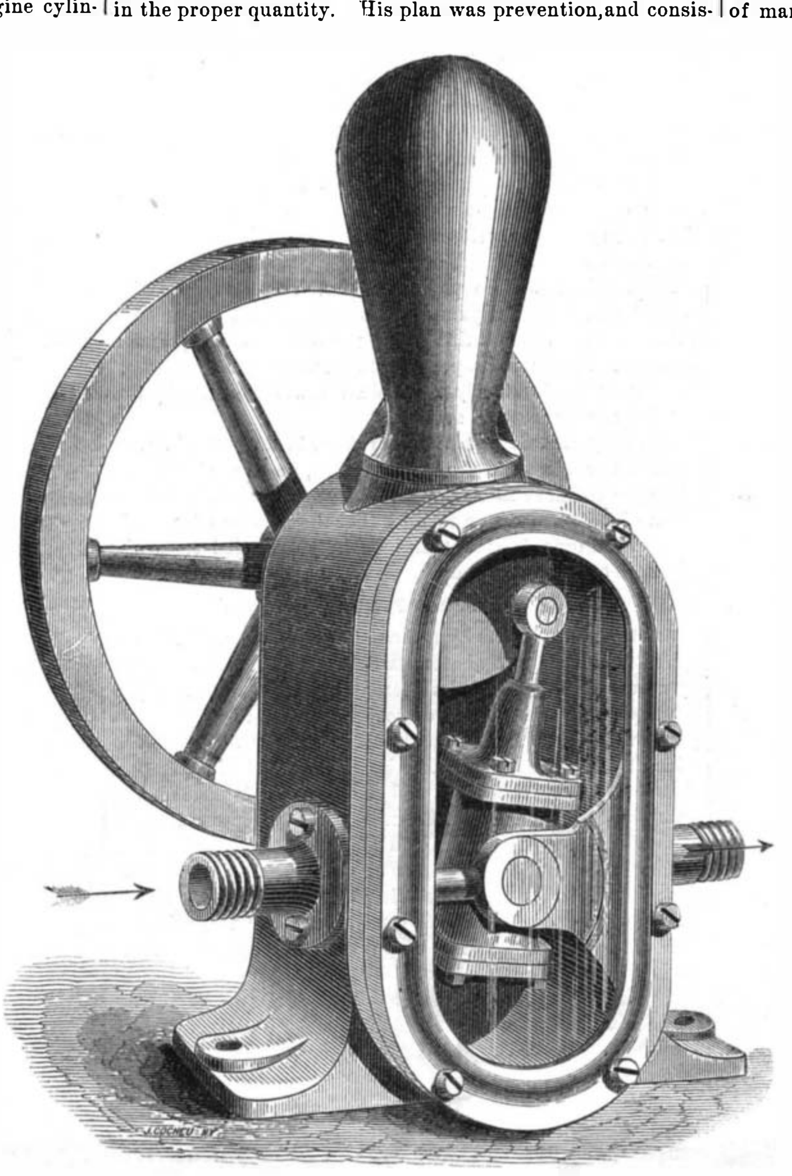
IMPROVED HYDRAULIC MOTOR.

The hydraulic motor represented in our illustration is intended to run one or more sewing machines, or other light machinery, and may be used in any house provided with a regular water supply. The apparatus consists of an oscillating engine placed within a perfectly watertight outer casing, into which the water enters at one side and leaves at the other, as indicated by arrows. The oscillating engine cylinder, driven by the water, swings in bearings, as shown, suitable entrance and exit ports of the bearing permitting alternately the entrance and discharge of water from the cylinder. The piston rod of the cylinder is pivoted to a crank disk of the driving shaft. The power is transmitted to the machinery by a friction cone and belting, and can be arranged to run the same at different speeds. A brake device could be applied to produce the instant stoppage of the motor.

The regulating air chamber, shown at the top of the inclosing casing, secures uniformity of motion under varying pressures. A glass front shows the working of the interior parts of the apparatus. The casing is to be attached by fastening screws to any suitable point at or near the sewing machine, and the water can be conveyed thereto by rubber pipes. No oiling is necessary, as the apparatus works entirely in water, which forms a sufficient lubricant. The motor is capable of making from 120 to 500 revolutions per minute, with an average water consumption of forty gallons.

The inventor of this ingenious little apparatus is Mr. A. Schmid, of Zurich, Switzerland.



SCHMID'S HYDRAULIC MOTOR.

Application of Armatures to Magnets.

M. J. Jamin states that, if a single armature is placed at the northern end of a magnet, it in no wise modifies the magnetic condition of the southern end, which remains bare. If the effect produced on the south side by the application of an armature is considered, it will be found that it takes magnetism which the steel loses, but that this new distribution is no wise modified by putting an armature on the opposite side, or by removing one. Hence, as regards armatures, there is an absolute independence between the two halves of the magnet. This independence proves a capital fact: that the application of an armature to one of the ends of the magnet occasions a new distribution there, but neither decreases nor augments the sum total of the magnetism there present; the steel loses what the armature gains. This points out a method of determining the magnetism of steel as compared with that of soft iron.

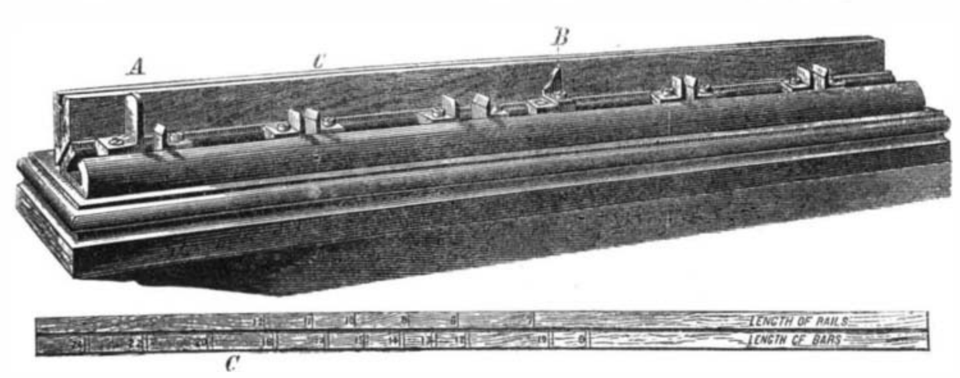
IMPROVED DEVICE FOR LAYING OUT SASHES.

The invention illustrated herewith is a device for laying out sashes of all sizes, from two-lighted windows having casements four feet square to windows of sixteen lights. It is claimed to mark in such a way as to enable better work to be produced than when the like operation is effected by gages fixed in the mortising machine, and to be a decided improvement over the ordinary method of laying out by hand or from separate standards for each size.

Stiles, rails, and bars may, in using the apparatus, be molded before marking, thus saving the time used in marking them with a pencil in pairs.

The device consists of iron guides in which the markers are easily adjustable. Upon the upper knife edges of the markers the stiles are laid, the stop, A, receiving the end mortised out for the meeting rail. A light tap of the hammer causes the cutting blades to enter the wood, thus marking any number of pieces exactly alike. For rails and bars the stop, B, is used, which allows the tenon to extend and receive the shoulders.

The bar, C, serves as an index to the implement, and gives the exact length between the shoulders of rails and up and down bars for twelve-lighted sash from 7x9 to 12x24 inches. It is so arranged that the stiles and bars will always be in proper relative proportion. The length of the apparatus is four and a half feet, and its weight 40 lbs. Its construction is strong and durable, and, judging from the numerous references forwarded us by the inventor, its use has given excellent satisfaction. A sash square, to regulate the depth of molding, and full directions for operation are supplied with each device. For further particulars address the inventor, Mr. Andrew Cook, Box 66, Medina, Orleans county, N. Y.



COOK'S IMPROVED DEVICE FOR LAYING OUT SASHES.

Protection from Fire.

At a recent sitting of the Society of Arts, in London, Mr. Coleman, an American civil engineer, read a paper descriptive of an apparatus for the protection of buildings and ships from fire, and for the ventilation of ships, starting with the statement that the annual loss to England and America from fire cost the two countries $250,000,000. Mr. Coleman proceeded to express his undoubted opinion that neither country was possessed, as yet, of the proper apparatus for quenching a fire, either in a building or on shipboard. The cases of Chicago and Boston had shown that no building was absolutely fireproof; and also that, from the moment a great fire obtained a certain head, no amount of water could quench it. What was wanted was an apparatus calculated to send the water into a fire in the proper place, at the proper time, and in the proper quantity. His plan was prevention, and consisted of iron standpipes, one going to the roof, and others to the separate stories of a building, the cocks of the whole to be secured in a box in the side wall. These pipes he would work with a steam engine, placed within the building or close to it. For ships he would have a somewhat similar apparatus. A ship of 1,200 tuns could be fitted with his apparatus for $1,500, and by it all danger of fire at sea would be avoided. The ventilation of ships he would effect by the use of compressed air and perforated pipes, which would diffuse the introduced air all over the interior space to be ventilated. The principle had already been carried out successfully in the Mont Cenis Tunnel. The use of steam as a means of extinguishing fires he had ascertained, by experience, to be an expedient of doubtful efficacy. In the brief discussion that followed, the lecturer was complimented on the ingenuity of his plans, but some doubts were expressed as to their being so applicable to European as they were to American buildings, also as to whether their expense would not be an obstacle to their introduction.

To the above we may add that not only are better means needed to apply water to fires, but inventions are wanted to prevent the freezing of the hydrants in winter. In this city great trouble was experienced during the recent cold weather. Hundreds of hydrants were rendered useless by freezing, and the city was exposed to fearful risks of great conflagrations.

Negotiations are in progress for the construction of a narrow gage railroad on the island of Nantucket, to extend from the village of Nantucket, through Town Pasture, the Plains, and head of the plains to the South Shore, a distance of five miles.

Natural History in our Public Schools.

Professor Tenney, of Williams College, publishes an interesting article, in the New England *Journal of Education*, on the importance of teaching natural history in public schools. From it we extract the following:

Every physical necessity and want of man is supplied, and every physical comfort and every physical enjoyment of man comes, directly or indirectly, from the material world; and therefore no subject, of mere human study and learning, can be of greater practical importance than that which embraces the consideration of those things upon which his very existence depends. Nay, the food which we eat, the hat on our head, the shoes on our feet, the coat on our back, every substance which enters into the structure of our dwellings, all come from the objects which natural history considers, and with which this science makes her votaries acquainted. And there are scores and hundreds of objects—minerals, plants, and animals—in the material world today, in addition to those we now use, which are waiting to serve us and bless us, when they have been fully studied and all their properties pointed out.

No, language can hardly exaggerate the importance of natural history studies, and the importance of teaching the elements of these studies early, even to children in the primary schools, as well as to those in the schools of higher grades.

And I have not alluded, by name, to the fact that all the great problems relative to supplying the world with glass and all grades of earthenware—with coal and iron—with lead and tin and copper—with gold and silver and precious stones—with grain for bread—with food fish from the streams and the lakes, and even from the ocean itself—with the flesh of fowl and of cattle—are connected today, most intimately, with natural history studies, and will be more so with every increasing year, with every added million to the population of the earth, and with every real or imaginary physical want.

Nor have I alluded to the fact that in every country, our own as well as others, millions upon millions of dollars worth of grain are destroyed by insects every year, both in the fields and in the granary, and that, if this annual destruction ever ceases, as it probably will cease, or at least be much abated, it will be mainly through remedies or preventives which will come from a more extensive knowledge of the insect tribes; and the boy who is catching and studying butterflies and other insects today may become the man who through his knowledge of natural history shall save to the farmers of this great nation, millions of bushels of grain in a single year—and perhaps a nation from want, and even from famine itself.

What one man can do who has been trained in the elements of natural history, and thus led to the careful study of Nature, is well illustrated by what has been done by such a man as Linnæus, or such a man as Pasteur, or such as many others who might be named, and whose history has already been written, and with whose valuable labors we are already familiar.

Many will perhaps remember that it is recorded that when the King of Sweden saw the ship timber in the royal dockyard going to decay and destruction, he consulted Linnæus, hoping through him to learn the cause of the destruction, and also a remedy or preventive; and he was not disappointed as to what he would know. Linnæus traced the destruction of the timbers to insects, learned their instincts and habits; and by directing the King to have the timbers sunk beneath the water at a certain season of the year, when these insects are abroad in the winged state and when they lay their eggs, he enabled him to prevent further waste. And who can tell the millions of dollars that have been saved to maritime nations by this simple direction which Linnæus gave to the King of Sweden! And it was Linnæus, who had studied the nature and habits of plants, who first taught the nations how to resist the encroachments of the sea by merely sowing a certain species of beach grass (*arundo arenaria*) which served to cover the sands and bind them in their places; and to this day Holland and other nations of the earth have profited by his teaching.

A few years ago, when the silk culture of France was crippled and apparently in danger of being wholly annihilated, by the disease of the silk worm known as *pébrine*, when France had lost by this malady more than two hundred millions of dollars, the French government invoked the aid of Pasteur, a student of Nature, hoping thereby to learn both the true nature of the disease and a remedy or a preventive; and the aid was not invoked in vain. He saved, directly and indirectly, millions of dollars which we can hardly estimate. And all this done, and all this saved, I say, by one man, a careful student of Nature, and just such a one as should be growing up in every school room in our country.