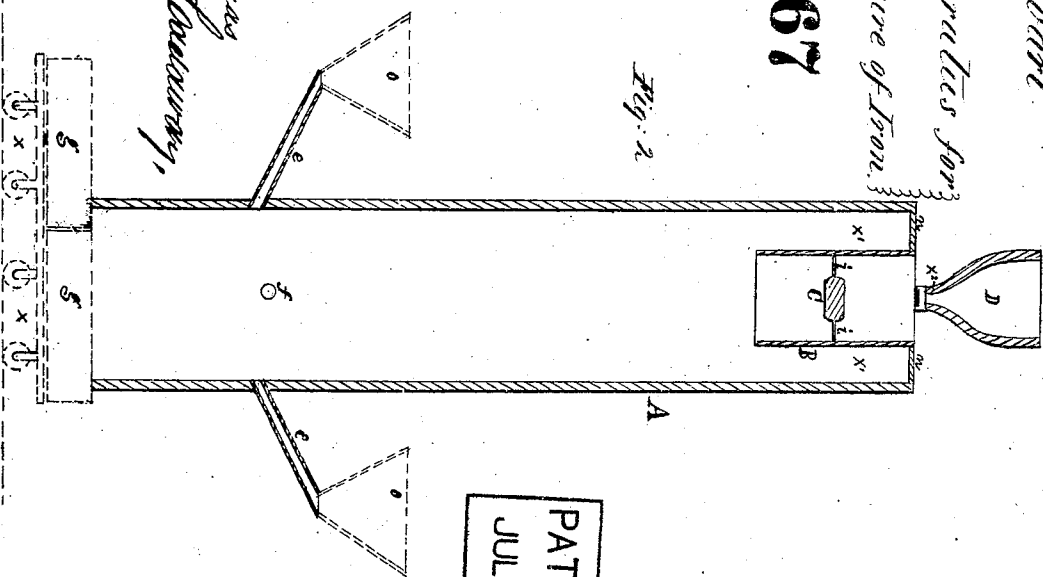


David Stewart
 Improvements for
 The Manufacture of Iron.
 No. 92667

Attest { Charles H. Brown
 Clerk of the Court

Fig. 2



PATENTED
 JUL 13 1869

Fig. 1

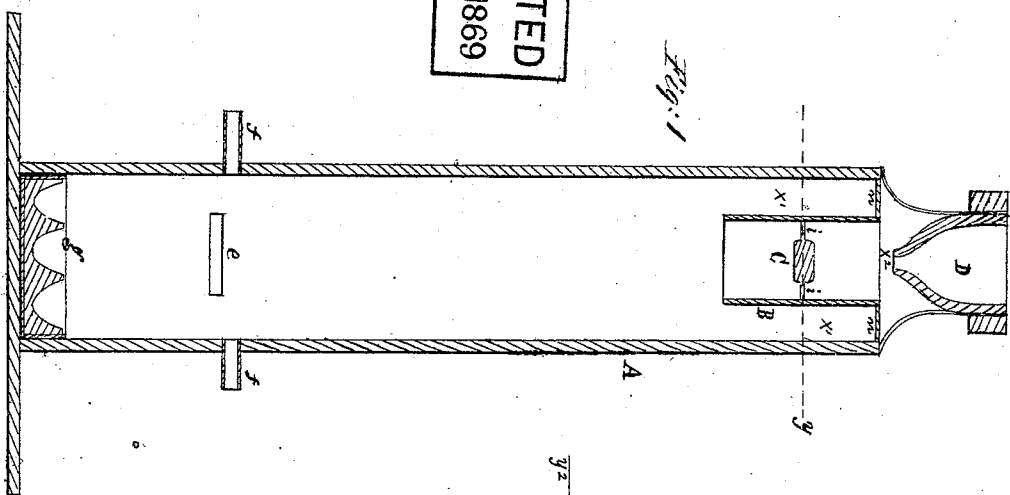
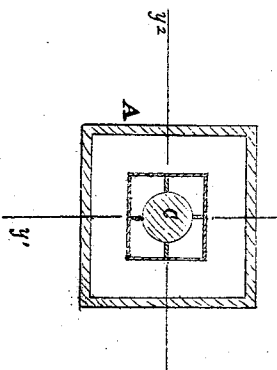


Fig. 3



Inventor
 David Stewart

United States Patent Office.

DAVID STEWART, OF KITTANNING, PENNSYLVANIA.

Letters Patent No. 92,667, dated July 13, 1869.

IMPROVEMENT IN THE MANUFACTURE OF IRON.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, DAVID STEWART, of Kittanning, in the county of Armstrong, and State of Pennsylvania, have invented a new and useful Improvement in Method and Apparatus for Manufacturing Iron; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The nature of my invention consists in the herein-after-described method and apparatus for manufacturing "concrete blooms," the constituent parts of which are partially purified, and partially converted cast-iron, and a metallic oxide.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

In the accompanying drawings, which form part of my specification—

Figure 1 is a vertical section, (when cut through at line y' , fig. 3,) of my improvement in apparatus for manufacturing "concrete blooms."

Figure 2 is a vertical section of the same when cut through at line y'' of fig. 3.

Figure 3 is a transverse section, when cut through at line y of fig. 1.

In the drawings—

A is a metal tube, about forty feet in height, and about twenty-four inches in diameter, and may be made round or square, when viewed in cross-section.

The upper end of the tube or pipe A is provided with a metal (by preference copper) pipe or tube, B. This tube or pipe is about three feet in length, and arranged concentric to the bore of tube or pipe A, and should correspond in form to the tube or pipe A, and be about eighteen inches in diameter.

The tube or pipe B is provided at one end with a flange, n , for holding it in position, with relation to tube or pipe A, and for covering over the upper end of the space x' , formed by the tubes or pipes A and B.

In the centre of tube or pipe B is suspended, by means of bars or rods i , a metal block, C.

This block should be about eight inches in diameter, and about three inches thick. The upper side of the block C should be coated with fire-clay, or other refractory matter.

A receiving-vessel, D, is suspended just above the upper ends of the tubes or pipes A and B.

In the bottom of the receiving-vessel D, is an opening, x'' . This opening is arranged directly over the block C.

The tube or pipe A is provided with two blast-pipes f , and two chutes e , which should be provided with hoppers, as indicated by the dotted lines O.

The position and relation of the blast-pipes f and chutes e to each other, and to the tube or pipe A, is clearly shown in figs. 1 and 2 of the accompanying drawings.

The point of attachment of the blast-pipes f and chutes e to the tube or pipe A should be about six feet up from the lower end of it.

The bloom or ingot-moulds g should be arranged on trucks, as indicated by the dotted lines z , so that they may be readily removed from under, and brought under and central to the bore of the tube or pipe A.

The form and size of the moulds may be adapted to the form and size of bloom or ingot desired by the manufacturer.

It is hereinbefore stated that the tube or pipe A should be about forty feet in height, but the height of it may be varied to adapt it to the difference in the quality of the cast-iron used in manufacture of the blooms.

If the cast-iron is easily purified and converted, then the tube or pipe A may be shorter; but if the cast-iron is hard to purify and convert, then the height of the tube or pipe A should be greater.

In practice, it will be found that about forty feet in height will answer for most of the cast-iron manufactured in this country.

The apparatus hereinbefore described should be arranged with relation to furnace in which the iron is melted, so that the molten iron can be readily elevated in suitable vessels to the receiving-vessel D, by means of suitable hoisting-gear, the construction and arrangement of which I leave to the skill and judgment of the mechanic, and those who may use my improvement.

As the construction and arrangement of my improvement in apparatus for manufacturing "concrete blooms" will readily be understood from the foregoing description, and by reference to the accompanying drawings, I will therefore proceed to its operation in the manufacture of "concrete blooms."

Having all things constructed and arranged as hereinbefore described, with the blast-pipes f attached to a fan, blower, or other blast-device, I take molten cast-iron direct from the ore, or pig-iron remelted, and having elevated it to the receiving-vessel D, the molten cast-iron is poured into it, and from it runs down through the opening x'' , and falling on the block C, is scattered into a great number of very small streams, which strike against the sides of the short tube or pipe B, and are thereby divided into spray or globules.

At the moment the molten cast-iron is poured into the vessel D, the blast is introduced, through pipes f , into the tube or pipe A, as is also finely pulverized iron-ore, or other metallic oxide or oxides, through the chutes e . By thus introducing an active current of air and streams of pulverized ore, or other metallic oxide, into the tube or pipe A, the upper portion of it will be filled with a moving column of air, and the lower portion of it will be filled with an active current of air, surcharged with finely-pulverized iron-ore, or other metallic oxide.

Now the molten cast-iron, being subdivided into

spray or globules, as hereinbefore stated, will first pass down through the moving column of pure air, which so acts on the spray or globules as to cause them to become intensely heated, and the oxygen of the air combines with the particles or globules of molten cast-iron, and partially purifies and partially converts the particles or globules into wrought-iron, as distinguished from ordinary cast-iron.

These partially-purified and partially-converted particles or globules, in their intensely heated condition, passing on down through the first portion of the tube or pipe A, come in contact with the air, surcharged with pulverized iron-ore, or other metallic oxide, combining with the oxygen of the air and the fine particles of pulverized iron-ore in it, and each particle or globule of molten iron becoming enveloped with the pulverized iron-ore, or other metallic oxide, falls down into the bloom or ingot-moulds, and there becomes thoroughly mixed and united with that portion of the pulverized iron-ore, or other metallic oxide, which has, by reason of its specific gravity, sunk down into the moulds, thereby forming "concrete-blooms," the constituent parts of which consist of partially-purified and partially-converted cast-iron, and a metallic oxide or oxides, which are so mixed, combined, and commingled together as to form one homogeneous mass.

The bloom or ingot-moulds *g* should be arranged on a truck or trucks, indicated at *x*, and provided with a continuous series of moulds, which can be brought directly under the lower end of the tube or pipe A, as shown in fig. 1, for the purpose of being filled, and when filled, removed, and another empty mould brought forward.

The truck *x*, with the moulds, may be made to travel on a straight or circular railway.

After the blooms are formed in the moulds, and have become sufficiently congealed, they are removed from the moulds, and afterward reheated, worked, and manipulated, in any known manner for working blooms or ingots, into other forms of merchantable iron.

I wish it clearly understood that I am aware that blooms, known as "pig-blooms" and "crude bloom," have been made by mixing molten cast-iron and pulverized iron-ore together; therefore I do not claim such mixing and blooms as any part of my invention; but the novelty of my invention consists in the hereinbefore-described method of partially purifying and partially converting, and intensely heating the molten cast-iron while in a subdivided condition, and then mixing the same with a metallic oxide, whereby a new result is obtained in the manufacture and quality of the bloom or ingot thus produced; therefore,

What I claim as of my invention, is—

1. Partially purifying and partially converting, and intensely heating molten cast-iron while it is subdivided into small particles or globules, prior to the mixing of the same with a metallic oxide, for the purpose of forming a "concrete bloom" or ingot by a single operation, as herein described.

2. The tubes or pipes A B, block C, blast-pipes *f*, chutes *e*, and receiving-vessel D, in combination with bloom or ingot-moulds, the whole operating substantially as herein described and for the purpose set forth.

Witnesses: DAVID STEWART.

GEO. H. THOMAS,
CHAS. HADAWAY.