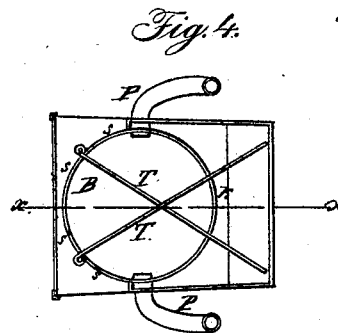
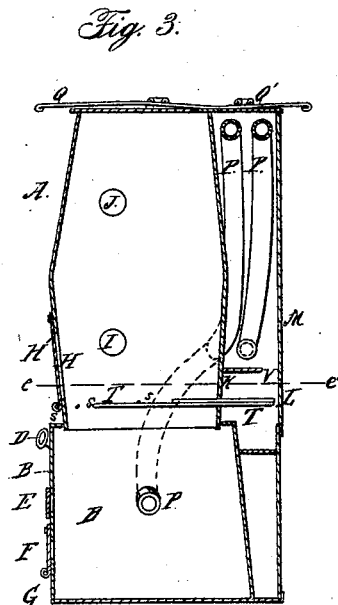
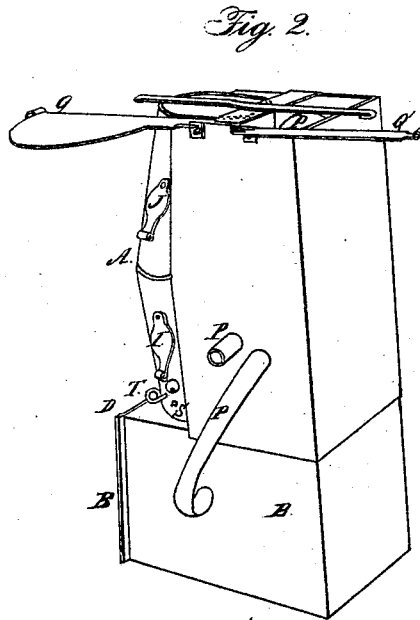
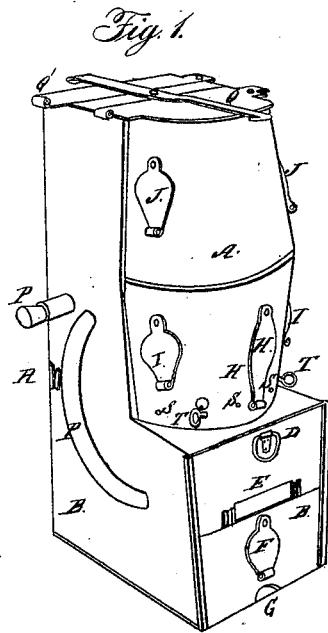


A. DICKERSON.
Making Iron Direct from Ore.

No. 5,013.

Patented Mar. 13, 1847.



UNITED STATES PATENT OFFICE.

ALEXANDER DICKERSON, OF NEWARK, NEW JERSEY.

IMPROVEMENT IN APPARATUS FOR THE MANUFACTURE OF MALLEABLE IRON.

Specification forming part of Letters Patent No. 5,013, dated March 13, 1847.

To all whom it may concern:

Be it known that I, ALEXANDER DICKERSON, of the city of Newark, in the county of Essex and State of New Jersey, have invented a new and useful mode of producing malleable iron direct from the ore, and in the construction of the furnace for doing the same, which is described as follows, reference being had to the annexed drawings of the same, making part of this specification, of which—

Figure 1 is a perspective view of the front of the furnace and of the left side thereof. Fig. 2 is a perspective view of the back of the furnace and the right side thereof, showing the doors of the charging-cylinder and of the oven containing the hotblast-tubes open, which in Fig. 1 are represented closed. Fig. 3 is a vertical longitudinal section at the line *x x* of Fig. 4. Fig. 4 is a horizontal section on the line *o o* of Fig. 3.

My mode of making malleable iron direct from the ore is effected by means of a new combination and arrangement of parts, hereinafter described and represented, to wit: by arranging a chamber, A, for containing the charge, with a chamber or box, B, arranged below it, for containing a portion of the charge, and the loop which is formed in said chamber B, having doors Q Q' at the top of the charging-chamber for admitting the charge, and a door, D, over the opening through which the loop is taken out and of excluding the entrance of cold air to the ignited fuel in said chamber B, with ovens L and M back of the charging-cylinder for reheating the loop and for heating the blast-pipes by means of the surplus heat from the chamber A passing through a flue, K, into the lower oven, L, and out at the top of the upper oven when the door Q' at top is open, and with doors H and I in the sides of the charging-chambers, through which to introduce suitable implements for working down the ore and coal, and valves J, to admit air and to discharge impure gases and regulate the heat, and a slide or door, R, for closing the mouth of the oven, and apertures S in the sides of the charging-chamber, near the lower end, through which to insert iron bars T, forming a temporary grate to hold up the heated coal and ore while taking out the loop below.

The box or chamber B for receiving a portion of the charge, and in which the loop is

formed and into which the blast enters, is made in the usual manner, except that the opening through which the loop is taken out, which is usually left open, is now to be kept closed by a slide or door, D, for excluding cold air from the ignited fuel, and thereby increasing and retaining the heat in the box B and charging-chamber A, and for removing the loop, when necessary, by opening said door D, there being a small door, E, in the large door D, to be opened at pleasure to ascertain the temperature of the loop. There is also an additional slide, F, near the bottom of the box and above the usual cinder-hole, G, for the purpose of tapping and drawing off cinder as may be required during the making of the loop. The box or chamber D should be made of the usual material, size, and form, or otherwise as preferred, and slightly gathered over at the top or where it unites with the upper chamber, A.

The charging-chamber A is placed directly over the box B, into which chamber the fuel and ore are disposed in proper quantities, which may be kept continually charged from the mouth of the chamber by opening the door Q. This chamber may be made cylindrical, conical, funnel-shaped, barrel-shaped, or of any suitable form preferred, and of any proper material and size and thickness, to be made perfectly tight by closing all the slides and doors. It is to be provided in front with a long opening, H, at or near the bottom of the chamber, directly over the box B, covered with a slide, H', for the purpose of admitting a suitable instrument for working down the iron when in a glutinative or pasty state, called "flurried" iron, into the box B. There are also two side apertures, I I, in the lower part of the chamber A, covered with slides, said apertures being designed to admit suitable instruments for the purpose of working down the coal and heated ore sufficiently fast to prevent clogging. The two apertures J J in the upper part of the chamber are for the purpose of admitting or ejecting air, as may be necessary, to expel impure acids and to keep the heat at any required temperature. There are also apertures S near the bottom of the chamber A, into which iron bars T or slides are inserted, forming a temporary grate to hold up the heated coal and ore while taking out the loop below, which, when taken out, admit

of the said bars being removed and a second loop commenced forming immediately, the apertures being then closed with small slides. All the apertures and openings above-named are covered with suitable doors, slides, or valves.

The oven L, in which the loops or blooms are reheated for drawing out by the surplus heat passing from the charging-chamber A through the flue K into the oven L, in combination with a small quantity of additional coal introduced to the oven L through the door R, is arranged behind the charging-chamber A, and connected to it and to the oven M, placed or arranged above it and behind the said charging-chamber A, and communicating with the said oven M by a flue, V, having a door, Q, at the top opening into the atmosphere for letting off the heat and gases when open, as shown in Fig. 2, or for confining them in the oven when closed, as shown in Fig. 1. The reheating of the loops is done by the flame passing from the back of the chamber A into the oven L in connection with the additional fuel. After the flame passes through the oven L it enters into a chamber or upper oven, M, through the flue V immediately over the lower oven, L, in which oven M are placed cast-iron

blast-pipes P, through which the blast passes, and is heated to any desired temperature, regulated by the slide-valve Q' at the top. The mouth of the oven is closed by the slide R.

The bars T may be made hollow and to contain water to prevent burning out or sagging or melting.

What I claim as my invention, and desire to secure by Letters Patent, is—

The method of making malleable iron direct from the ore by combining a chamber containing the charge with a closed forge-fire, B, containing a continuation of the charge and the loop formed therein, arranged below and communicating with the same, provided with a suitable opening closed by a door, D, for the introduction of a portion of the charge and for excluding the air therefrom, and with movable bars T, for holding up the charge in chamber A while burning down the charge in the lower chamber, B, and taking out the loop therefrom at door D, substantially as above described and set forth.

ALEXANDER DICKERSON.

Witnesses:

WM. P. ELLIOT,

ALBERT E. H. JOHNSON.