

**IMPROVEMENTS IN THE MANUFACTURE OF COKE.**

The production of iron of a quality and at a price that will meet the wants of the consumer, and at the same time yield a profit to the manufacturer during periods of depression in the market, truthfully says *Saward's Coal Trade Journal*, requires that every step be well taken with a view that no labor be needlessly employed; that all material entering into its composition be carefully selected, and cleansed of all foreign matter before it is put into the tunnel head. It is a fact too often overlooked that, to make a good iron, pure fuel is an absolute necessity.

Bituminous coal is frequently found so mixed with sulphur, slate, and other impurities that, despite immense deposits in the immediate vicinity of points where fuel is required, its use is abandoned owing to its being unfit for the blast furnace.

In the annexed engraving are represented some new coke ovens which are said to have produced coke from coal when all previous similar attempts had proved failures. They were recently built by McLanahan, Stone, & Bayley, of Hollidaysburgh, Pa., for the Cambria Iron Co.

These ovens are 36 inches wide, 7 feet high, and 22 feet long, and present the appearance of a succession of arcades closed at each end with iron doors. They are surrounded on the two sides and bottom with combustion chambers in which the volatile matter is burnt as it passes away from the coal that is being coked. The burning of this gas maintains a high and certain heat, sufficient to coke the coal.

Charging the ovens is done by means of hopper-filling cars that run on tracks on top of the ovens; each oven has two filling holes through which the coal contained in the cars is emptied. The discharge is effected by a powerful steam ram, shown in the illustration, which moves back and forth in front of the ovens on a three-rail track. On the end of a long rack is a head which fits the oven, which is pushed through the latter by powerful gearing, and expels the coke from the door at the opposite end. The coke being left on the cooling ground on the other side of the oven, the ram is withdrawn, the door closed, covers taken from the filling holes, and coal dropped in before the oven has had time to cool. The charge for an oven is 17,500 lbs. of coal, and in 72 hours this charge is coked, producing 13,125 lbs. of coke, which is a yield from the coal of 75 per cent; the cost of labor in coking a gross ton of coke in these ovens is 35 cents. Careful experiments made with coal from the same mine coked in pits, during the most favorable weather, showed that 59 per cent from the coal, at a cost of labor of 76 cents per ton of coke, was the best that could be done. The best result in the beehive oven was 61 per cent from the coal. Taking a whole year's work, both in beehive ovens and in pits upon the ground, the yield was about 50 per cent of coke in weight from the coal.

The coal in Jackson and Vinton counties, Ohio, although existing in such great quantities, has been considered unfit for iron smelting until very recently, and it is through the application of modern improvements in the way of crushing and washing the coal, then coking it, that the great and beneficial result has accrued.

Experiments recently had at the Vinton Furnace proved eminently satisfactory. The coal is crushed and bolted almost the same as flour would be, then washed thoroughly by streams of water playing upon it constantly while it is undergoing the crushing process, until all the impurities of sulphur and slate are extracted. It is now ready to be coked.

The ovens are improved Belgian, patented by McLanahan, and may consist of any number. At Vinton there were twenty-four, each three feet wide, seven feet high, and twenty-two feet in length, built of fire brick, with iron doors at each end; the charge is 180 bushels of crushed coal; it remains in 48 hours, and is then ready to draw.

The bottom and sides of each oven, as well as the tops, are solidly lined with fire bricks. All along, near the top of each oven, are small apertures through which the gas from the heated coal passes, and is carried down one side, and under the oven and up the other side, and is burnt in its passage, thus creating the heat which keeps the fire brick of the oven a bright red in all its parts. The ovens are filled from the top by means of hopper cars, which run on a track and dump coal into an aperture on each end of the oven; it is then raked level by hand through the doors, which are

afterward closed and sealed up with soft clay. There is a mica-covered opening in the doors, so that the combustion may be observed, and the proper time noted for drawing. These improvements must prove of value to the locality.

The cleaning and crushing process is described as follows: The car load of coal is emptied on a sloping iron screen with bars three inches apart; the coal that does not pass through this falls on to a level screen of iron bars, where it is pounded by hand power until it all passes through. Then it passes between iron cylinders driven by steam power, and is crushed until it will all pass through a  $\frac{1}{8}$  inch screen. This crushed coal is elevated precisely like flour in a flouring mill, with small buckets or scoops on an endless belt. At the top, where the belt passes over a roller, the fine coal is poured from the little buckets into a great bolt, which

one, C, merely opening into the interior, the other, D, extending nearly to the bottom. To these tubes are connected sections of pipe, that on C having a suitable mouthpiece.

In operation the vessel, A, is placed in the tank until filled with water through the valve. The lips are then applied to the mouthpiece on the tube, C, and air blown in. The effect of this, pressing on the surface of the water in A, is to close the valve in the bottom, when the water rises through D, and is forced out through the pipe thereto attached. The invention is small, is easily sent by mail, and is especially adapted to the parlor fountains which we illustrated a year or so ago. It is manufactured by the American Fountain Company, 6 Cortlandt street, New York city, whither inquiries for further particulars may be addressed.

**How to Treat Frosted Plants.**

A writer in *Inter-Ocean* says: "The disastrous effects which tender plants, which have become frozen, are subject to is generally known to cultivators; but how or why freezing produces the effect it does upon plant life is not so easily ascertained; and all attempts, heretofore made by scientific men to solve the question, have been, at most, only partially successful. In practical experience it is found that the length of time, and the degree of cold to which plants are exposed, affect them in proportion to the duration and intensity of these conditions, and these point, therefore, to the speedy restoration of a suitable temperature as the best means of restoring plants that have unfortunately been exposed to frosts. But the thawing out should, in all cases, be moderately gradu-

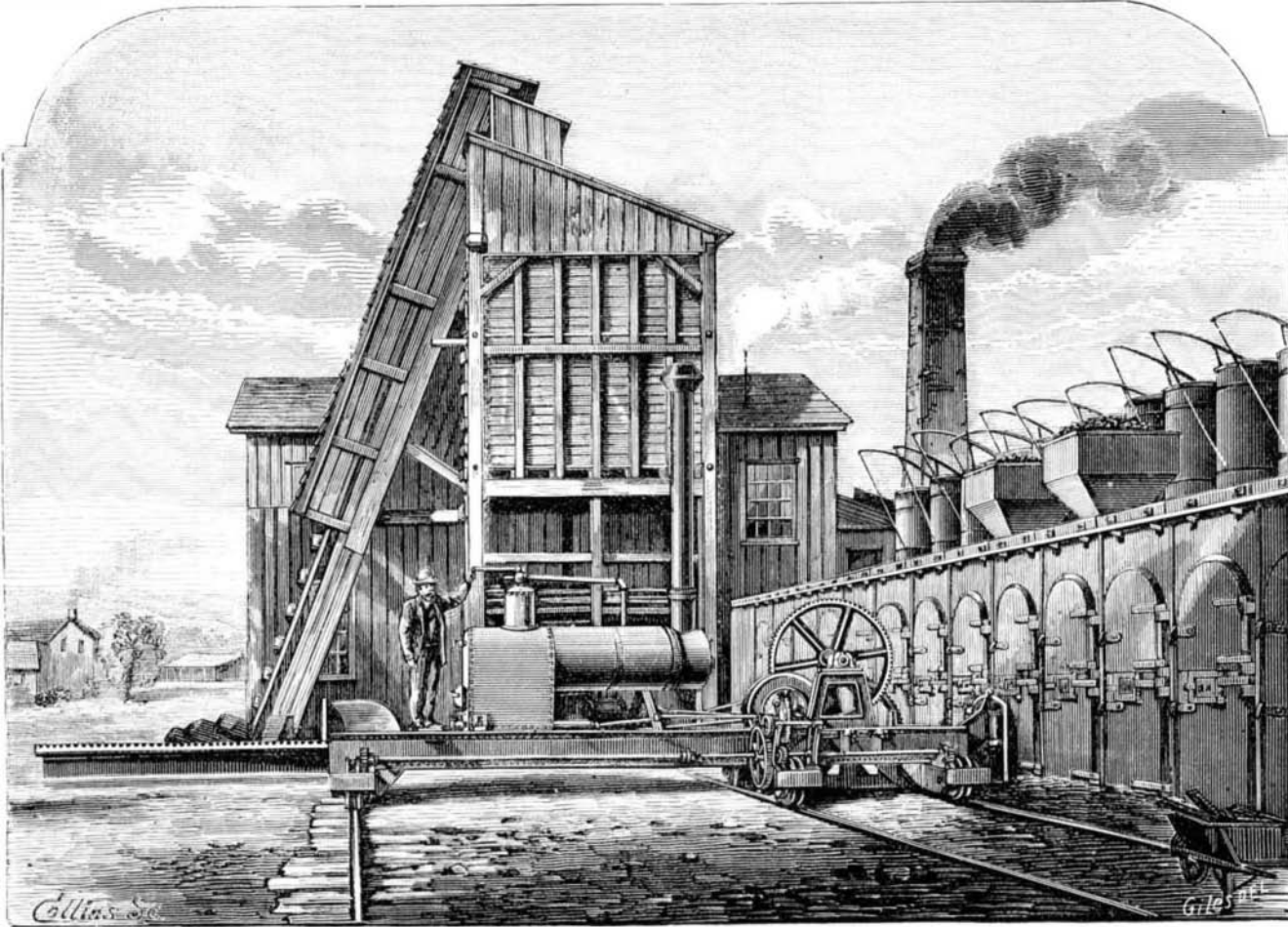
al; and one of the best things to do, when plants have become frozen, either in the dwelling, conservatory, or open air, is to sprinkle the foliage with cold cistern or well water, as the temperature turns to rise. In the dwelling or conservatory, however, it will be necessary to start the fire in the stove, furnace, or flue, the first thing of all, to give the temperature an ascendancy; but it should, for several hours, not be allowed to rise above an ordinary suitable degree. Some advocate shading the plants from the sun and light for some length of time, but the policy of so doing has never been apparent to me, while I have frequently had proofs to the contrary; and the sun's rays, striking upon the plants with gradually increasing heat, in a great measure aid in their recovery. There is a great difference in plants as regards their ability to resist cold; and while some by the slightest frost will be injured beyond cure, others will bear various degrees, and even alternate freezing and thawing again and again, with impunity. Avoid handling plants in a frozen condition as much as possible, as the injury to them will be heightened should the leaves become bent or be roughly brushed over. To restore flowers that have become frozen, place them in cold water until the leaves are thawed out."

**A Good Suggestion.**

An excellent proposition has been made, which, if it be carried into action, will greatly add to the permanent value of the Centennial. In each county, provision should be made for the delivery of an address on the Fourth of July, tracing the history of that particular community during the past century or from the time when it was settled, and including a sketch of its growth, industry, resources, prospects, etc. These addresses, bound in some uniform style, as, for instance, that of Congressional reports, might thereafter be bound together by the States, and thus become of invaluable historical importance. The proposition is an admirable one, and should be carried out.

**Automatic Locomotive Whistle.**

Mr. L. S. Ware, C. E., of Philadelphia, Pa., sends us diagrams and description of an automatic railway signal, designed to remedy the defective system now in use, which depends on the clearness of the atmosphere for its efficiency. It is the invention of M. Lartigue, electrician of the Chemin de Fer du Nord, of France, and of Mr. Forest, professor at the Ecole Centrale. It consists of a whistle on the locomotive, which is opened by an electro-magnet, the current being sent from a stationary battery, placed at some distance from the depot or junction which the signal is designed to protect. The device is conveniently and well arranged, but is not, we think, likely to supersede a simple lever on the engine operated by a lug near the rail, which device, we learn, has been tried successfully in England.

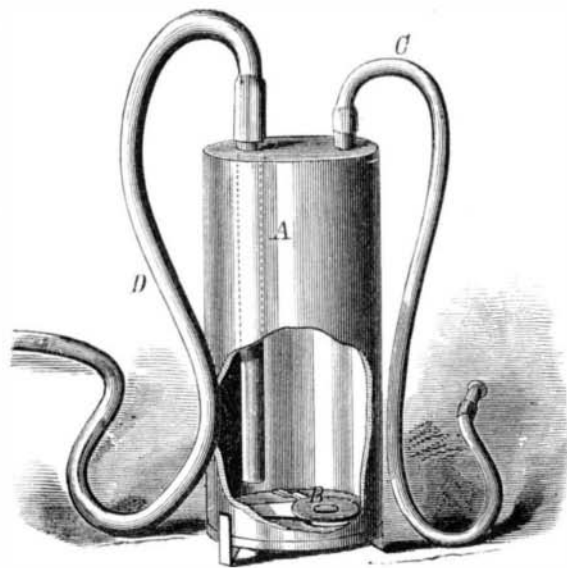
**THE CAMBRIA IRON COMPANY'S COKE OVENS.**

revolves precisely like a bolt in a flouring mill. Extending the whole length of this bolt, and directly over it, is a small water pipe, perforated with numerous small holes, through which streams of water fall upon the bolt.

The Cambria Iron Company has over 100 of these ovens in use at Hollidaysburgh and Johnstown, Pa., and the Rock Hill Iron Company employs 47 more. Patents for some improvements are now pending through the Scientific American Patent Agency, to Mr. McLanahan.

**IMPROVED APPARATUS FOR EMPTYING AQUARIA.**

It is not everybody that knows how to arrange a siphon for draining water out of aquaria or parlor fountains after the fish or vegetation therein have rendered the fluid foul, and to attempt to start the water running by sucking on the pipe after the siphon is placed in proper position, is often to receive an unpleasant mouthful. Emptying the water from the tank or globe, as out of a bucket, is impossible in an aquarium where there is loose rockwork, and in any event



it is a proceeding by no means calculated to improve the condition of the fish or the plants. A simple little device, however, has lately been invented which will perform the operation of removing the water very easily and surely. It is represented in the annexed engraving, and consists of a small vessel, A, in the bottom of which is a hinged valve, B, which opens inwards. Entering the top of the vessel are two tubes,