available, along with modern donations and grants, for the cultivation of practical science. Such institutions are furnished with laboratories, museums, scientific libraries, and apparatus; and their courses of study embrace such subjects as mining, Metallurgy, Agriculture, Botany, Zoology, Geology, Mineralogy, Engineering, Architecture, Drawing, Military Science and Tactics, Practical Mechanics, Astronomy; all eminently practical, and arranged so as to suit the wants of young men entering on a variety of useful trades and professions. Although these institutions are numerous and largely attended, they have not yet reached the limits of the demand for their work, and large grants in their aid have recently been made by Congress, while State Legislature and the munificence of private individuals are daily adding to their number and efficiency. It should be a fact that requires but to be mentioned to excite earnest enquiry and effort, that while all the older universities in the United States have scientific schools, and while multitudes of similar schools are supported by the several States and the general government, we have in this Domion four States, certainly equal in resources to any of those in the American Union, without one scientific school. In the mother country the subject is attracting great attention. I have just read a report presented to the House of Commons last year by a select Committee on Scientific Instruction, which, after hearing the evidence of a number of leading Professors, Teachers and Educationists, strongly recommends to Parliament to proced at once to organize the technical education of the country, and to add to the existing means as far as possible; and further, to recognize natural science as an indispensable element in such education. This report will, no doubt, be acted on soon, probably before anything can be done in this country, and we shall have the satisfaction of being another step behind the mother country in this most important matter. It may be asked what connection has all this with this Society, and with the present occasion. One such connection is, that this Soctety would derive aid from every graduate of any Scientific school established here; and on the other hand, it can never attain for its collections their full utility, until there should be such schools. Another is, that while as President of this Society I have its immediate interests in view, I have also at heart the advantage of the young men growing up among us, and whom I should wish to see rising to something higher than the position of subordinates to men trained in other countries; and with this feeling, I propose, on every fitting occasion, and I regard this as one, to insist as strongly as I can on the necessity of schools of practical science to the welfare and progress of this country.

ART.

The New Art of Fresco-Painting.

The art of stereochromy must be considered as involving an entirely new mode of creating durable pictures upon walls, inasmuch as a new binding material is applied, which differs from any employed in the usual modes of mural painting. By this binding material, which is the soluble glass of commerce, the colors become, as it were, silicified; and pictures executed in this way are distinguished by a certain freshness and a power of resisting atmospheric influences which ordinary frescoes do not possess.

In giving an account of this interesting mode of painting, we shall confine ourselves to a general outline of the method by which Kaulbach, the celebrated artist of Munich, and Echter, have executed, in the new museum at Berlin, four large pictures, which are generally acnowledged to exhibit a great advance in the art of mural painting. The wall to be painted is first coated with a layer of ordinary lime-mortar, in order to equalize its unevenness. The sand employed, which may be either silicious or calcareous, must be of even grain and well washed beforehand. Lime must be sparingly employed, so as to render the cement rather poor than otherwise. In this and in all the subseqnent operations, pure rain-water must be used. The plaster, thus prepared, must be well dried and exposed to the air for several days, so as to become entirely carbonated. Caustic lime would decompose the soluble glass. Fuchs, the inventor of stereochromy, recommends the moistening of the wall several times with a solution of carbonate of ammonia, so as to accelerate the saturation of the lime. When dry, it is washed over several times with a moderately diluted solution of the so-called "double water-glass," allowing it to dry each time.

The ground being thus prepared, the upper layer may be soon after added. It consists, like the lower one, of a lime-mortar, and is spread to the thickness of about one tenth of an inch. The sand employed must be well washed, and of a grain not exceeding a certain size. Very fine powder must be rejected; and for this reason it is best to pass it through a sieve. A rough grain is rather advantageous; Kaulbach says "it ought to feel like a rasp." For a picture to be viewed at a great distance, a coarser grain is required than for one designed for closer inspection.

When the coating is perfectly dry, it is sometimes rubbed with a sharp sandstone, in order to remove the layer formed of carbonate of lime. It is better, however, to accomplish this by means of diluted phosphoric acid. The phosphate of lime thus formed binds the soluble glass, a solution of which, when the coat is dry, is spread over the surface. The same is diluted with its equal bulk of water, and the operation is twice repeated. Too much water-glass prevents the ground from taking the colors. The ground being thus prepared, the painting may be at once proceeded with; some delay, however, increases the capacity for absorption. The colors to be used must be ground with pure water, (we will speak of their preparation in a subsequent article,) and the wall has also to be frequently sprinkled with water, in order to displace the air from the pores, and to insure thus the adherence of the colors. Nothing further remains to be done than to fix the colors properly with a solution of the soluble glass referred to, which operation is accomplished by sprinkling the painting in the form of a fine shower or mist, then letting it dry, and repeating the operation until the colors adhere so firmly that they can not be any more rubbed off by the finger.—*The Manufacturer and Builder.* (1)

Imitation-Marble.

It can not be gainsaid that a quality of imitation marble, or "*Hallenenstein,*" as it is sometimes called by the German, is now being produced in the arts, which, in comparison to native marble, comes up very nearly to the highest point in the way of perfection. Indeed, in the old Roman times the most beautiful structures were ornamented in their interior parts with pieces of marble which consisted commonly of sand, lime, and gypsum, and which even yet exist. But in order the more to perfect this art, it was necessary that one of the many secrets of nature should be won from her keeping. Some two years ago, a manufacturer in Cassel, of the name of Thiel, succeeded in producing an artificial stone, known under the above name which is said to exceed in its excellences any that have been made heretofore. It is prepared by means of chemico-physical methods, which are known only to the discoverer and a few manufacturers. The writer of an article in the *Polytechnisches Notizblatt,* to whom we are indebted for these facts, states that in one manufactory large four-cornered slabs are made, having a length of ten feet, width of five feet, and a thickness of one foot. After one day of drying, under the influence of an ordinary temperature, these slabs are cut into smaller ones, out of which plates or slabs for the tops of washstands, tables, mantels, etc., are manufactured.

But above all else, however, this material is adapted to building and decorative purposes. It is stated, moreover, that the castle in Brunswick, Germany, which was very much injured by fire not long ago, is to be ornamented with this imitation-marble, as also the new music-hall in Hamburg. Besides these uses, very tasteful mosaic-work can be made from it. This is done by first sketching the figure or figures upon the stone; they are next neatly cut out with fine instruments, and then, finally, filled in again with the same artificial mass of the desired shades of color. The surface is then polished as though it were native marble, until it has taken on a perfect lustre.

In so far as the name "*Hallenenstein*" is concerned, it may be remarked that the nature of the mass is such that one can imitate, even to the point of deception, the most excellent and purest kinds of marble obtained from the Hellenic Mountains of Greece. Nor, as giving rise to quite a new branch of industry, does the imitation, in any respect, fall far behind those rare kinds of Grecian native marble. Slabs for building purposes, cornice-work, etc., are manufactured in large blocks. These are afterwards further wrought by means of steam power, under the circular saw and the planing machine; then, finally, they come into the hands of the worker, who finishes them in accordance with the purposes for which they are designed. *Ib.*

(1) A new candidate for favor which we would take this opportunity of recommending to our readers. It is a marvel of cheapness.