SCIENTIFIC AMERICAN

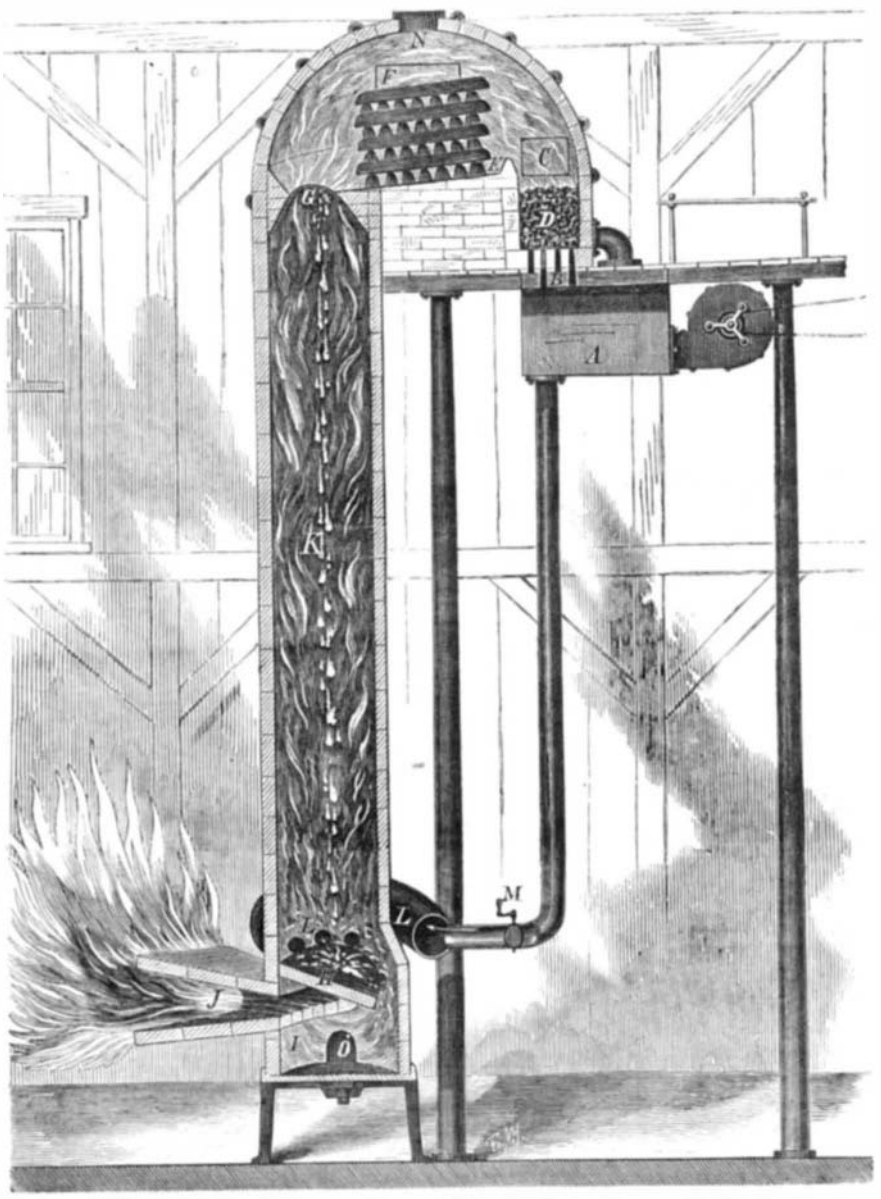
A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. XXIII.---No. 1. [NEW SERIES.] NEW YORK, JULY 2, 1870. $3 per Annum [IN ADVANCE]

The Peters Process of Manufacturing Steel from Pig Iron.

One of the fields in which great advancement has been made, and in which a great many are still earnestly striving to make improvements, is that of the production of refined iron and steel by new processes which do not involve the necessity of puddling by manual labor, as is the old practice.

The annexed engraving represents a vertical section of a furnace for decarburizing and desulphurizing iron in the manufacture of cast steel for rails, car wheels, guns, etc., it being a modification of the reverberatory and cupola furnaces combined. The blast enters the air chamber, A, under the scaffold, and passing upward through tweers, B, to the fuel—either anthracite or bituminous—which is supplied through the small door, C, into the fire-box, D, passes from thence to the dome of the furnace, the flame playing upon the pig iron which is piled upon the bed or hearth, E, and which is introduced through the large door, F. The vertical part of the furnace is contracted at the top, G, so as to retard the exit of the flame at that point, and the product of combustion passes down on to the platform, H, which may be supported from the bottom or from projecting brick from the sides. The platform, H, is composed of fire-brick or any incombustible material; and the products of combustion then pass on into and through the reservoir, I, and finally escape at J. The reservoir, I, having thus attained, after a time, intense heat, is now ready to receive the molten iron as it falls in globules, K, from the top of the furnace or stack, through the flame and on to the platform, H, previously described. The concussion causes them to burst upon the platform, liberating all the free carbon and all the gas or sulphur contained therein, and thereby increasing the density of the metal. A blast through the tweers, L, is caused to play upon the iron, while thus in a finely divided state, similar in form to scales. This supply of oxygen brought in contact with the particles of iron completely decarburizes it and also frees it from any remaining sulphur or other impurities. Also the unconsumed carbon from the fuel above is supplied with oxygen at this point, and consumed, producing intense heat. It will be observed that each particle of iron is, without coming in contact with the fuel exposed to the flame and blast, and undergoes a self-puddling process by falling from a hight of fifteen feet or more. Manganese and charcoal are placed in the reservoir, I, for the purpose of a final fluxing and recarburizing, as may be desired.



THE PETERS COMPOSITE DECARBURIZING AND DESULPHURIZING FURNACE.

By turning the blast off with the damper, M, in the lower tweers, L, all the advantages of the reverberatory furnace are secured, while purer and stronger iron is obtained for ordinary foundery purposes, where clean castings are essential, with the additional advantages of the puddling process. The escaping flame may be utilized by leading it under a boiler, or for other purposes. The opening at the top of the arch, N, is for letting off the smoke when starting the fire, and to be closed with a cover of fire brick while melting. The bottom of the reservoir, I, may be constructed with a drop bottom, like the ordinary cupola, for the purpose of repairs, etc. The metal is drawn off at O, into ingots. It will be seen that the area of the puddling platform, H, can be increased if desirable. If crucibles are used for pouring the metal, they can be heated to any degree by placing them in the flue at the escaping point, J, of the flame, by arranging a small door at that point in the side.

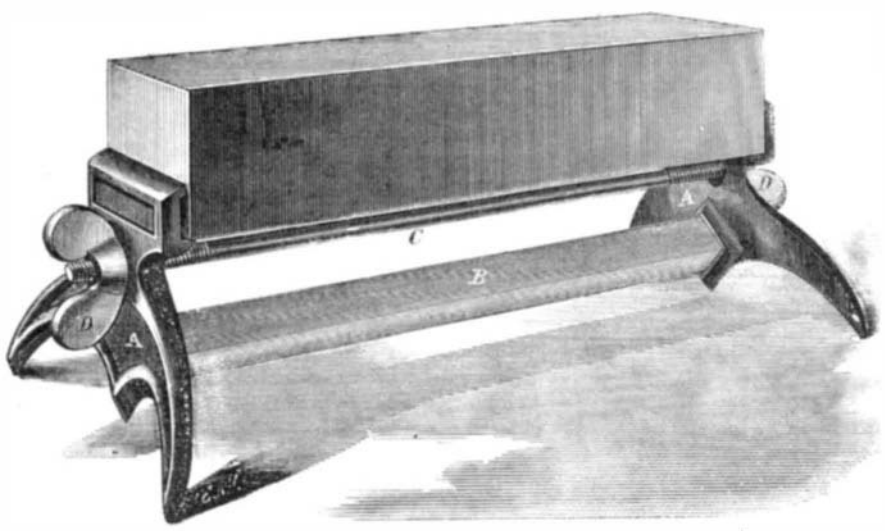
The inventor assures us that a very fine quality of steel can be produced by this method.

A striking feature is the cheapness of the required plant. The inventor estimates that he can put up a furnace that will melt and convert two tuns of metal per diem for $500, and one that will melt and convert five tuns twice a day for less than $3,000.

The inventor who is a practical iron master of long experience, would like to arrange with some capitalist to start and superintend the manufacture of steel by this process. The device was patented, through the Scientific American Patent Agency, Nov. 2, 1869, by Charles Peters, of Trenton, N. J., who may be addressed for further information at 122 Jackson street, as above.

Improved Oil-Stone Holder.

The old method of setting an oil-stone in a wooden box with a cover, is open to several objections. Only one side of the stone is available for use except when by considerable trouble it is taken out and reset, bottom side upwards. The vertical sides are never available. The sides of the wooden box are receptacles for grease and accumulated dirt, and also are in the way in sharpening many kinds of tools. The stone is so close down to the bench that the handles of some tools, draw-shaves, for instance, strike the bench when it is attempted to sharpen them, and an extra stone held in hand, or the stone set in the box inverted and held in the hand has to be employed. Each of these objections is entirely obviated by the neat little device shown in our engraving.



BROWN'S OIL-STONE STAND.

In this stand the stone rests upon narrow ledges at each end, the ledges being cast upon the end-plates, A. The lower parts of these plates are formed into legs. A square wooden rod, B, fits into sockets formed in the end plates and serves as a longitudinal brace. The whole is clamped firmly by means of a longitudinal rod, C, and thumb-nuts, D.

By loosening the thumb-nuts slightly the stone may be turned so as to bring either of its sides to the top, and these sides may be shaped differently, if desired, for various kinds of tools.

By placing a shelf of wood underneath the stone to strengthen it, it may be used till worn nearly or entirely through. The device is very simple and will, we think, be found a very useful one by all who use an oil-stone.

The inventor will negotiate for the manufacture of the implement on royalty, or for the sale of the entire right; preferring the former, however, as it is his desire to at once put it permanently into market as a staple article in the hardware trade. Patented, through the Scientific American Patent Agency, April 26, 1870, by Homer Brown, whom address at Hamilton, Ill.

Zinc as a Building Material.

Stone and stone only, says the *American Builder*, has always been deemed by architects and others, the appropriate material to be employed in the ornamentation of buildings, and doubtless there has existed, until a comparatively recent date, the best of reasons for this theory. First, stone is durable; there is nothing ordinarily entering into the composition of our building, that, in this respect, can compare with it, and again from its peculiar facilities, few other suitable substances can be worked into the required form, offering the means for such boldness and strength in the general effect or such correctness and delicacy of detail. On the other hand, however, stone can be employed only at a considerable expense, both in working and in transportation, and, in some localities, distant from quarries, this expense reaches a point when the employment of such material is practically precluded, save where its use is an absolute necessity. In ornamented fronts especially, where stone has heretofore been considered indispensable, its use is discarding, and metal imitations are taking its place.

The principal objections raised against the use of metal, lie in the fact that it is untruthful, and therefore inappropriate, but certainly the use of an imitation in this particular is in no sense more inappropriate than the use of hollow iron columns in imitation of stone, and the employment of similar counterfeits in interior ornamentation. Prominent among the substitutes for stone is zinc, a material which has proved eminently adapted to the purpose, and is rapidly acquiring a place among the building materials from its adaptability to all form as well as from its lasting qualities. With the introduction of pressed ornaments of this material the expense of exterior decorations has been greatly reduced, and an additional advantage is gained in the fact that from the facility with which it is worked, there exists but little difference in the cost of the plainest and most elaborate patterns. The work when coated with paint suited to the purpose, may be made to resemble cut stone work so closely as to deceive the eye of any one not an expert, and in like manner the interior of buildings can be ornamented with zinc in imitation of stucco, or embellished with elaborate moldings at a small cost, which work may be cleaned at any time without fear of injury. In the ornamentation of old buildings, which if of cut stone, could only be accomplished by taking down the walls, zinc also plays a useful part, as decorations may be put on without displacing any portion of the structure. As a roofing material its value has become generally acknowledged in Europe, and, in this country, is rapidly acquiring an equally high reputation, particularly in the construction of large buildings. When exposed to the influence of the atmosphere, the oxidation that at once ensues instead of rapidly eating up the metal, soon forms a crust which hardens and effectually protects the body of the covering from further damage.