SIBLEY COLLEGE, CORNELL UNIVERSITY.

FIVE YEARS OF GROWTH.

Five years ago we published an account of the then new schools of the mechanic arts and of mechanical engineering, which had just been established by the formal organization of four of the departments of Cornell University into one, known as the Sibley College of Mechanical Engineering and the Mechanical Arts. Sibley College had been, for some years, the department which, in accordance with the fundamental U. S. land grant act, and the charter of the University, the University and the State of New York were to found in order that the institution might pursue as its "leading object," in the words of the law, the plan of promotion of the useful arts, which was the initial and main purpose of the land grant bill. It had been named after Mr. Hiram Sibley, who had supplied those funds which the act made the State responsible for, to put up buildings and to furnish equipment, a responsibility which the State has thus far failed to assume, in any direction. Ezra Cornell undertook this, the obvious duty of the State, as respects the University generally; while Sibley took in hand this special part of the work, in which he was most interested. He retained his interest until, two years ago, he died, leaving some $200,000 worth of property as the testimony of his philanthropic zeal in behalf of technical education.

In 1885, the demand having indicated the wisdom of the move, the trustees reorganized this side of the University in the manner described in our earlier account, placing the organization in charge of a "director," with instructions to plan the system, lay out proper courses of study, and suggest desirable changes and improvements in studies, methods, buildings, equipment, and whatever should seem desirable. This was done, the suggested changes were approved, and the college was given the form and character indicated in the SCIENTIFIC AMERICAN five years ago (October 17, 1885).

We now propose to indicate what five years have brought forth. At that time it was estimated that the buildings and equipment were ample for 200 students, the University, however, supplying all non-professional instruction, as in pure mathematics, languages, the physical sciences, and general academic studies, as far as called for. A remarkable growth at once began. The number graduating the first year, 1886, was 5; the next year 16 took the first, and 3 the higher degree of master in mechanical engineering. The third year 19 took the first degree and 6 the higher one. In 1889, 27 took the first degree and 5 the higher one; and in the fifth year, 1890, 54 took the degree of mechanical engineer and 6 that of master—the latter including a number of distinguished professors and instructors from other colleges; while among those taking the first degree were many graduates of classical and other academic courses and of many other colleges. During this period the total numbers rose rapidly until, in the academic year just passed, there were over 400 students crowded into accommodations intended for 200, and instructed by the smaller force organized for that number; while there were 1,300 in the University. The result has been that the authorities have been compelled to choose between enlarging their buildings and equipment and their teaching force or rigidly excluding the excess in numbers of students applying for entrance. Notwithstanding the fact that the income of the University is seriously taxed, the former course was decided upon, and the changes now going on will enable the college to work 600 students more conveniently and profitably than they formerly could handle 200.

In the college year 1890–91, about to commence, the shops, laboratories, and experimental departments of the college will be about doubled in extent. The new chemical laboratory will give similarly enlarged accommodations, and the physical laboratory will fill Franklin Hall, and occupy also a large dynamo room adjacent to the engine and boiler rooms of Sibley College, thus more than doubling its extent. As this department supplies the instruction in electrical physics, and all the introductory and much of the advanced work in the course in electrical engineering, its extension and improvement constitute an important gain to Sibley College. Other improvements about the University add also greatly to the facilities for advanced study, which will be appreciated by the increasing numbers coming to pursue semi-professional with their professional studies, as in technical reading, advanced mathematics, political economy, patent law, etc.

Our first illustration shows the university campus as it would appear from a balloon over Cayuga Lake, at the N.W., and a mile from the grounds. It is seen that the half mile square of campus now includes a dozen great buildings, and about thirty professors' houses, most of the older members of the faculty residing within the beautiful park. At either end is a deep gorge, Cascadilla and Fall Creek, full of beautiful cascades and magnificent falls of from a few feet to sixty feet descent in the half mile abreast the campus. The Fall Creek Falls supplies power for the water supply department and for the wheels driving the shop and other machinery when required. Steam engines also abound for the purposes of the electric lighting department and the laboratory. The largest buildings in the "Professors' Row," crossing the middle distance in the picture, are those of ex-President White and President Adams; while directly in the vertical line, over the great library building, is that of the director of Sibley College.

The "technical side" of the University is seen in the foreground at the left, where are grouped the buildings of the College of Civil Engineering, Sibley College, the two great chemical and physical laboratories, the shops and the laboratories of the department of mechanical engineering. The Sibley College group is distinguished by the tall chimney, at the foot of which are the 600 horse power boilers supplying heat to the whole University. Fall Creek gorge drops a hundred feet or more beside it, and a thousand feet of steel wire is there in operation bringing up the energy of the fall below to turn the machinery of the shops and laboratories.

The second picture shows the house of Director Thurston, and the next one to the right represents the Sibley College buildings, with the recent additions which have been made to them. The department of physics occupies the largest building, at the right. The trees about the buildings are removed to give a better view. These buildings are from 150 to 165 feet long, and from 40 to 60 wide, yet, in the working season, are crowded with busy and interested students, some under instruction, the older ones engaged in verification of data and formulas of engineering, and advanced students in researches in a thousand interesting and important departments of applied science. The professors and instructors also make time, despite their long working hours and fatiguing duties in instruction, to pursue those investigations which have a special charm for the man of science familiar with the higher walks of his profession. The small building at the right is the magnetic observatory of the department of physics, containing the famous great tangent galvanometer; that next it is the mechanical laboratory. At the left follow the Sibley College main buildings, the physical laboratory, and the chemical laboratory, just completed and perhaps the finest of its kind yet built.

The equipment of the college is as interesting and remarkable as are the buildings. All students have access to the great library, which will hereafter expend $15,000 or $18,000 annually in the purchase of books, having accommodations for a half million, nearly, with facilities for doubling conveniently. The new laboratories are filled with the needed apparatus for instruction, of the standard sorts, and, in addition, are provided with very extensive collections for research, partly secured by purchase, largely by construction at the University. The physical laboratory, besides the usual lecture room illustrative apparatus, contains working instruments for several hundred students, and special apparatus for research is constantly in use and continually being made. The great structure is occupied from top to bottom. In electrical engineering apparatus the outfit is something peculiarly impressive. There are collected here, and in Sibley College proper, in the departments of physics and of electrical engineering, representatives of all the well known systems of dynamo, motor, and distribution. There are two or three dozen, and of all sizes, as well as all kinds, ranging from the "pony" alternators of Westinghouse and the half horse power Edisons to the machines for 400 and 600 lights, for lighting the campus and, ultimately, the larger buildings and groups of buildings about the campus. Ball, Edison, Brush, Mather, Gramme, Stanley, Thomson-Houston, Westinghouse, Weston, Tesla, Sprague, the various storage batteries, and various sizes and forms of dynamo built in the University, crowd the rooms to overflowing; in fact, some could not be set up until the extension of this summer was made, in consequence of lack of space.

The dynamos are grouped in large rooms adjacent to the boilers, and near them are also placed the various engines employed for experimental and other purposes. There are a half dozen of these, large and small, and more to come.

These are usually fitted up with Prony brakes for tests, and a surface condenser is so arranged that those to which it can be attached may have their efficiency measured by the Bryan and Donkin system. A dozen sorts of indicators—all the well known and many unfamiliar kinds—usually in pairs, permit a large amount of this kind of work to be carried on at once. The boiler room is also intended to offer special facilities for boiler trials and measurements of efficiency and of quality of steam, including in its outfit all the "calorimeters" for the latter purpose. Transmission, as well as the various forms of absorption, dynamometers are employed, and include among the former the Norin, built in the shops, and among the latter the Halpin and the Alden forms. The testing machines, of all the usual and some unusual forms, are only less numerous than the dynamos. They include all the best makes, and range from a little Brown & Sharpe "yarn tester" to a 5 ton transverse machine, and from a small impact apparatus to 40,000, 50,000, and 100,000 pound machines made by Fairbanks, Olsen, and Riehle. Oil testing machines and an "autographic" machine, mainly of the Thurston forms, as built by the Pratt & Whitney Co., and other apparatus too numerous for cataloguing, fill these laboratories.

The shops of the Department of the Mechanic Arts now occupy two large buildings, one, 150 feet by 40, devoted to foundry and blacksmith shop, the other, 165 by 40, and two stories high, to the machine shop on the lower floor, and the wood-working shop above. They are well fitted up with machinery and hand tools, and will be of ample capacity for six hundred students. The toilet rooms, with their hundreds of lockers, and the tool rooms, are hardly less interesting, as exhibiting the extent of this great institution, than are the shops and laboratories themselves. The skilled workmen here employed and the pupils vie with each other in the construction of apparatus and tools for the University and for the various purposes of the college. Besides the machinery built here, there are good examples of the best work of all the great tool builders of the country, and lathes and planers, milling machines, drills and shapers of all the standard kinds, are made useful in giving a practical instruction such as every good citizen desires his son to obtain. When these young men attain to positions of responsibility, it is found that this part of their education is of enormous advantage to them and to their men, not only in facilitating the application of the best methods of work, but in giving them a good idea of what constitutes good work, and enabling them to deal fairly by those working under their direction.

The course of instruction includes four years of work in drawing rooms and shops, a continuous course in mathematics, pure and applied, the modern languages, and the sciences. Two years are given in part to the course in chemistry, including a certain amount of analytical chemistry; and two years of physics in lecture room and laboratory. Advanced work in physics is also given, the electrical engineers devoting much time both to electrical measurements and the theory of the dynamo, and to electrical engineering, construction of stations and of machinery and distributing apparatus. With these students, the last year is mainly given to work directly needed and characteristic of their special calling. Two years of work in the mechanical laboratory, in learning the use of apparatus, in testing metals and other materials of engineering, engines and boilers, and other machinery, and in pursuing various lines of scientific and professional research, give the young engineers most attractive as well as practically useful knowledge. The lecture room work in machine designing, in the principles of construction, and in the theory of the prime movers, places the graduate in these courses in a position to profit admirably by his later opportunities.

A large amount of work is now done by graduate students, most of whom are candidates for advanced degrees, and intend to pursue, as a rule, the vocation of instructors in science and in technical schools. Many professors of engineering go to Cornell and Sibley College to secure an experience in laboratory work and to make scientific and engineering researches such as their earlier opportunities failed to offer them. Facilities for this branch are here exceptionally great and are continually improving.

The standard of requirements for admission to the courses leading to degrees is higher than is usual, even in technical schools of high standing, and is steadily advancing; but the number who are found competent to enter is, nevertheless, continually increasing, and the authorities are constantly embarrassed in their endeavor to find funds for erection of buildings and to enlarge the teaching force. Particulars can be obtained by addressing either President Adams, the dean of the University, or Dr. R. H. Thurston, director of Sibley College, Ithaca, N. Y. The opportunities here for those who desire and are able to aid higher education are exceptionally great, and the larger the endowments and the larger the income of the University, the more widely do the opportunities in this direction open.

Trial Trip of the Steamer Plymouth.

The steamer Plymouth had her trial trip on Wednesday, October 1, and it was in all respects a success. With a numerous party of guests representing the steamboat and general mechanical interests of this city, she ran up the Hudson River as far as Spuyten Duyvil Creek. There the steamer was turned in various directions to adjust her compasses. When this was in a measure attended to, she turned and proceeded down the river and bay to Sandy Hook, where the adjustment of the compasses was completed. Meanwhile the guests had partaken of a banquet in the grand saloon, which was followed by some speeches. The engines were started by their designer, Mr. Andrew Fletcher. They showed to great advantage, working up to twenty-six revolutions. The control over them was remarkable, and they worked with perfect smoothness, and, in connection with the feathering paddles, propelled the boat with great steadiness. The entire absence of a dead point was very noticeable. A speed of nearly twenty miles an hour was developed without any effort and at a low boiler pressure.