Science and Art.

Construction of Furnaces.

In a paper read before the British Society of Arts, by Charles Sanderson, upon the subject of Iron, he says, as regards the construction of furnaces, that generally speaking, they should have an internal form favorable to the gradual reduction and diminution of the volume of materials charged, which it is important should be so mixed that the earthy matter of the ore and the flux may readily unite; the descent of the materials into the furnace is regulated by the inclination and width of the boshes, and necessarily this inclination or width varies according to the nature of the ore which is to be melted—those which are most easily reduced require the boshes to be most inclined, while those which are difficult of reduction, and consequently require to be subjected to the action of the carbon of the fuel and the gases which are generated, for a longer period, are retained in this part of the furnace by greatly increasing its width, and giving the boshes a greater inclination. In explaining this action of the blast-furnace, he showed how the metal is reduced and carbonized, from which it will appear how difficult it is to obtain a pure metal, because, as it becomes developed in the lower regions of the furnace, it is necessarily mixed with substances forming a variety of metalloids; besides which, it is mechanically associated with the slag, which protects itin the dam from the oxydizing influence of the blast, through which it descends, carrying also with it a mixture of unreduced matter, which, from its gravity, becomes more or less mixed with the metal when it is in a state of pig-iron.

Improved Stave Cutting Machine.

This invention relates exclusively to that portion of barrel or cask machinery designed for cutting the staves. It consists in the employment of an adjustableknife or cutter, corresponding with the intended form of the stave, adjustable gage, and a vibrating bed, arranged in the proper relation to each other to respectively perform the functions of feeding and manipulating the "bolt" from which the staves are cut in an extremely simple, efficient and economical manner.

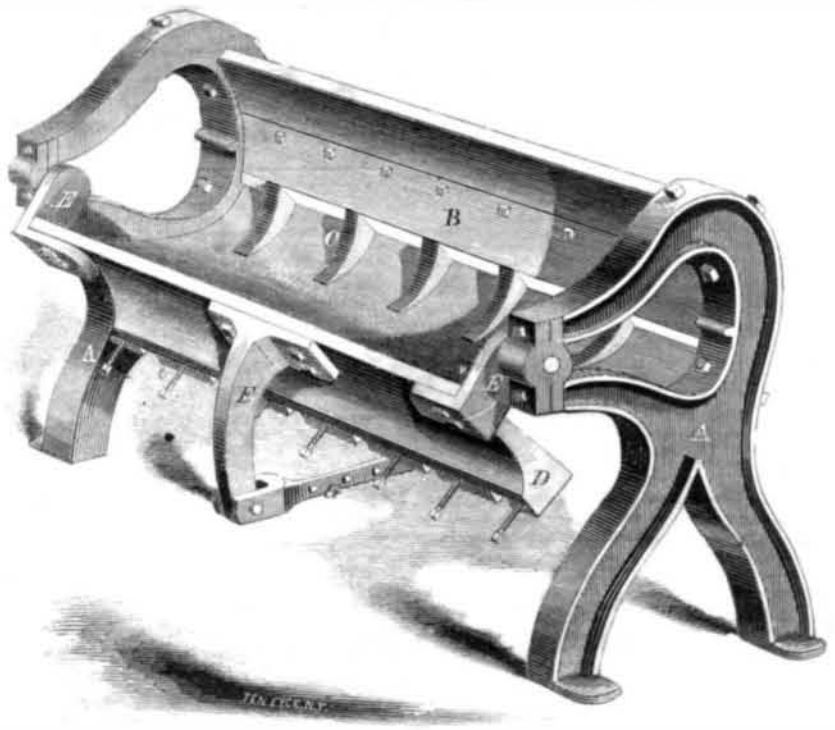
Our engraving represents a perspective view of this improved stave cutter, with a pitman rod attached through which it receives motion.

A A are the upright ends of the frame, which are secured firmly together, and between which a horizontal knife or cutter, B, is secured, by means of screws, or in any convenient manner for enabling its edge to be moved in and out. C are a series of gage pieces, which are secured on an eccentric plate fastened to the end uprights, A, of the frame. The curved faces of these gage pieces are parallel with the face of the knife, and the plate to which they are secured is attached to the uprights by screws, or by any other suitable means to admit of their adjustment to regulate the thickness of the staves. D is a cutting block, or bed piece, which is attached to levers, E E, at each end. These levers are jointed to the upright ends, A A, one to each, by journals turning in suitable boxes at one end, and are secured at their opposite ends to a longitudinal plate or beam, D, which forms the cutting block or surface upon which the stave "bolt" is placed.

The cutting block, D, when raised by the levers or radial arms, E, raises, of course, in the arc of a circle of which the journals are the fulcra, and the inner side of the knife, B, forms a segment of a circle which is concentric with the axis of rotation of the cutting block or bed piece, D, and the radius of the circle, in the arc of which the cutting block or bed, D, moves, is equal to that of the cask to be constructed. These fulcra may, by any suitable arrangement, be made variable, so that staves may be cut for different sized casks or barrels.

The operation is as follows:—The "bolt" from which the staves are to be cut is properly steamed and placed on the block or bed, D, which is then vibrated through the medium of the reciprocating motion of the pitman rod, G, or other suitable device or arrangement. This causes the block or bed, D, to be alternately raised and lowered past the edge of the knife or cutter, B, and at each vibration a stave to be cut from the "bolt," which moves with the same. As the staves are cut from the "bolt," it may, if necessary, be drawn back from the knife or cutter. This is often essential, for the bolt frequently requires

CROSSETT'S STAVE CUTTING MACHINE.



to be thus manipulated, either for the purpose of being turned or withdrawing the core. From the foregoing, it will be observed that gravity aids the manipulation of the "bolt," when being adjusted to the knife at each vibration, and in withdrawing therefrom. This is an important feature, and without it, the "bolt" could not be readily adjusted by the hands above, whereas through the peculiarity of construction and relative actions of the parts observed in this contrivance, these objects are easily and quickly obtained, and without any injury to the attendant.

This machine is admirably adapted to the purpose of its design, being simple and economical in its construction and efficient in its operation. It was originally patented by Isaac Crossett, of Bennington, Vt., July 1, 1844, and subsequently extended for seven years from July 1, 1858, and assigned to Geo. E, Crossett, of Joliet., Ill., who will be happy to furnish any further information.

Cronk's Bottle Faucet.

This simple contrivance consists in attaching to the enlarged neck or mouth of mineral water and other bottles, a metallic casting and screw cap piece, in such a manner as to readily enable a part or the whole of the effervescent liquid in the bottle to escape through a tube at the side of the casting, or to be closely confined in the same.

In our engravings, Fig. 1 is a section of the improved faucet applied to the neck of a mineral water bottle, and Fig. 2 is a section of the same and the neck of the said bottle in an inclined position, with the cap partially unscrewed, to admit the escape of the liquid.

The enlarged end of the tapering or trumpet-shaped tube, A, is inserted in the enlarged space, B, formed in the mouth or neck of the bottle, C. This enlarged space is also made in the form of a frustum of a cone, the neck of the bottle having a shoulder at this part, to admit of its inner enlargement, in which latter it is secured, with its edge resting on the shoulder, D, in the neck of the bottle, formed by the space, by any suitable cement poured into the space, B, between the lower portion of the periphery of the tube, A, and the periphery of the said space. A cylindrical tube, E, is cast or otherwise attached to the tube, A, and extends upward from its periphery to within an eighth of an inch, more or less, of the top edge of the inner tube, A, so as to have a concentric space between the two tubes, A E, which has an outlet through a tube, F, secured to the side of the outer tube, E. On the upper end of the cylindrical tube, E, is screwed a cap, G, having an elastic or leather washer secured to its inner flat surface, and a serrated flange formed on its sides, for enabling it to be turned between the forefinger and thumb, to either screw the leather washer firmly upon the upper edge of the inner tapering tube, A, or to unscrew and raise the same therefrom, and open a passage-way between said upper edge and the cap, to allow the escape of the effervescent liquid from the bottle.

When the bottle is turned to the position represented in Fig. 2, with the tube, F, over the tumbler or other vessel into which the effervescent liquid is to be discharged, the cap, G, can be unscrewed, to admit the required quantity to flow over the edge of the inner tube, A, through the space between the two tubes, A E, and in the event of any of the liquid still remaining in the bottle, the cap can be again screwed tightly upon the edge of the tube, A, so as to effectually stopple the bottle, and keep its contents free from the exterior air. This characteristic is peculiarly desirable in beer bottles, as through it a glass, or a portion of a glass of the liquid can be drawn, and the atmosphere readily excluded from the portion remaining in the bottle, so as to prevent the evaporation of its effervescent properties, and its deterioration by the contact of the air. The saving of corks effected by this permanent stopple would, it is supposed, pay for it in three to four months.

The patent for this novel bottle faucet was issued on the 6th of July, 1858. Any further information can be obtained by addressing the patentee, M. C. Cronk, Auburn, N. Y., or S. D. & J. K. Wackman, who are half owners of the patent.

RAILROAD AT CAPE TOWN—The government of the cape of Good Hope have advertised for tenders for constructing a railroad from Cape Town to Wellington—a distance of fifty-one miles. They estimate the cost at about two and a-half million dollars.