

struction of sewers in towns, is either because it is not perfectly understood, or that architects cannot give, and should not be expected to give without extra remuneration, that close attention to it which is required. But even supposing that the system adopted was, to a certain extent, faulty, no system, however good, will answer its purpose if the construction of sanitary work is entrusted to ignorant men. When the laying and cementing of tile pipes are entrusted to mere labourers, and the plumbers' work to tinsmiths, what can the public expect but a total failure of any system of drainage adopted?

It seems rather paradoxical that when thousands of dollars are spent in the erection of a beautiful villa, and no expense spared to fill it with every comfort that a home should have to make it a place desirable to live in for many years, too often the lowest mechanical ability is employed to do that which will give life or death to its occupants.

The whole subject of city sewerage, and especially house drainage, needs earnest, sincere and early attention. It is indeed to be regretted that all the efforts that have hitherto been made by our Health Society have not resulted in any permanent benefit. Complaints are constantly made of bad drains. Much has been written by eminent physicians and engineers, and the technical imperfection of our drainage pointed out as we have done in this article to-day; but *without action being taken by those who have it in their power, the evil will remain unremedied until some dreadful scourge appears in our midst and carries off thousands to the grave.*

VICK'S ILLUSTRATED MONTHLY MAGAZINE,

Published by JAMES VICK, Rochester, N. Y.

We continue to receive the numbers of this excellent floral publication, which is replete with practical information to all to whom floral culture is a pleasure or a business.

We have received a copy of the *Scholastic News* for July. It is a journal which will prove of great value, not only to the teachers, but to the public generally, and will afford an excellent medium for discussing very important subjects relating to education. We have frequently called the attention of teachers to the necessity of technical instruction forming an important branch in the education of boys, particularly in country schools. The *Scholastic News* should be supported by every teacher and made the channel of useful suggestions and friendly discussions on all subjects tending to the advancement of education in the Dominion and its practical application.

VARIOUS PRACTICAL USES OF ASBESTOS.—The uses to which asbestos can be employed are multiplying steadily; it is not only in the United States that this movement is going on, but also in many foreign countries. At the head of all stands Italy, which country, since its emancipation from priestly government, has made giant strides in the road to progress, practically as well as scientifically. Its practical industrial progress was lately shown in an interesting exposition of asbestos, which was recently held in Rome, the material being exhibited under all forms, from the crude state as mined, to its highest industrial preparations. There were samples of thread made from the mineral which were stronger than the best English cotton; cloth, from coarse bagging to a fabric as fine as linen; paper for writing, printing, sheathing and building, and pasteboard. The asbestos paper is made at Tivoli, and costs about forty cents per pound. It is especially

useful for important documents which it is desired to preserve from fire. In the space of five minutes the unprepared paste-board box and its entire contents were wholly consumed, while to that period the asbestos box remained uninjured. Much of the asbestos mined in Italy finds a market in the United States, where, thus far, only asbestos of short fibre, and unfit for spinning, has been found.—*Manufacturer and Builder.*

REMOVING NUTS FROM CLIPS AND BOLTS.

The London (England) *Carriage Builders' Gazette*, in answer to a writer who asks as to the best means of getting off the nuts of bolts and clips, and of driving up bolts and clips without destroying the screws, gives the following reply:

When the clips twist ever so slightly in trying to unscrew the nuts, cease to try until you have enlarged the nut by holding it for a minute or two with a pair of red hot tongs. If the clip has an extra point on it file it round and oil it; then try. If still firm, cut the nut in halves with a chisel, having another long chisel or iron bar held against the opposite side of the nut to take the force of the blows of the hammer. Be sure to use a light bolt hammer, which is more effective than a heavy hammer—it is better to cut off twenty nuts than to break a clip. For driving up bolts so as not to bruise or burr up the screw, unscrew the nut one turn only, or enough to cover the point of the bolt; then drive the bolt back by striking the nut; if immovable, get somebody to hold a heavy hammer on the nut while you strike forcibly the iron on each side of the head; if set fast, apply the end of a hot iron bar to the side of the head of the bolt to expand the iron. If you cannot start the bolt for the want of room to strike a fair blow on the bolt point, get somebody to hold the edge of a long piece of heavy tire iron on the bolt point; then with a heavy hammer strike the bar as near the bearing as you can get at. Sometimes if the bolt is through a scroll iron, and where the spring is in the way of the hammer, a peculiar shaped drift pin has to be used—it is something like a tuning fork; the fork being put on the driving bar at right angles, the bar is struck to drive the drift pin up the bolt hole.

HOW TO STUDY SCIENCE.

Prof. F. W. Clarke has an article in the *Popular Science Monthly* for June, in which allusion is made to the true method of studying science; every student of science should meet nature at first hand, and learn to observe her phenomena for himself. Lectures and text books are but minor accessories to study; in the sciences they play a wholly subordinate part; in the laboratory, the field and the museum, the chief work is to be done. No matter what branch of science is to be pursued, the student from the very first must meet it face to face. The biological sciences ought to be studied in the field, collecting; in the museum, classifying; in the laboratory, with the microscope and the scalpel. Far too often is the study of natural history degraded into a mere memorising of classifications; as if the transitory part of the science were more valuable than the permanent! The student must see, handle and investigate for himself. He is to study the phenomena of life, and not merely the external appearance of a lot of stuffed specimens. Chemistry, and physics also, is to be studied chiefly in the laboratory. It is not enough for a student to see experiments, he must perform them. Thus only can he learn the true scope of these great sciences. By a proper drill in qualitative analysis, he learns to observe closely, and to reason from his facts to their interpretation. Quantitative analysis gives him accuracy of manipulation, and an insight into the absolute value of experiment. This insight also results from delicate practice with instruments of precision in physics; a kind of exercise of the very highest educational value. If the course of study in any science can be capped by an original research leading to the discovery of new facts, so much the better. In a German university the candidate for a doctoral degree in science is absolutely required to carry out such a research, and to submit a dissertation upon it. This is not a severe requirement—every student who has been decently trained is able to come up to it, all the popular notions about mysteriousness of scientific research to the contrary notwithstanding. Why should we not aim to equal the German standard?

A RAT-TAIL FILE, the teeth of which are cut on spiral ribs, with grooves between to facilitate clearing, is the subject of a recent patent. It is made by twisting a fluted bar of steel, and then cutting teeth on the spiral ribs so formed.