wickliffe, '07.

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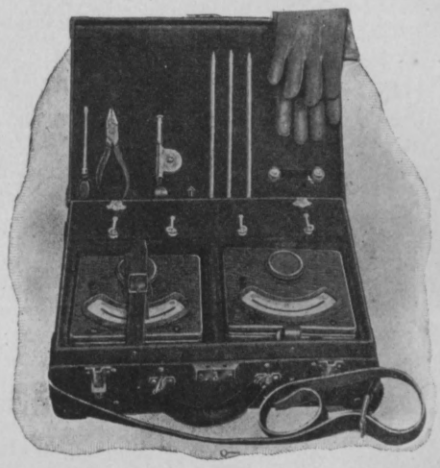

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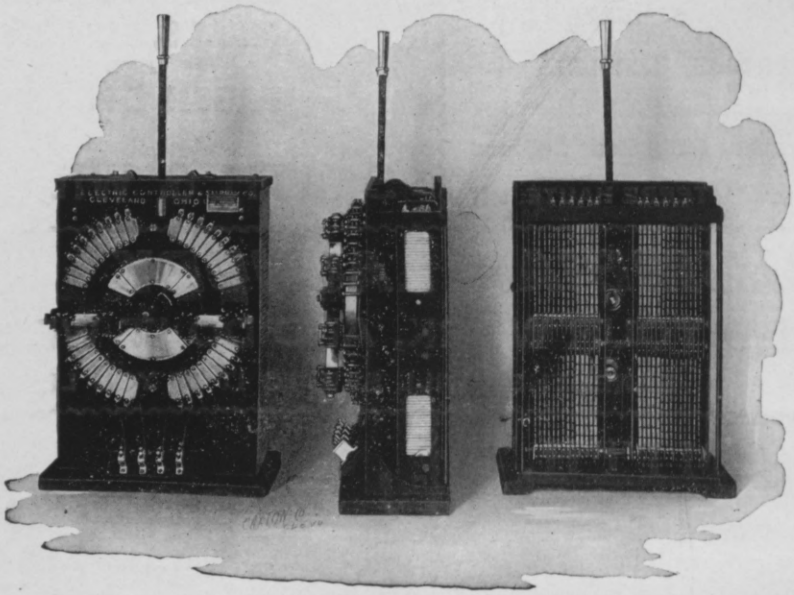

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