J. ASHCROFT.
Furnace-Door.

No. 162,334. Patented April 20, 1875.

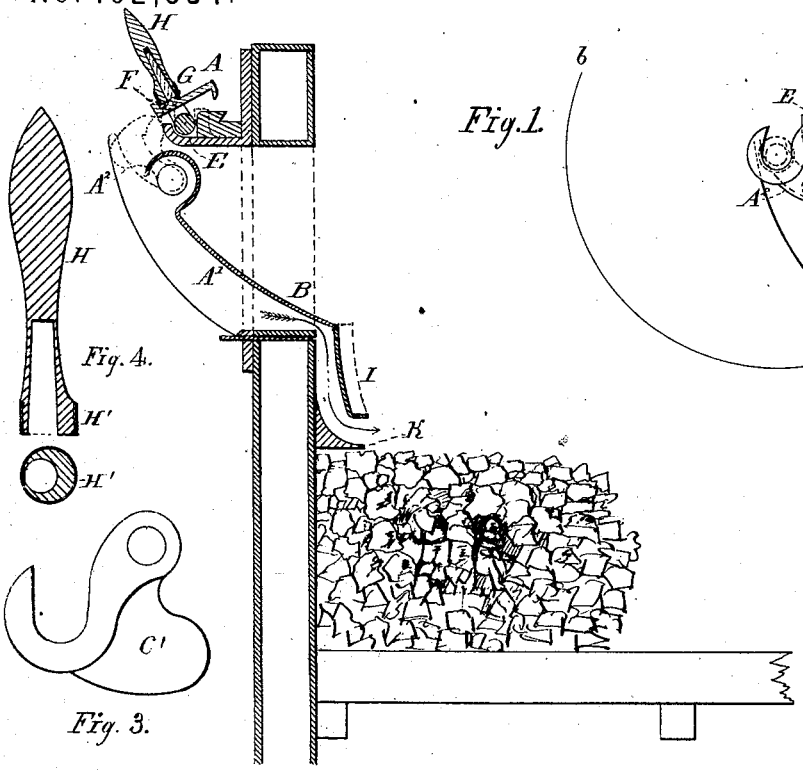

Fig. 1.

Fig. 4.

Fig. 3.

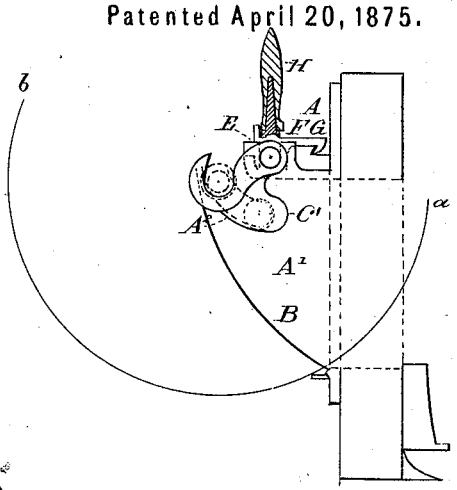

Fig. 6.

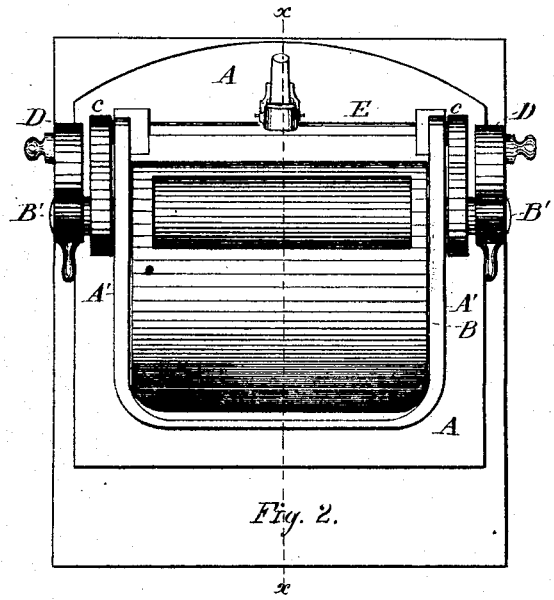

Fig. 2.

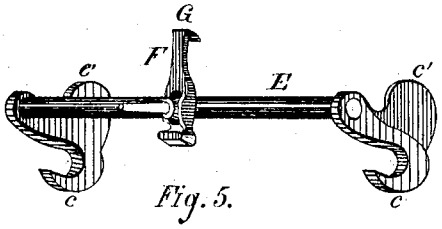

Fig. 5.

Witnesses

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UNITED STATES PATENT OFFICE.

JOHN ASHCROFT, OF BROOKLYN, NEW YORK, ASSIGNOR OF ONE-HALF HIS RIGHT TO EDWARD H. ASHCROFT, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN FURNACE-DOORS.

Specification forming part of Letters Patent No. **162,334**, dated April 20, 1875; application filed December 5, 1874.

To all whom it may concern:

Be it known that I, JOHN ASHCROFT, of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Furnace-Doors for Locomotives; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings and to the letters of reference marked thereon, which form a part of this specification.

Figure 1 is a vertical section on line *x x* of Fig. 2; Fig. 2, a front elevation of the door and frame, it being shown as attached to a steam-generator. Fig. 3 is a side view of the swinging bracket which carries the door. Fig. 4 is a sectional and end view of the rock-shaft handle. Fig. 5 is a perspective view of the rock-shaft; and Fig. 6 is a side elevation of Fig. 2 without the door.

Corresponding letters denote corresponding parts in all of the figures.

This invention relates to furnace-doors, the construction here shown being calculated to render it peculiarly adapted to the furnaces or fire-boxes of locomotives. It consists in the combination and arrangement of certain of the parts of which the device is composed, as will be more fully explained hereinafter.

In constructing doors and their operating mechanism in accordance with my present plan, I use a frame, A, of cast-iron or other suitable metal, which is secured to the outer surface of a furnace or generator, it being provided with outwardly-projecting flanges A^1 for the reception of the journals of the doors. This frame is to be secured to the furnace or generator at such a point as to cause it to cover the aperture through which the fuel is inserted. The upper portions of the flanges A^1 have curved slots A^2 formed in them, near which the lower portions of the journals of the door rest when it is in the position shown in Fig. 1, said journals traveling through said curved slots when the door is elevated to the position shown in Fig. 6. The door B, in this case, consists of a curved plate of cast or other metal, which has formed upon its outer sides journals B′ B′, which are of such length as to cause them to pass through the slots in the frame, and through brackets C C, and receive upon their outer ends counter-balances D D, said balances being so arranged upon the journals of the door as to cause it to remain in any position in which it may be placed, whether opened more or less, either outward or inward, the curved line *a b* in Fig. 6 showing its range of movement in either direction. This door is attached to its frame by means of a rock-shaft, E, which has its bearings in recesses formed in the upper ends of the flanges A^1 A^1 of the door-frame, and which has secured to its outer ends brackets C C, as shown in Fig. 5. The brackets C C are constructed as shown, in order that they may form bearings for the journals of the door to rest in, and that they may cause the door to be raised and lowered according to the position in which they are placed, they being shown in their most elevated position in Fig. 6, and in their lowest or most depressed position in Fig. 1. These brackets are provided with flanges C′, which serve to close the slots in the frame against the passage of air to the furnace when the door is shifted from one position to another, and thus cause all of the air to be deflected downward upon the fuel.

When the door is in the position shown in Fig. 1, all of the air will be admitted through the passage formed by the hood and the door-frame, or the wall of the furnace and the door may be opened inward for the admission of more air, or for the introduction of fuel; but when it is in the position shown in Fig. 6, the influx of air will be shut off; but by turning it in either direction, air will be allowed to pass it, a portion of which will pass below the hood, and another portion will pass to the fuel above said hood. When in this position the door may be opened outward for the insertion of fuel.

The mechanism for operating the rock-shaft E, for changing the position of the door, consists of a projection, F, upon said shaft, to which there is pivoted a hook, G, which, when the door is in the position shown in Fig. 6, engages with a keeper formed upon the door-

frame, and thus holds the door in position. Upon the outer end of the projection F there is placed a handle, H, upon the lower end of which there is an eccentric, H′, as shown in Fig. 4, it being so arranged that when the full portion of the eccentric is brought in contact with the upwardly-projecting portion of the outer end of the hook G the inner end thereof will be disengaged from the keeper, and the rock-shaft will partially rotate and the door will be allowed to fall to its lowest position.

The hood above referred to may consist of a piece of metal, I, which is attached to the interior surface of the furnace immediately below the aperture through which the fuel is inserted, its upper edge projecting up far enough to allow the door to shut against it when it is in the position shown in Fig. 1, or it may be extended out far enough to be lined with fire-bricks or other non-conducting substance to prevent the burning of the metal, or it may be made hollow and be connected with the water-space of the generator, so as to be constantly filled with water. This hood is so formed as to leave a space between it and the wall of the furnace, in order that some or all of the air admitted may pass downward, and afterward be deflected upon the fuel, and the amount of air thus admitted and deflected will be controlled by the position of the door, as above described. In order that the air which passes the hood may be deflected upon or among the fuel, a curved deflector, K, is placed directly below said hood, its form being such as to change the direction of the air from a vertical to nearly a horizontal direction, and thus cause it to come in contact with the fuel and the gases arising therefrom, and to travel in the same direction with said gases, as a consequence of which a thorough mixture of the oxygen of the air with the heavy gases is effected.

Some of the advantages growing out of this form of door, when applied to the fire-boxes of locomotive-engines, may be enumerated as follows: First, when opening the door for the insertion of fuel the area of such opening may be regulated so as to be only large enough to admit the fuel, and thus a less quantity of cold air will be admitted than is done with the doors now in use; secondly, the door will remain in any position in which it is placed, whether the engine is turning curves or is running upon a straight line, and the fireman is thus saved the annoyance of having the door closed when he is about to insert fuel; and, thirdly, air may be admitted to contact with the burning fuel and to the gases arising therefrom in such a manner as to give the best possible results by causing a more thorough combustion thereof.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination of the hood I and the deflector K, substantially as and for the purpose set forth.

2. The combination of the door B, the hood I, and the deflector K, substantially as shown and specified.

3. The brackets having the projecting flanges C′, substantially as and for the purpose set forth.

4. The combination of the rock-shaft E, the brackets C, the pivoted hook G, and door B, substantially as and for the purpose set forth.

5. The combination of the eccentric handle H, pivoted hook G, and rock-shaft E, substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my own invention I affix my signature in presence of two witnesses.

JOHN ASHCROFT.

Witnesses:
C. M. CONNELL,
ALFRED CLOUGHLY.