THE TEACHERS' COLLEGE OF NEW YORK CITY.

Nearly twelve years have passed since the Teachers' College was organized under the name of the Industrial Education Association. After passing through its successive stages of growth and of organization of work, it received in 1892 a charter under its present name. The president of the board of trustees is Mr. Spencer Trask. It is allied with Columbia College and Barnard College in its work, and its building is situated immediately north of the site of the new Columbia College. While it would be interesting to trace its growth in its old quarters, in University Place, from the days when it appeared rather a struggling affair to the present time, when it occupies a new building constructed for it, of admirable features and fitted with the best possible appliances, the present article will be confined to the college as it now is. It is a unique institution; one devoted to the theoretical and practical training of teachers and which, for the latter element, has instituted the Horace Mann School, where practical lessons are given in the art of teaching, and observations of methods as actually carried out are made.

The building is situated on Morningside Heights, in this city, near the tomb of Grant. It has a frontage of 210 feet on 120th Street, and the excellence of its design, due to Mr. Wm. A. Potter, well known architect of this city, is testified to by the views which we produce.

The ultimate cost of building and equipments is put at $900,000.

There are two distinct departments in the college. The Horace Mann School, the first of these, is a complete school in which children are taught. Beginning with the Kindergarten, open to children of three years old, the succession of classes leads through the high school to and through classes in manual culture, drawing and the like until the graduate is prepared to enter college or business life. The Horace Mann School represents the most complete possible primary and high school course, and is carried on precisely as any first-class institution of the kind is conducted, with, however, the benefit of all refinements in pedagogy naturally developed by its connection with the Teachers' College.

In our illustrations of the college, it will be noticed that many of the rooms are occupied by children and grown people. The children are the students of the Horace Mann School, the others are either their teachers or are students in the Teachers' College.

The Teachers' College proper, from which the whole institution derives its name, is an institution for the training in pedagogy of teachers. Its processes include several methods. Lectures on pedagogical subjects, using the term in its widest scope, are given by the members of the faculty. The students are not simply taught chemistry or physics, but study the most advanced methods of teaching these sciences in the school room. Psychology, the history of education, the natural sciences in general from the aspect of the teacher, are other typical subjects lectured on. Laboratory practice is another of the methods. In botany, zoology, geology, chemistry and physics, laboratory work, showing how school work in these subjects is objectively conducted, may serve as examples of the laboratory feature of instruction. So far all is theoretical, at least no experiments on children have been made. It is here that the Horace Mann School comes in. This school is maintained in the highest stage of excellence, and supplies at once a model for the future work of teacher graduates, giving them a school of observation where they can see advanced teaching methods, and a school of practice where they can apply what they have learned.

Such, in as few words as possible, describes the characteristics of the Teachers' College, an institution practically unique in teaching the theory and practice of teaching, using a model school for a laboratory.

Our illustrations give views of the work. The Kindergarten in one cut is seen in active operation, its children representing the youngest pupils in the Horace Mann School. A special course for students of kindergartning is maintained, and under the auspices suggested by our cut the best possible opportunity for becoming efficient in this most difficult of the advanced educational methods is afforded. Miss Angeline Brooks has charge of the entire Kindergarten department. Another cut shows the physical laboratory, where normal work in physics is carried on by the students for the profession of teacher, as well as by the more advanced scholars of the Horace Mann School. Professor John F. Woodhull has charge of this and allied departments, and in carrying out its methods inculcates the use of simple apparatus, the personal construction of apparatus, and general simplification of appliances—ideas which he also carries out in the chemical laboratory.

Next to the physical laboratory is shown the geological laboratory, devoted at present to geology, botany and other branches of natural science. In our cut the Horace Mann scholars are shown at work on specimens, while students of the Teachers' College are making notes on the operations, so that this cut is in some sense an epitome of the characteristic methods of the institution. The art studio speaks for itself, and shows students working in drawing and painting, one of the fundamental theories underlying the college being that every one should know how to draw. The chemical laboratory comes next, where are seen the Horace Mann students doing practical work in chemistry, while interspersed among them, either assisting, teaching or observing, are seen students of the Teachers' College, this laboratory, like the geological, furnishing a good example of the methods. The two next cuts illustrate two of the workshops of the Horace Mann School, where students in the high school department are instructed in manual training. Of these laboratories, which are very complete, we only show two; they give an unexcelled opportunity for teachers to learn the pedagogics of manual training, a subject now in the greatest possible demand. It will be noticed that the instruction in manual training is given to boys as well as to girls.

When it is realized that our illustrations give but an incomplete representation of the work of the institution, it will be seen that New York has in the Teachers' College something to be very proud of, and something which is destined to have a deep influence upon the instructor's art in America. Its faculty, headed by Walter Lowerie Hervery, Ph.D., the president, includes sixteen members, whose work is supplemented by twenty-two assistant instructors. Its work is divided into twelve different departments including seventy-five separate courses, the principal ones of which contain one or more courses counting toward the college degrees of A.B., A.M., and Ph.D.

We have said but little of the departments of Domestic Economy and Physical Training or of the general subjects of the classics, mathematics, "rhetoricals," etc., but all are included and receive, with the assistance of the Horace Mann School, the same thorough treatment which is accorded to other branches. The Bryson Library, founded by Mrs. Peter Bryson, in memory of her husband, is one of the most valuable departments, containing some 5,000 volumes, in a room which may he termed the ideal one for its purpose.

An Invention Needed.

Dr. Peter T. Austen, Professor of Chemistry in the Brooklyn Polytechnic Institute, who is the chairman of the advisory committee recently appointed by Mayor Schieren, of Brooklyn, to consider ways and means to avoid accidents by the trolley system, in speaking to a representative of the SCIENTIFIC AMERICAN, stated that while there was no lack of fender devices, there appeared to be a dearth of devices for announcing the speed of the cars. Probably some device will be required that shall announce by ringing a bell, lighting an electric light, or any other way, when the speed of the car is exceeding the legal rate.

Some sort of indicator, in the form of a dial or some legible device, might also be placed in the car, if not too expensive, so that the passengers might know at all times the speed. A device has been suggested for shutting off the current automatically when a certain speed is reached, but this is impractical, as in case of a failure of the brake on a down grade the inability to reverse the motor might be attended by accident. Prof. Austen considers a speed limit announcing device as a first necessity in controlling the trolley system.

Remarkable Armor Test.

An interesting test of the armor plates for the turrets of the battle ships Massachusetts and Indiana has been made recently at the proving ground of the Bethlehem Iron Company at Redington. The plate tested was of Harveyized nickel steel 15 inches thick, and represented nearly 500 tons of armor. The tests were made with a 10 inch gun, and consisted in firing two shots at the armor from a distance of 250 feet. One shot was to try to crack the plate and the other to pierce it. The curved armor plate was set up on edge and bolted to an oak backing 3 feet thick. This backing was in turn braced against a lot of heavy timbers, filled in with sand and extending back for a distance of 25 feet. Back of this was a mass of trap rock against which the whole target rested. It required several days to prepare the target for the test. In the first test a 10 inch Carpenter projectile of chrome steel was employed, and enough powder was used to send the projectile at the plate with a velocity of 1,539 feet per second. The plate was required to stand this severe test without any serious cracking. The projectile entered the plate for a distance of only about two inches, and was completely shattered, but failed to produce a single crack on the plate itself.

In the second test, a projectile weighing 500 pounds was fired at the same plate at a speed of 1,940 feet per second. The armor, however, offered such resistance that the projectile entered the steel for a distance of but six inches. The shocks were so severe as to completely wreck the timber bracing back of the armor. The naval experts who watched the experiment declared it one of the most successful armor tests ever made.

Punching of Iron and Steel.

In an article in La Revue Technique, M. Ch. Fremont endeavors to show that Henri Tresca gave an erroneous explanation of the phenomenon of punching iron and steel. Most of Tresca's experiments were made on lead. M. Fremont has conducted a number of experiments on iron plates, punching holes in the plate to different depths and then splitting the plate and etching the section with acid, so as to make evident the distortion of the fibers arising during the process of punching a hole. M. Fremont holds that his results show that the metal really yields by traction, being thinned out at the surface under strain and finally giving away. To determine the work required to punch a hole through a plate, M. Fremont has used a simple form of autographic apparatus, recording the motion of the punch and pressure exerted at all parts of the stroke. The principal result obtained is that the maximum pressure required is proportional to the area sheared, and that for the same area cut through a punching machine requires to exert a pressure nearly fifty per cent greater than a shearing machine.

Boiler Explosions.

A paper on boiler explosions, read recently at the Institution of Civil Engineers, by Mr. William H. Fowler, presents, says Nature, some points of interest. The theories, such as "deferred ebullition," "dissociation of water," "spheroidal condition," which have been propounded to account for such explosions, are well known. Mr. Fowler showed that it was the hot water, rather than the steam, in the boiler which formed the source of destructive energy. In regard to the causes of boiler explosions, there is nothing occult or mysterious. They can, as a rule, be traced by patient investigation to the operation of simple and well known facts. Thus when a boiler shell is normally in a state of high tension, if once a rupture takes place by the action of static stresses on a locally weak spot, the stored-up energy is capable not only of tearing the boiler to pieces, but of producing all the other destructive effects observed in connection with such disasters. Prominent among the principal causes of explosions is the corrosion of the boiler shell. Some explosions have their origin in the stresses arising from expansion and contraction due to the action of the fire. As an illustration of the stresses set up by unequal expansion and contraction in a boiler, a case was mentioned in which an explosion occurred two hours after the fires were drawn. A frequent source of boiler explosions in the past is the practice of cutting large openings in boiler shells, without providing compensating strengthening rings. Overheating from shortness of water is a common cause of boiler explosions, but the operation of this cause is different from the reason formerly assigned to it. Explosions are not the result of turning cold water on to red hot plates. What takes place is that the overheated plates become gradually softened, with the result that they bulge downward and are rent at the ordinary working pressure; explosions of this kind are of a relatively mild character. Many explosions arise from excessive pressure in consequence of the defective action of the safety valve. This may occur in a variety of ways, but the type of valve loaded with a spring balance is the most prolific source. Finally, explosions sometimes arise from faulty material and construction. As a result of using iron of poor quality with punched holes, incipient flaws are occasionally set up in the seams, and several cases have occurred in which these inherent defects were so situated as to forbid detection when the boiler was put together, and were only revealed by the explosion. These defects show the value in connection with new work of a careful hydraulic test.

Explosions.

This was the subject of a recent address at Firth College, Sheffield, by Mr. L. T. O'Shea. In the course of his remarks he said that in 1881 Berthelot established the fact that the velocity of explosions in gases increased rapidly from the point of ignition until a maximum was reached, which remained constant, no matter how long the column of the gases might be. This maximum velocity was exceedingly great, and to it Berthelot gave the name of "the explosive wave." Dixon confirmed Berthelot's results, and considerably extended his works. In 1881 Mallard and Le Chatelier showed that before the explosive wave was set up, the flame traveled for a certain distance, depending upon the dimensions of the gallery, with uniform velocity; then it assumed a vibratory motion, and finally detonated with extreme velocity, or died out. What happened in a colliery explosion was that the flame traveled for perhaps 50 or 60 yards with uniform velocity, and in this distance comparatively little damage was done. Then it assumed a vibratory motion, when large masses of heated gases swung backward and forward with increasing amplitude, gathering impetus as they went, and smashing everything before them. From that point the amount of damage done would be greater or less as the vibrations gathered force or died away.