

(No Model.)

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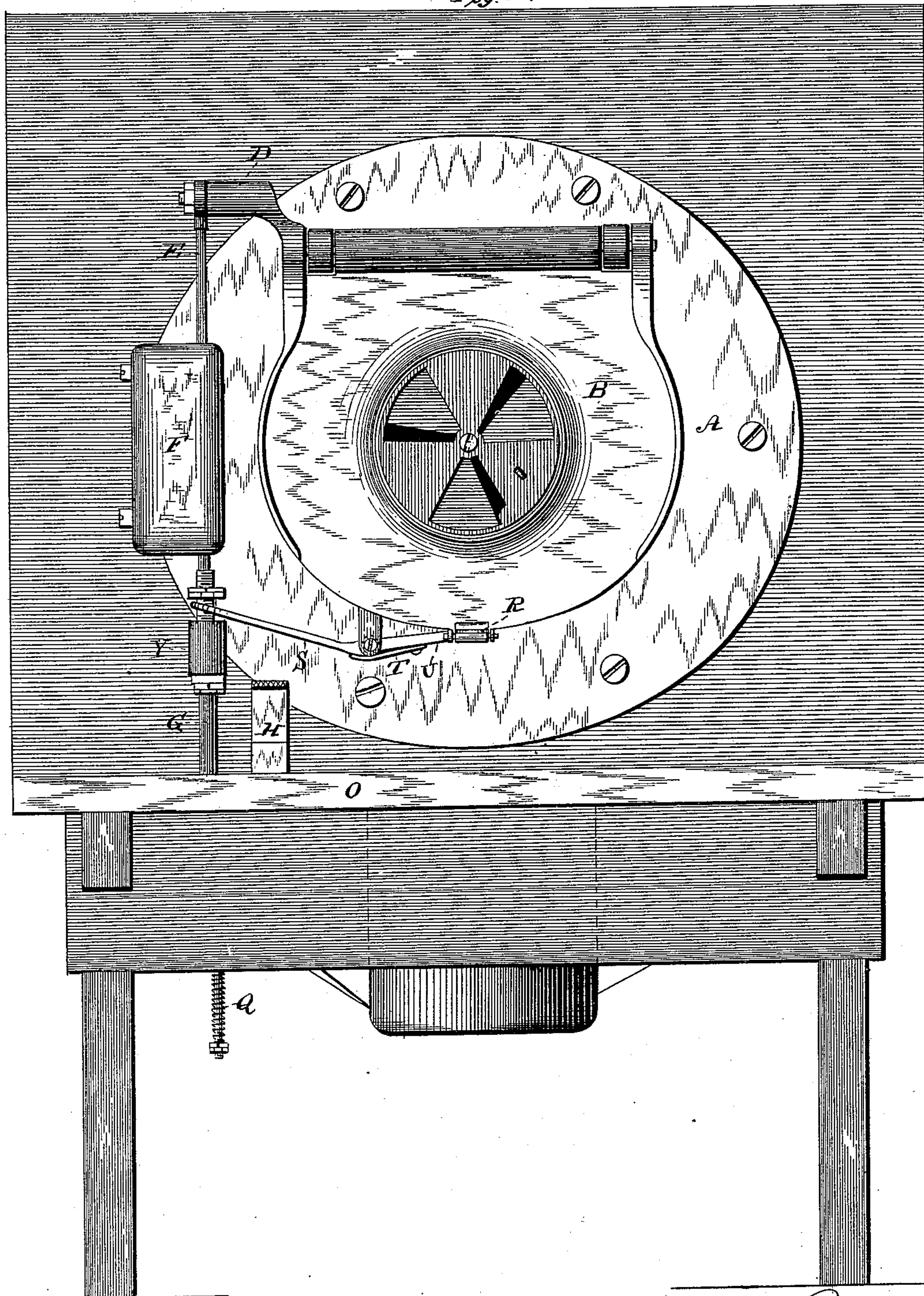
T. R. BUTMAN.

FURNACE DOOR.

No. 308,550.

Patented Nov. 25, 1884.

Fig. 1.



WITNESSES

Chas. R. Burr
W. E. Bowser.

INVENTOR
Thomas R. Butman
per C. E. Quigg
Attorney

(No Model.)

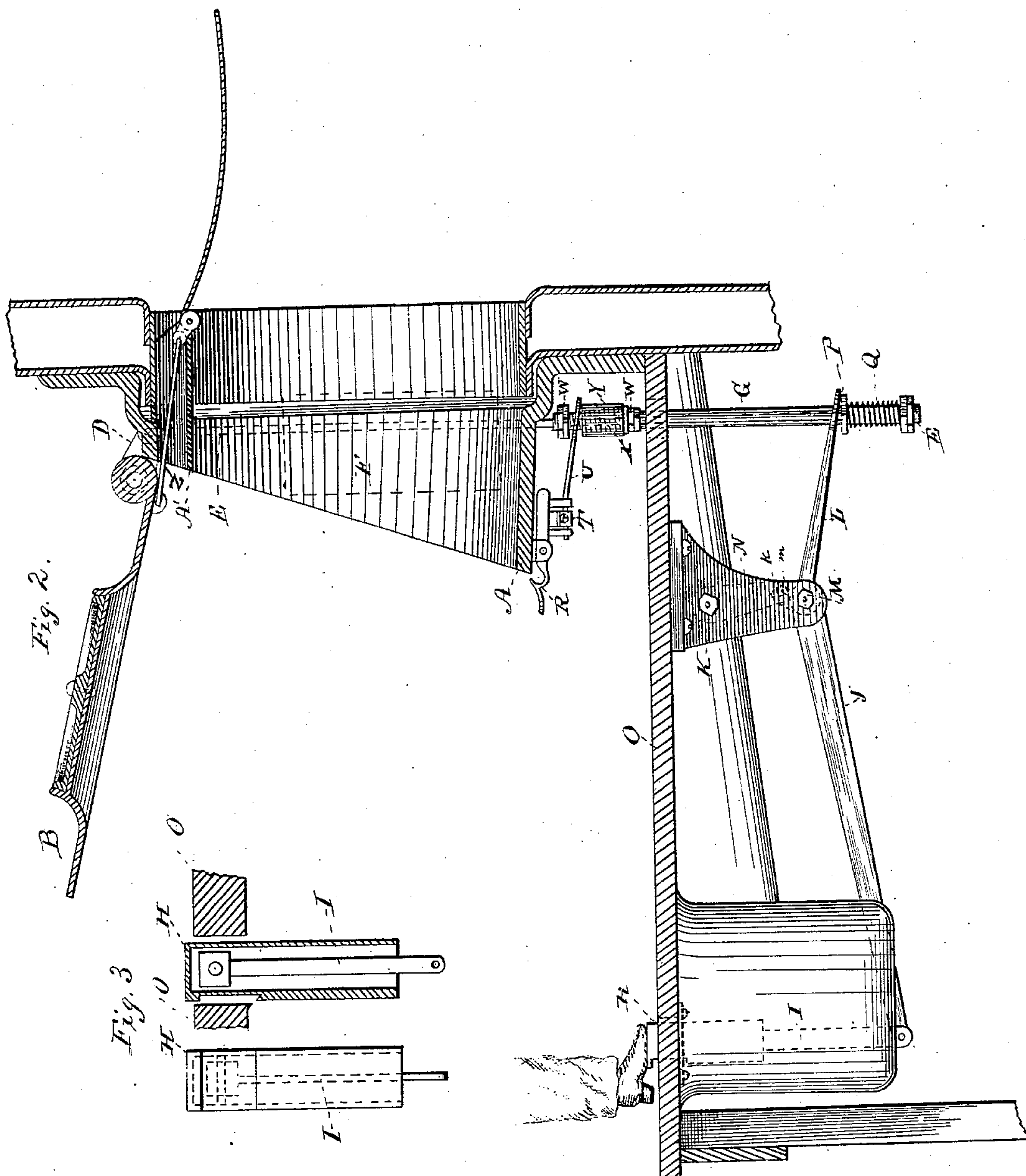
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T. R. BUTMAN.

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No. 308,550.

Patented Nov. 25, 1884.



WITNESSES

Chas. R. Burr

W. E. Bowen

INVENTOR

Thomas R. Butman
per O. E. Duffy
Attorney

(No Model.)

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T. R. BUTMAN.
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Fig. 4.

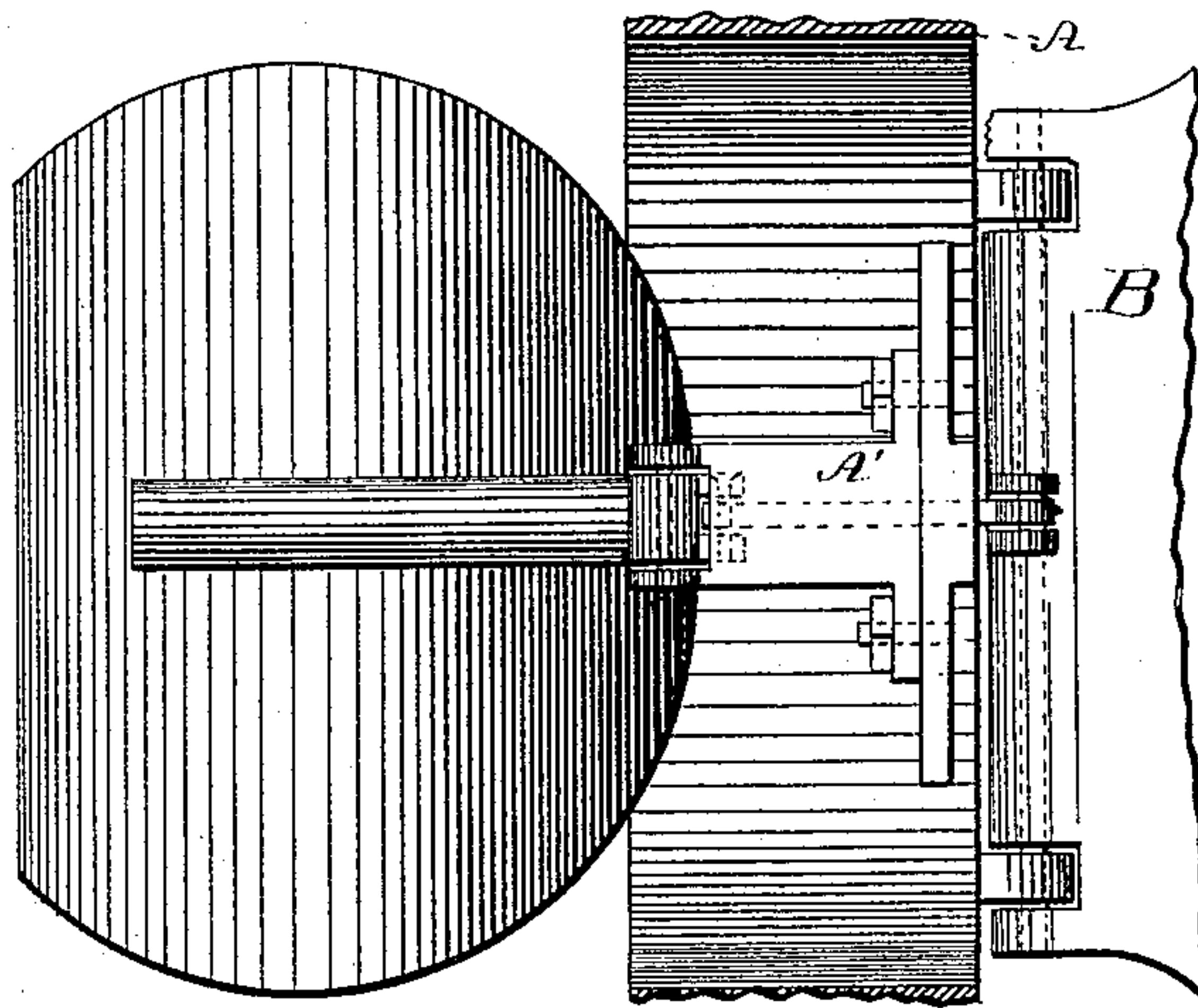


Fig. 5.

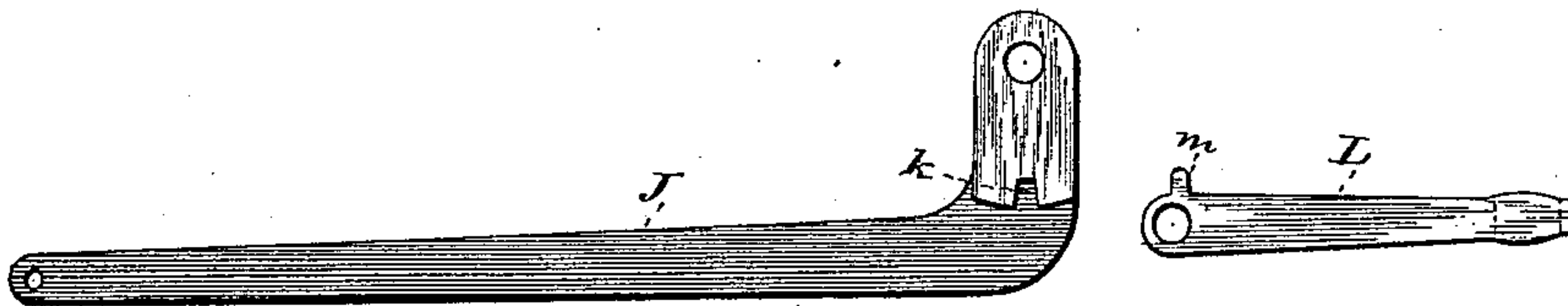
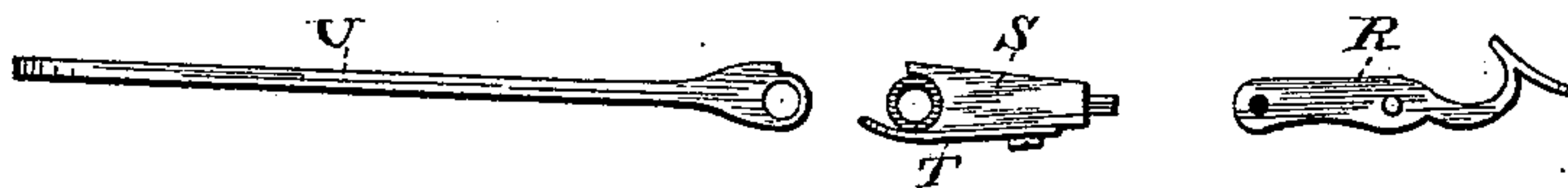


Fig. 6



WITNESSES

Chas. R. Burr
W. E. Bowen.

INVENTOR

Thomas R. Butman
per O. C. Duff
Attorney

UNITED STATES PATENT OFFICE.

THOMAS REED BUTMAN, OF CLEVELAND, ASSIGNOR TO JAY A. HIGBEE,
OF FREMONT, OHIO.

FURNACE-DOOR.

SPECIFICATION forming part of Letters Patent No. 308,550, dated November 25, 1884.

Application filed February 15, 1883. Renewed April 16, 1884. (No model.)

To all whom it may concern:

Be it known that I, THOMAS REED BUTMAN, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Locomotive and Marine Furnace Doors; 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 appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

The primary object of my invention is to economize in fuel, labor, and to facilitate the feeding of fuel to furnaces and in the attainment of these ends to obviate waste of noxious gaseous matter, the wasteful development of smoke within the furnace, and to preserve the boiler plates and joints.

My invention is applicable to a variety of boiler-furnaces, but preferably to the locomotive type, to which the description will in this case be mainly confined.

In the development of my invention I have proceeded upon the well-established theory that perfect combustion within a furnace must of necessity obviate the wasteful discharge therefrom of ignitable matter, whether solid or gaseous, and that with a high degree of combustion no smoke can be produced within a furnace, and therefore none can be discharged therefrom. In the attainment of these ends I employ well-known elements which have heretofore been combined and arranged in various ways, as may be seen by reference to my former patents, which will be hereinafter referred to; and my invention consists in certain novel features in the construction and application of some of these elements and their arrangement with relation to each other, as particularly hereinafter set forth.

My furnace-door is provided with an inner deflecting-plate extending the entire width of the door-opening, and hinged immediately above the fire-door, by which the air-current passing in through the fire-door way and through the regulating-register in the fire-door is deflected onto the burning fuel, while, owing to the deflector, which swings upward when the door is opened, the air is prevented from striking or impinging upon the crown-

sheet, and when the door is closed the deflecting-plate is brought down again, and, contracting the opening as the operation of feeding the fire is discontinued, the objection of maintaining a constantly wide opening a comparatively long time, through which excessive quantities of cold air would pass into the furnace, is to a large extent avoided, also the great danger of sudden contraction and expansion of the boiler-sheets is avoided, thereby preserving the boiler-seams, rivets, and joints from deterioration.

The furnace-door is adapted to be opened and closed by the foot of the operator, thereby allowing his hands to be free for any obvious duty. The door can by the same means be put in position to be retained in any open position for any reason, and when the engine is at rest. These means consist in the arrangement of certain levers, springs, and rods, which I will now more particularly describe by referring to the accompanying drawings.

Figure 1 represents a full front view, in elevation, with door closed and the register partly opened. Fig. 2 shows a vertical transverse section, all the parts being in position when the door is fully open, some of the parts being in elevation. Fig. 3 shows detail views of the foot-working mechanism. Fig. 4 is an inverted plan view of the crown of the furnace-door, fully showing the shield-box, which protects the connecting-link of the door and deflector from the extreme heat of the fire. Fig. 5 shows the foot-levers detached, and Fig. 6 the door locking and unlocking devices.

In the instances above alluded to it will be observed that the door is secured to the face of a locomotive-engine boiler. The locomotive foot-board with king-bolt and braces are also shown for a better illustration of my invention, and the means for carrying the same into effect.

A represents the door-frame, and B the door, arranged to be suspended horizontally to the frame by means of trunnions and pintle-rod. The door is constructed with a rim for strengthening it, by which it is made much lighter than those in ordinary use, thus rendering it sufficiently stiff to maintain its contour notwithstanding the heat of the furnace. This rim terminates on the left side of the door in a crank, D, to which is connected a vertical

rod, E, said rod extending from the crank down through the foot-board O to a considerable distance below it. At the lower terminous of rod E are located double check-nuts supporting spiral springs Q, and at its upper end it supports a weight, F, which is designed to counterbalance the weight of the door.

Between the spiral spring Q and weight F, and encircling the connecting-rod E, I locate a sleeve, G, through which the connecting-rod E operates. Between the weight F and the upper end of sleeve G is located a small cylinder, Y, operating between two sets of double check-nuts W. The spiral spring contained in the cylinder Y is designed to operate the levers for operating the door-latch by power imparted from the foot of the operator, and the spiral spring Q, in conjunction with the weight F, is designed to close the door after the operator removes his foot.

It will be obvious that the power for opening the door is imparted by the foot of the operator through the means of the foot-board and intermediate mechanism.

P is a collar on sleeve G, for retaining lever L in position, and L J are levers connected to the foot-post I, jointed in a toothed segment, m, (shown by detail at Fig. 5,) and suspended and journaled at the lower end of bracket N. The upper end of the segment or crank m is journaled in upper portion of the bracket N, so that the rocking motion imparted by the foot-board connecting-rod I to the segment is in turn imparted to sleeve G and transmitted to connecting-rod E, and thence to the door-crank, which opens the door.

M and K show the junction of the levers J and L. H is the tread and foot post cylinder, which is sufficiently large to permit the rod I to oscillate therein.

S and U represent the door-unlocking levers, which are jointed and journaled in a bearing suspended from the bottom of the door-frame. Motion from lever S is imparted to lever U by means of spring T, which operates the door-latch R and retains it in position.

The principle of operating the door and deflector simultaneously is specifically described and claimed in patents granted to me in the years of 1876 and 1878, numbered, respectively, 184,061 and 199,182, which perform substantially the same result as far as the door and deflector individually and jointly are concerned. But in this instance these parts are differently connected, the connecting-rod Z permitting the deflector to be extended well in under the crown-sheet of the boiler, which is desirable. The deflector is also preferably concaved on its outside for two reasons—i. e., to make it fit the ordinary contour of the locomotive and marine-boiler door, and, secondly, to permit and deflect the incoming air passing through the register down upon the burning fuel, greatly enhancing combustion and preventing the air in a cold state striking the crown-sheet of the boiler.

It may be observed that the foot-board of the tender of the locomotive is of small area, and when the door is vertically hung, as in many cases, it frequently strikes the legs of the engineer when opened, causing great pain and annoyance, as well as the door being otherwise an obstruction.

Another great disadvantage of the ordinary door is that when the fireman or attendant is supplying fuel to the furnace the glare of the fire is so great that for an instant after closing the door the engineer is comparatively blinded, and particularly at night, not only injuring his eyes, but entirely dimming his vision when it is important for him to see.

With a door horizontally hung the eyes of the engine attendant are shaded from the vivid glare of the fire, and thus his eyes are not only preserved, but he can readily see the objects which it is essential that he should see for safety.

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

1. The combination of the furnace-door with the deflector, and with the connecting-link and heat-shield, whereby the link is preserved from the extreme heat of the fire, and thus retains its rigidity for operating the deflector, as described.

2. The combination, in a furnace-door and deflector, of the intermediate link, shielded as described, with the vertical rod E, having weight F and crank D attached to the door, for the purpose set forth.

3. The combination, in a furnace-door provided with the rim and crank D, of the vertical weighted rod E, cylinder Y, having spring X and spring latch-levers, as shown, for operating the door-latch, as set forth.

4. The combination of mechanism for opening and closing a furnace-door, consisting of the vertical rod E, weighted, as described, having sleeve G, spring Q, with toothed levers J and L, and foot-post, arranged for joint operation with the door-operating levers, as set forth.

5. The door-operating mechanism, consisting of the vertical rod E, sleeve G, levers J and L, foot-rod I, and foot-post H, as shown and set forth.

6. The combination, with a furnace-door, of the door-operating mechanism, consisting in part of the vertical rod E, having sleeve G, and levers J L, the said levers being united together and suspended by bracket N, the whole being adapted for joint operation by power imparted to the foot-post, substantially as described.

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

THOMAS REED BUTMAN.

Witnesses:

H. S. WALKER,
E. H. EGGLESTON.