The Chicago Manual Training School.

The Manual Training School is not conducted on a free principle. A tuition fee is charged for each student. With the exception of twenty pupils admitted this year, the fee is paid individually. These twenty were received upon recommendation of persons competent to judge of the merits of the boys, and their tuition is paid by members of the Commercial Club. Three years' study is necessary to complete the course. Of the seventy-two who entered the first junior class, twenty-seven remained to graduate. Ninety-eight entered the junior class last September. Four of this number have since dropped out. The boys who enter are from the ages of 14 to 15. None under 14 is admitted. No candidates are accepted who cannot pass a satisfactory examination in reading, writing, spelling, geography, English composition, and arithmetic. A boy must have, too, a certificate of good moral character from some responsible person. The penalty of any impropriety in conduct is dismissal. Latin, French, descriptive geometry, and higher algebra are taught. The first manual work a boy does when he begins the course is in the wood room. There he learns various branches of the carpenter's trade, joinery, wood turning, and pattern making. He learns not only the use of tools, but their proper care. Each boy furnishes his own kit and has his own tool drawer. Extra tools are supplied if needed, but the student is made responsible for them. Recently the boys were at work on picture frames, tables, hammer handles and the wood parts of other tools. In the second year the pupil is put in the foundry and blacksmith shop. No better hammers and screw drivers can be found in Chicago than are made by the lads. The most expert workman can turn out no smoother pieces of casting than some they show. In the senior year the students get into the machine shop. By that time they are able to make and put together a steam engine. Three were constructed in the school last year, and three will be made this.

The work of making an engine begins in the drawing room. Every stroke of the pencil is made by actual measurement, even to the drawing of a bolt head. The scholars draw the plans for the patterns, and then make the patterns. In the machine shop the busts of Stephenson, the engineer, and James Watt, begrimed with the soot of labor, look down upon the busy workers. The boys will soon try their skill in constructing an ornamental iron gate for the Michigan Avenue entrance of the building, for which drawings are now being made in the school.

The wood room contains thirty-nine cabinet makers' benches, twenty-four speed lathes, a circular saw, scroll saw, a boring machine, planer, grindstone, shoot plane, bench lathe, and general tools sufficient for the use of ninety-six boys. In the foundry are two furnaces, crucibles, troughs, flasks, trowels, rammers, sieves, and other apparatus, so that sixty-six boys can work at once. In the forge room they can get smut on their faces together, too, at the same time. There are twenty-four forges, twenty-three anvils, one emery wheel, one shears, three vises, one blower, two exhaust fans, tongs, sledges, hammers, fullers, and all the other tools required to transform clean skinned youths into the sootiest of blacksmiths.

The machine shop has seven 12 inch, 6 foot bed engine lathes. There is also an engine lathe with a 16 inch swing and 8 foot bed. There are two speed lathes, a planer with 6 foot bed, shaper, drill, grindstone, fifteen benches, fifteen vises, chucks, boring bars, taps, dies, chisels, files, and other tools—enough for thirty-two amateur machinists.

A visitor can pass through every room in the building and find no idlers. All are absorbed in the work they have in hand, and scarcely raise their eyes. "The fact that their attention is so riveted on what they are doing," said Mr. Belfield, "shows the cultivation of a most important faculty of the mind—the power of concentration. This attention, too, is not enforced, but is voluntary and unremitting. The boy who goes through a three years' course here not only attains intellectual development, but he gains comprehension of essential branches of knowledge far superior to those of the high school pupil. The training school is by no means a manufacturing establishment. The product of the school is not intended to be perfect pieces of machinery and polished furniture, but polished, perfect boys. It practically demonstrates, also, the dignity of labor. So thorough is the training here, that graduates who desire to pursue a higher grade of education are admitted, on recommendation of the director, without examination and free of conditions to several of the colleges and universities of mechanics and engineering in the United States.

"Prof. R. H. Thurston of Sibley College, Cornell University, wrote to me recently that if we could send him as good specimens of boy development as we have already forwarded, they'd be glad to get them. The professor of mechanical engineering at Perdue University, Lafayette, Ind., also wrote to me about one of our graduates who is there: 'If you can send us any more boys like this one,' he says, 'we shall be mighty glad to get them.' I believe we have struck the key note for the practical education of boys in the system of the Manual Training School. It embodies at once the education of the hand to skill and the brain to directive intelligence. There come the boys down to lunch. Their dining room is in the basement. They have made all the tables themselves."

ROBURITE—A NEW EXPLOSIVE.

A number of experiments were conducted lately at the works of Messrs. Heenan & Froude, Manchester, with a new explosive, called "roburite," which is manufactured in Germany, and is about to be introduced into this country for use in blasting operations. The composition and process of manufacture of this explosive are kept secret, but we understand that it consists of two non-explosive and perfectly harmless substances, of such a nature that they may be stored or transported without special precautions or restrictions. These two substances may be mixed together when required, and, in combination, become roburite, a yellowish compound, which will bear rough handling with safety. We understand that an intense heat is necessary to explode it. In order to prove this, the explosive was placed, in the experiments in question, between two plates, which were freely rubbed together and hammered; and a small quantity thrown upon a fire was merely consumed, without exploding.

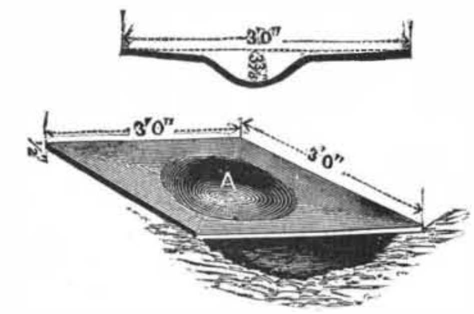

Fig. 1.

In order to obtain an idea of the explosive effectiveness of roburite, eight ounces of the explosive were placed on a plate of the very best steel, at the point marked A in Fig. 1, which shows the state of the plate after the explosion. This plate was 3 ft. square by ½ in. thick, and a bulge of about 1 ft. diam. and 3½ in. deep was caused by the explosion. Twelve ounces of the explosive were then placed at A (Fig. 2) on a cast iron plate, 6 in. thick, and weighing nearly three tons. After the explosion the plate was found to be broken transversely, in the manner shown in the engraving. Unlike dynamite, roburite is said to be in no way affected by varying temperatures, and if duly protected against damp, it may be kept for years in any climate, without its efficiency becoming in any way impaired. It is also claimed by the manufacturers that roburite has an explosive force greater than dynamite by at least 25 per cent.

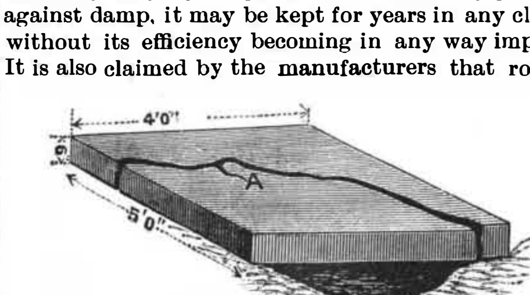

Fig. 2.

In exploding, roburite does not produce noxious gases, and, therefore, may be used without intermission, while the poisonous gases given off by dynamite often necessitate the stoppage of work, in some cases for a considerable time. This new explosive is applicable for use in mines and quarries, and for torpedoes and blasting operations generally.—*Industries.*

Connecticut Lava Beds.

The repeated earthquake shocks in the Western States, considered in connection with the destructively severe ones last August and September, make one wonder sometimes if Connecticut will always escape with as light a shaking up as it received when the city of Charleston was so nearly destroyed. But if there is no present danger from earthquakes and volcanic eruptions in Connecticut, the time is not so very distant, geologically speaking, when the city of Hartford, had it existed, would have been in danger of being flooded with lava. It was some time before the Connecticut Valley was peopled with red men, and about the time it was settled with red mud; it was when those great birds, thirty or forty feet high and weighing 800 to 1,000 pounds, were stalking about in the mud at Portland, that a great rent was made in the crust of the earth up and down the Connecticut Valley, and the streams of lava poured out. One of these fissures made its appearance within a few miles of Hartford, at Talcott Mountain, and the cooled lava now forms the solid foundation of that pleasant summer resort. Another outpour occurred near Meriden, and the cliffs there are what remains of this solidified ebullition after the glaciers have acted upon it. The east and west rocks of New Haven are the outcome of this same eruption, and just over the line Mount Tom and Mount Holyoke belong to the same family of fiery mountains, as also do the Palisades on the Hudson. It would appear that these lava eruptions in Connecticut were of comparatively short duration, and that the force that caused the earth to crack open up and down the valley in nearly a straight line suddenly ceased to act and the fissures closed up again. Great as must have been the forces exerted, and vast as must have been the amount of lava forced out, yet these mountains of melted rock here in Connecticut sink into insignificance when compared with a bed of lava in the northwestern part of this country. There the sheet of lava spreads out over the country from 2,000 to 4,000 feet thick. It covers not only the whole of Idaho, but most of Oregon and Washington Territory, and portions of Nevada, California, and Montana. Incredible as it almost seems, this great sheet, so many feet thick, spreads over an area of country nearly forty times as large as the whole State of Connecticut. All the Grand Army people who returned from California last fall, over the Northern Pacific Railroad, passed through a canon several thousand feet deep, worn through this frozen sea of lava by the Columbia River. Much as Connecticut has to boast of, in owning some of the first dry land that was ever created, and which has since never been covered by water, and settled and solid as it now appears, covered with a coating of snow and ice, still in comparatively modern times it was in a very unsettled condition and on the point of boiling over its borders.—*Hartford Evening Post.*

Chinese Journals in California.

Most of the Chinese dealers and business men of San Francisco, as well as their employes and agents, can read and write English, and a large number of them are subscribers to newspapers. In San Francisco there are four journals regularly published in Chinese characters. These appear weekly, and have a circulation of 2,500 copies.

It requires four persons to run a Chinese journal—an editor, a sub-editor, a translator, and a printer. The editor and sub-editor are usually the proprietors. The translator is the first and most important person. His duty is to collect news from the Chinese quarters, and to read the American dailies carefully. From these he takes the market quotations, new laws, and accounts of insults offered the Chinese, etc., and, in fact, everything that he thinks will interest his countrymen. He translates this news into Chinese, and gives it to the editors for insertion.

The editors take copies in Chinese characters, with the ordinary pen of their country, and with a peculiarly prepared ink, upon transfer paper. This latter is of the same dimensions as the sheet upon which the characters are to be printed. As soon as the editor has filled his sheet, he gives it to the printer, and his work is done.

According to the Chinese method, a good printer can print 400 sheets a day. Five days' work are required to get out an edition of 1,000 copies.

The journals are printed with black ink upon single sheets of white paper, except on the Chinese new year, when the printing is done with red ink or upon red paper.—*La Papeterie.*

A Locomotive Engineer, Lecturer, and Editor.

Mr. Angus Sinclair, editor of the *National Locomotive and Car Builder*, delivered a lecture recently at Cedar Rapids, Mich., before the employes connected with the Burlington, Cedar Rapids, and Northern shops. After referring to the attainment to the highest degree of perfection in an engine by effecting the transportation of steam into work, the speaker continued by saying that the great object sought was to make an engine which used the least steam and required the least repair. The locomotive engine, while it is imperfect in its economic use of steam, yet compares favorably with other engines. He spoke at some length of the great difficulties of getting the motive power economically out of coal. Electricity has of late years been forced to the front as a motive power, although it is not itself a prime motor like the locomotive, wind and water wheel, gas and hot air engines. Electricity must first be developed by the use of an engine and dynamo. At present, we are compelled to use coal to develop steam with which to move the engine by which the dynamo is driven. About fifty per cent of the motive power of steam is consumed in the transmission to the dynamo, and thus is seen the great waste of steam in the production of electricity. If electricity could be generated without the great expense of steam, as now required, a great saving would result; but under the present process, but little more than five per cent of the coal used in our furnaces is now put to work and utilized in the moving of machinery. Thus it will be seen that the great aim in the manufacture and management of engines is to get the largest percentage of the coal converted into working power.