Planing Machines.

(Continued from our last.)

To make, in any piece, a cut of a given depth, which shall not go through, and which I call a score, you have only to adjust to the depth required, the height to which the saw, through its slit, projects above the bench; which is done by making either the bench or the spindle so as to raise or lower at pleasure. If, after having given any such cut, which does not go through the piece, you turn the piece, so as to give it another cut, meeting and making an angle with the former cut, you may thus cut out a portion of the piece altogether, leaving in it the sort of channel which is called a rabbet: by cutting out, on different sides, two such rabbets, you may leave between them a projecting part, such as is called a tongue; and a tenon is, at the end of a piece, the same thing as a tongue on the side.

To cut a parallel sliding groove or channel, you have only to make the circular saw, or (to use the name I call the tool by, wherever its effect depends upon a degree of thickness greater than necessary to give it strength) the circular cutter, of the thickness requisite to form the breadth of the groove; the depth being determined, as before, by the height of so much of the cutter as projects above the bench. If the groove is to be dovetailed, the cutter must be conical at its circumference, that is, the cutter, instead of being square at its edge, must bevel according to the angle of the dovetail; and the bench, or the spindle, must be inclined; or the piece so supported, as that its under surface shall be parallel to the outer edge or circumference of the cutter. If the piece be now advanced against the cutter, one side of the dovetail groove will be formed; to form the other, the piece must be reversed, end for end, and shoved along as before. Another mode of cutting out dovetail gooves may be made by a mandril, turning in a collar, and at the end of it furnished with a conical cutter, the diameter of which, at the farthest end, shall be equal to the breadth of the dovetail, and the sides bevelling according to the angle of the dovetail; suppose the mandril to be placed perpendicularly for example, in which case the cutter itself will be horizontal, with its base parallel to the bench; let that end of the mandril at which the cutter is to be uppermost, the mandril being let through, and the cutter projecting above the bench, and raised to such a height above it as the depth of the dovetail channel to be made requires: the piece now lying flat on the bench, advance it against the cutter, and a dovetail channel will be cut at one operation. It is evident that in this way, whatever be the breadth and length of the groove or channel to be cut in a piece, so much of the stuff by the removal of which the channel is formed is consumed; and the broader the channel, the greater the resistence the cutter meets with, and the greater the force which is required to make it act. To save as much as may be of this force, will be an object in every case; and so it will be to the stuff, where it is of a dear sort, and the breadth of the required channel considerable. To effect both these savings, instead of a thick conical cutter, put on the same mandril a thin saw, forming the base only of the cone. To this thin saw there must of course be a mandril for it to turn upon; which mandril must have some means of making its way through the piece, along with the saw itself, which is mounted on it. This passage may be made by either of two expedients: one is, to give to so much of the length of the mandril as enters the wood, a power of making its way through, for instance, by fluting or forming it into sharp leaves, and thus making it into a cutter in that part; the other expedient is, by a previous operation to form, for the reception of the mandril a preparatory groove or channel, the greater the saving will be in point of stuff, and in point of force; on the other hand, the narrower it is, the weaker the mandril, and the greater the danger of its not being strong and stiff enough to support the saw which turns on it. To obviate this danger, the mandril may be supported by a bar of metal, which by a perforation, transverse in respect to the length of the bar, encloses the mandril up to the very saw, and thus forms a continuation of the collar: this bar may be of any length provided only that its thickness and direction admit of its being received into the preparatory groove, as the piece is advanced against the saw. The bottom of the groove or channel thus being cut, the saw-kerf forming the sides of it may now be made according to the angle required, and two bars or slips will have been cut out entire, one on each side of the preparatory groove; or these two side cuts might have been made at the same time with the middle or preparatory one. A saw or cutter working in this manner, at the end of a mandril, within the substance of a piece, may be called a *root-cutter:* by a root-cutter of this sort, a T shaped channel, used in some cases, particularly in metal, instead of the dovetail groove, may in this manner be formed at once.

Cutting of mouldings.—If the circumference of a circular cutter be formed to the shape of any moulding and projecting above the bench no more than necessary, the piece, by being shoved over the cutter will thus be cut to a moulding corresponding to that of the cutter; that is, the reverse of it, just as a plane iron cuts its reverse; accordingly, teeth of such cutters may be considered as so many plane irons. If a plane cutter, such as that above spoken of for cutting a groove in the breadth of a piece, be made so thick, or, as we might be apt now to say, so broad, or so long, as to cover the whole breadth of the piece, it will present the idea of a roller; I accordingly call it, in this case, a *cutting roller:* it may be employed, and in many cases with great advantage, to perform the office of a plane. The recollection of what has been said of the manner of producing a waving, or winding surface, by a rectilineal reciprocating saw, may be sufficient to suggest the means by which similar effects may be produced, in much greater variety, by a rotary cutter, broad or narrow, plain or formed to a moulding. I shall speak only of the cutting-roller; it will be easy to apply the observations to the other cases. If a roller of this sort be placed with its axis horizontal, and the bench underneath it be made to rise and lower, the bench may be very readily adjusted, so as to determine the thickness to which a piece may be reduced by being passed under the roller. It is to be observed, that where the track of the piece is under the roller, the influence of the rotation, on the advancement of the piece, is the reverse of what it is where the track of the piece is above the roller: therefore if you choose that the advancement of the piece should instead of being performed in a direction the same with that of the rotation, be performed in the opposite direction, the direction of the rotation must be reversed.

Whether the axis be horizontal, perpendicular or oblique, the piece, by being passed against it, so as to perceive its figure, may be made to receive not only a flat and even surface, but any longitudinal curvature or waving, by a compound motion; the bench, during the advancement of the piece, approaching and receding from the cutter; and, by giving at the same time a tilt to the bench, or to the roller, any degree of winding may be given to the surface of the piece. To gain time, cutters may be applied to different sides of a piece at once; and such of them as make parallel cuts, may be mounted on the same spindle; if the cuts meet, a piece of given depth may be slit by cutters of but half the diameter that would otherwise be necessary.

(To be continued.)

Mines of Cinnabar in Upper California.

Rev. C. S. Lyman communicated to the last number of Silliman's Journal a letter dated Pueblo de San Jose, in March last, wherein an account is given of a Cinnabar Mine, situated a few miles from the coast, about midway between San Francisco and Monterey, and in one of the ridges of Sierra Azul Mountain. The mouth of the mine is a few yards down from the summit of the highest hill that has yet been found to contain quicksilver, and is 1,200 feet above the neighbouring plain, and not much more above the ocean.

This mine, known to the aborigines from time immemorial as a "cave of red earth," from which they obtained paint for their bodies, was first discovered to contain quicksilver about four years since, during experiments made by some Mexicans to smelt the ore for the purpose of obtaining gold, which they supposed it to contain. [Several attempts since, to work the mine, have proved futile, until recently.] Mr. Forbes, of the firm of Barron, Forbes & Co, having the present charge of the entire operations, wished to devise some way of extracting the metal without mixing lime with the ore in the 'roasting,' but was unsuccessful. At length a kiln of lime, which occurs in the immediate vicinity, was burned, and mingled with this, the ores yield a vastly larger per centage of metal. In the last three weeks (says Mr. L.) about 10,000 pounds of metal have been extracted with the same apparatus, being a yield of over fifty per cent. Between 15,000 and 20,000 pounds have been extracted in about two months, only six miners have been employed in digging the ore, and the hands of the establishment all told, miners, furnace-men, wood-choppers, &c. &c. numbering only a score. The mine is probably yielding a net profit of $100,000 a year, even with its present crude apparatus. With suitable furnaces and iron cylinders or retorts, the mine would easily yield $1,000,000 and upward. The other mines opened in the vicinity have not yet been sufficiently developed to decide upon their character.

SCIENTIFIC MEMORANDA.

FIRE APPARATUS.

A Mr. Phillips, lately exhibited in London in the Vauxhall Gas Company's grounds a gaseous vapor to annihilate fire. A model house and a reservoir of tar were ignited and soon extinguished. A new fire escape was also exhibited whereby a fireman ascended a ladder standing away from a wall, secured the hook of the hose to the topmost round, and then directed a stream of water in any direction

APPARATUS TO MANUFACTURE GAS FROM WATER.

At a recent lecture before the London Polytechnic Institution, a small gas apparatus was exhibited (a patented machine by a Mr. S. White,) for making gas from water and tar or rosin. The invention is considered to be a valuable one. The apparatus consists of three retorts placed in a stove two of which are filled with charcoal and thin pieces of iron, and the other with iron chains hanging from a centre bar. The first two retorts are for the decomposition of water which is regularly supplied by means of a syphon-pipe passing through and into the centre of the retort; the water, in passing through the heated material becomes converted to pure hydrogen and peroxide of carbon. It then passes into the third retort to receive its dose of bi-carburet of hydrogen which is prepared from common tar, or melted rosin or similar substances passing or dropping on the red hot chain from a syphon tube which regulates its supply. This causes the tar, or melted rosin to throw off an abundance of bi-carburet of hydrogen gas.—The gases being mixed in this manner are immediately conveyed into the gasometer for use without any purifying vessels whatever, none being required.

It was stated to the Institute, that gas could be made much cheaper by this apparatus than by the common plans, and we may yet live to see Sir Humphrey Davy's prophecy fulfilled, that "at some future time gas would be generated from water for general purposes, surpassing coal gas in brilliancy and purity."

NEW ELECTRIC LIGHT.

The Electric Light of Mr. Staite, which has already been noticed in the Scientific American, is beginning to come into use in England. Our foreign exchanges say that "a common apparatus will only cost about $100, and it will illuminate the largest and smallest buildings at one-twelfth the price of gas."

This we think must be a favorable calculation. We should like to see this apparatus brought over and tested here. If it is no cheaper than English gas, it would be a great benefit to our citizens The project, however, may be like many others which have come and gone. Experience is the only true judge of value and usefulness.

An elder chap, says the New Orleans Picayune, speaking of his great knowledge of the Western country, the other day, said he had "known the Mississippi river ever since it was a small creek."

Dragon's Blood.

This is a resinous juice obtained by incision from several different plants found between the tropics. It is obtained, in commerce, in three principal parts—in that of oval masses, of the size of a pigeon egg, enveloped with leaves of the pandanus; in cylinders covered with palm leaves; and in irregular masses, marked with impressions of leaves: that in oval masses is the most esteemed. It is often very much adulterated, and other substances are substituted; particularly Arabic and gum Senegal, colored with logwood, &c. Several of these substances may be detected by their dissolving in water, while dragon's blood is nearly insoluble; others require to be submitted to some chemical tests. Madagascar furnishes this resin of a good quality, but so much fixed with foreign substances as to be little used. Dragon's blood is opaque, of a deep redish-brown color, brittle, and has a smooth and shining conchoidal fracture; when in thin laminæ, it is sometimes transparent; when burnt, it gives out an odor somewhat analogous to benzion; its taste is a little astringent; it is soluble in alcohol, and the solution will permanently stain heated marble, for which purpose it is often used, as well as for staining leather and wood. It is also soluble in oil, and enters into the composition of a very brilliant varnish, which is much esteemed by artists. Its quality may be proved by making marks on paper: the best leaves a fine red trace, and commands a pretty high price. It was formerly in high repute as a medicine, but at the present time is very little used.

TO CORRESPONDENTS.

"C. C. of Conn."—You have not stated the question correctly, water will not "move freely" in a canal without a fall or incline—this should be known—but allowing water to run 160 feet and calculating the perpendicular fall 1 foot, it would take 80 seconds, but if the perpendicular fall was 16 feet, it would only take 10 seconds. You must take the square roots from 16 to 1—and use 16 as a centre—thus, if a body falls through a space of 16 feet in one second, how long will it take to fall one foot, allowing the velocities to decrease with the squares of the distance, then divide 160 by the same time of root 1.

"W. M. of N. Y."—You would perceive that we mentioned the crucibles of Mr. J. Dixon, Jersey City. You can get them by writing to the manufacturer.

"J. W. of Ky."—We have received yours and will give it attention.

"M. W. P. of N. Y."—We know of no lecture or course of lectures that was delivered before the N. Y. Mechanics Institute last winter and since published. The lectures delivered last season were not published.

"A. B. of Ohio."—Isinglass is made only from fish. We will in a few weeks endeavour to give you the information.

"E. H. Z. of Pa."—We shall endeavour to publish in the course of a few weeks some articles containing our views upon the subject you mention.

"R. L. T."—We shall send the information you desire in a few days. We are trying to find out the best. $5, all right.

"H. H. T. of Mass."—The Picket machine is sold. We could not give you the name of the correspondent to whom you refer.

"E. G. of Ala."—We intend publishing before long a series of articles of the construction of machinery for grinding grain, &c. which will embrace the information you desire.

"P. S. H. of N. C."—We should have answered your letter before this but have been unable to give you as exact an answer as we desire. You will have a letter from us soon.

"D. W. of La."—We procured a copy of Davis's Munual for you in Boston and sent it to your address by mail last Saturday.

"B. & R. of Mass."—Your letter containing — dollars came safely to hand. We will attend to your request in two weeks.

"D. Wright, Hull Prairie, Perrysburg, Ohio."—Your Scientific American has been sent regularly to Perrysburg. They must be in the P. O. Tell the Postmaster to look them up—7 back numbers. Glad to hear of your welfare.

"D. R. Jr."—We will do what we can for