

A. HOWATSON.

FURNACE DOOR.

No. 262,595.

Patented Aug. 15, 1882.

Fig. 1.

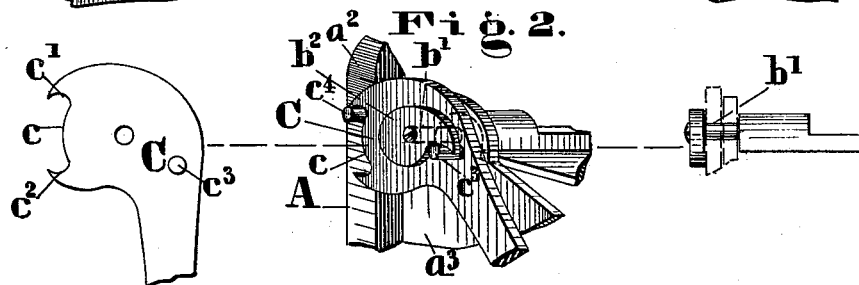
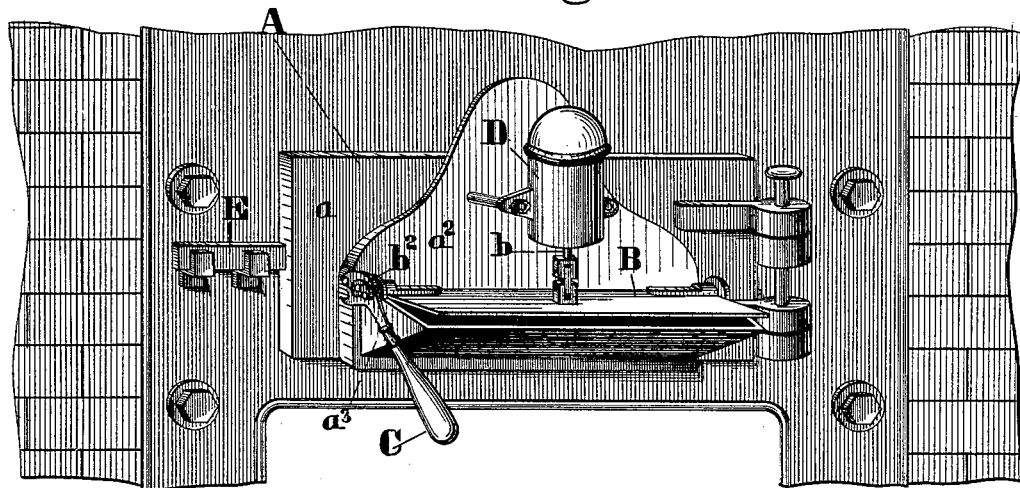
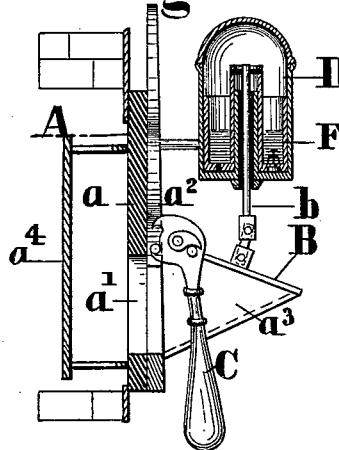


Fig. 3.



WITNESSES:  
E. E. Beadle.  
V L West

INVENTOR:  
ANDREW HOWATSON,  
BY H. W. Beadle & Co.  
ATTYS.

A. HOWATSON.

FURNACE DOOR.

No. 262,595.

Patented Aug. 15, 1882.

Fig. 4.

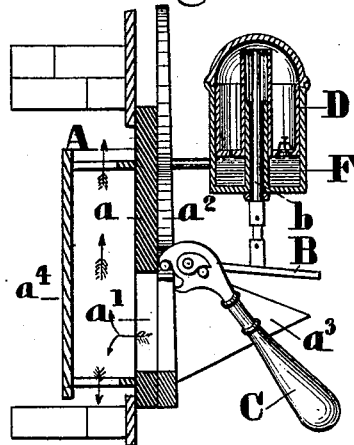


Fig. 5.

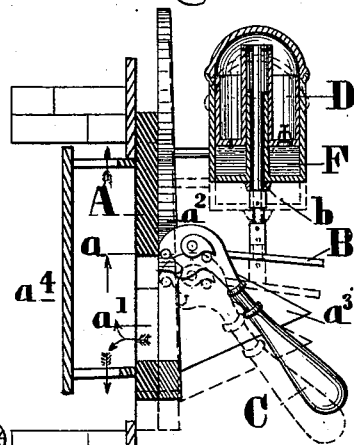


Fig. 6.

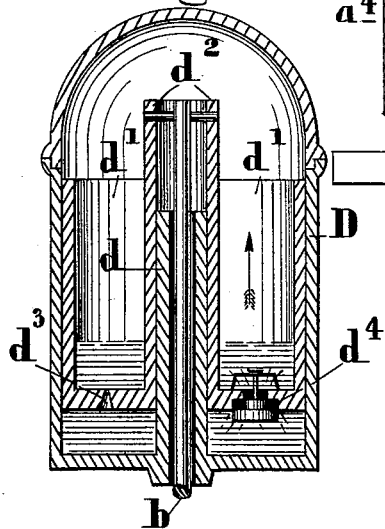
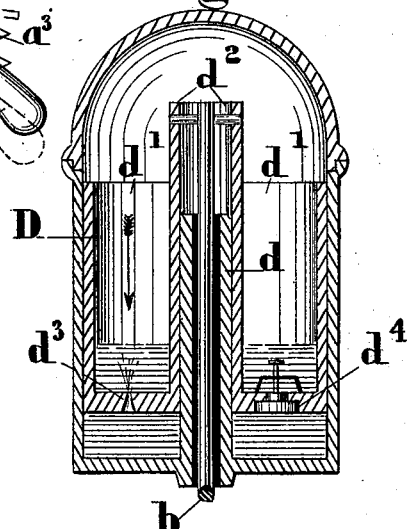


Fig. 7.



WITNESSES:  
C. G. Beadle.  
V. L. West

INVENTOR:  
ANDREW HOWATSON,  
BY H. W. Beadle & Co.  
ATTYS

# UNITED STATES PATENT OFFICE.

ANDREW HOWATSON, OF PARIS, FRANCE, ASSIGNOR TO JAMES W. TUCKER.

## FURNACE-DOOR.

SPECIFICATION forming part of Letters Patent No. 262,595, dated August 15, 1882.

Application filed March 23, 1881. (No model.) Patented in France March 22, 1879.

*To all whom it may concern:*

Be it known that I, ANDREW HOWATSON, a citizen of Great Britain, and a resident of Paris, 22 Rue Vernier, France, have invented a new and useful improvement in furnace-doors for the supplying of air automatically to consume the gases of combustion, and for ventilating and cooling the furnace-front, of which the following is a specification.

This invention consists of certain simple mechanisms adapted for ready application to any furnace door, by means of which a special volume of air is automatically supplied to the furnace whenever fresh coal is introduced therein; and it has for its principal novel feature the combination, with the door, of a special handle and special mechanism actuated thereby for controlling the supply of air, as will be fully described hereinafter.

In the drawings, Figure 1 represents a perspective view of my invention as applied to a furnace-door; Fig. 2, an enlarged perspective view of the inner end of the handle and its attachments; Fig. 3, a vertical sectional elevation of the invention as applied in Fig. 1, the cover-plate B being closed to exclude the entrance of air; Fig. 4, the same view with the cover-plate B open to permit the entrance of air; Fig. 5, the same view of the door and its attachments elevated for the purpose of disengaging the latch; Fig. 6, a vertical sectional elevation of the vessel D and the piston contained therein, the latter being represented as ascending; and Fig. 7, a vertical sectional elevation of the vessel D and the piston contained therein, the latter being represented as descending.

To enable others skilled in the art to make my invention and properly use the same, I will now proceed to describe fully the construction and operation of the same.

A represents a furnace-door, constructed generally in any proper manner, which is provided with the inner plate,  $a$ , having the opening  $a'$  for the passage of air, and the outer plate,  $a^2$ , having the triangular box or extension  $a^3$  projecting outward from an opening in the plate, as shown.

$a^4$  represents an auxiliary perforated plate which may be employed, if desired.

B represents what may be termed, for convenience, the "cover-plate" of the box  $a^3$ , and  $b$  a connecting-rod or plunger suitably attached

to the upper side of the cover, the purpose of which will be fully described hereinafter.

$b'$  represents one of the journals of the door A, which has a bearing in the side of the box  $a^3$ , as shown, and extends through the same far enough to support the inner end of the handle C and also the cam  $b^2$ , as shown. The handle C is loose upon the journal so far as revolution is concerned; but the cam  $b^2$  is rigidly fixed thereto.

C represents the independent handle before referred to, loosely held upon the journal  $b'$ , which is provided upon the periphery of its circular end with the recess  $c$ , having the bearing-shoulders  $c'$   $c^2$ , and upon one side with a stud or pin,  $c^3$ , as shown.

$c^4$  represents a pin upon the edge of the plate  $a^2$ , the purpose of which will be fully described hereinafter.

D represents a cylindrical vessel, suitably secured, in any proper manner, to the plate  $a^2$  in line over the cover-plate B, as shown in Figs. 1 and 3, which is provided with a central tube,  $d$ , Fig. 6, open above and below, as shown.

$d'$  represents a cylindrical piston or plunger, having a central tube,  $d^2$ , adapted to slide upon the central tube,  $d$ , of the vessel, as shown.

$d^3$  represents a small opening, and  $d^4$  a downwardly-opening valve, both located in the head of the piston, as shown.

The upper end of the connecting-rod  $b$  is attached, it will be observed, to the upper end of the tube  $d^2$ .

E, Fig. 1, represents a latch of any proper construction.

F, Figs. 3, 4, and 5, represents a fluid volume in the vessel D, mercury being preferably employed.

The operation is substantially as follows: When the door of the furnace is closed the handle C hangs downward in the position shown in Fig. 3. When it is desired to open the door the handle is grasped and raised into the position shown in Fig. 5, by means of which the door is sufficiently elevated to disengage the latch. By means of the upward movement of the handle the cover-plate B is swung open upon its hinges, the pin  $c^3$  on the handle giving rotation to the cam  $b^2$  of the journal of the hinge. By means of the upward movement of the cover the rod  $b$  is lifted,

and also the tube or hollow piston-rod of the piston  $d'$ , connected thereto. By means of the upward movement of the piston the fluid volume is transferred from the space above the piston, as shown in Fig. 3, to the space below the same, as shown in Fig. 4, through the downwardly-opening valve  $d^4$ , as shown in Fig. 6. The upward movement of the cover-plate and its attachments is effected by the movement of the handle from the position shown in Fig. 3 to the position shown in Fig. 4, the door itself and latch being entirely unaffected thereby. By the further movement of the handle, the bearing-surface  $c'$  of the same being in contact with the pin  $c^4$  of the door, the latter itself is lifted bodily for the purpose of disengaging the latch. The upward movement of the cover-plate B having transferred the fluid volume from the space above the piston to the space below the piston, the latter cannot return again, excepting through the small orifice  $d^3$ , and hence the time of descent will be determined by the size of this opening.

From the forgoing it will be understood that the raising of the handle to open the furnace-door will open also the cover-plate B, and that the closing of the latter, in consequence of its connection to the piston in the vessel D, will depend upon the rapidity with which the mercury flows through the small opening  $d^3$ .

The special purpose of this invention is to automatically supply to the furnace, when fresh fuel is introduced therein, a special volume of air for the purpose of consuming the volume of smoke thrown off at this time. The amount of air supplied is gradually reduced as

the necessity for it becomes less, until finally the cover reaches again its closed position.

Some of the advantages of the described construction are as follows: The attachments are simple and may be applied to any ordinary furnace-door. The action is automatic, so that the door can be opened without causing the medium to act.

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

1. In combination with the furnace-door, an independent or loose handle, substantially as described, and intermediate mechanism, substantially as described, for communicating the movement of the handle, when lifted, to the mechanism for controlling the supply of air, all the parts being attached to and moving with the door, as set forth.

2. In combination with the independent handle, the furnace-door having an air-aperture, and a cover-plate adapted to regulate the supply of air through the aperture, the cover-plate itself being provided with a hinge-journal having a cam attached thereto, as described, and being united by proper connections to the controlling mechanism, as set forth.

3. In combination with the cover-plate B of the door A, having loose handle C, the connecting-rod  $b$ , the vessel D, and piston  $d'$ , the whole being attached to and moving with the door, as described.

ANDREW HOWATSON.

Witnesses:

JOSEPH S. J. EATON,  
PHILIP WALKER.