(No Model.) 2 Sheets—Sheet 1.

W. A. JOYNER & C. N. PETESCH.

DOOR OPENER AND CLOSER FOR FURNACES.

No. 358,977. Patented Mar. 8, 1887.

Fig. 1.

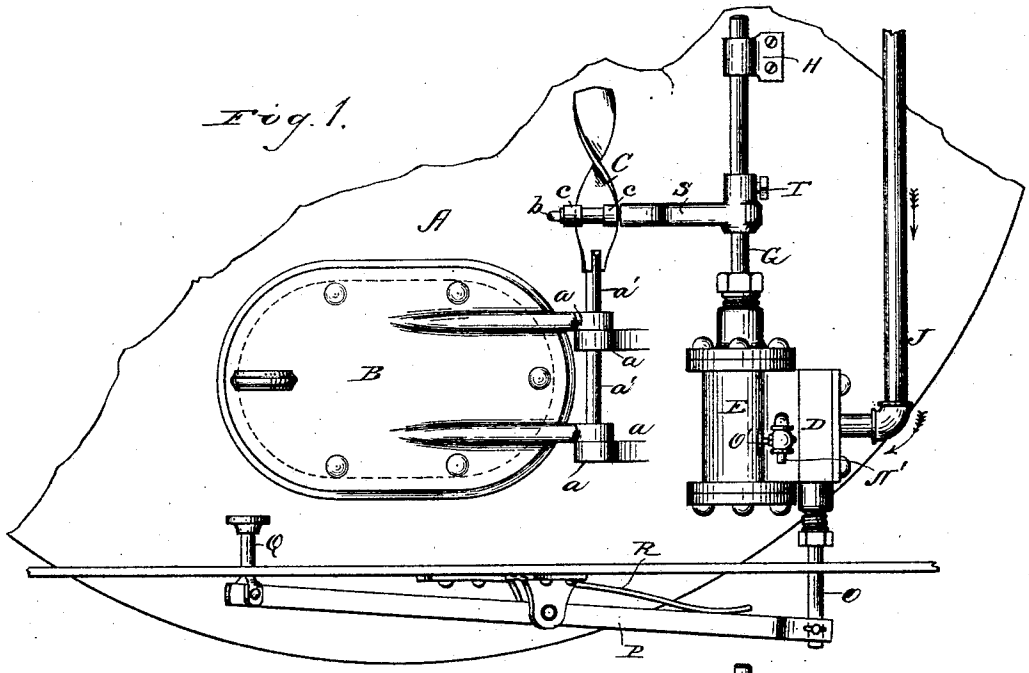
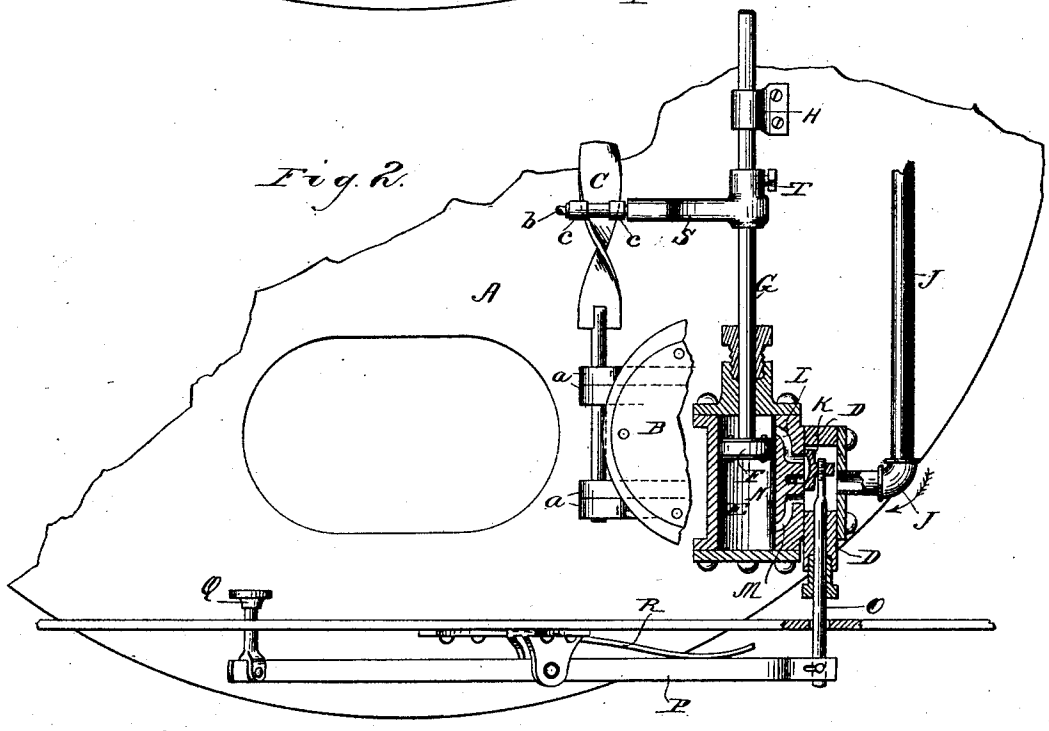


Fig. 2.



Witnesses.
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per F. F. Warner
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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

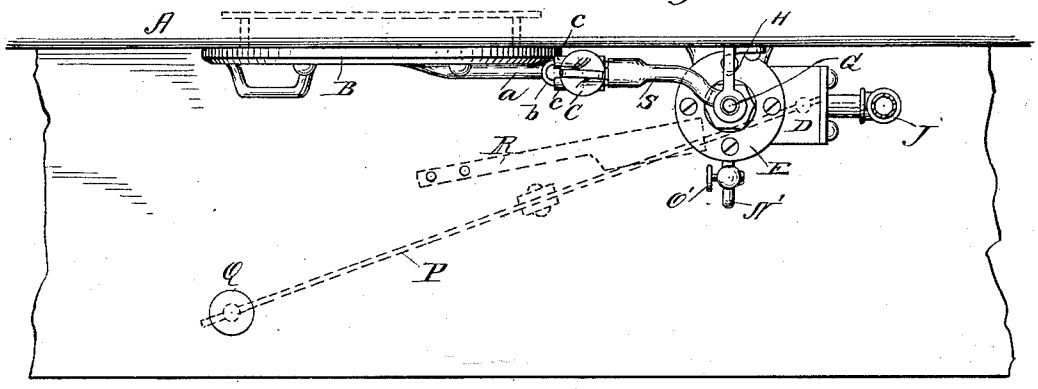


Fig. 7.

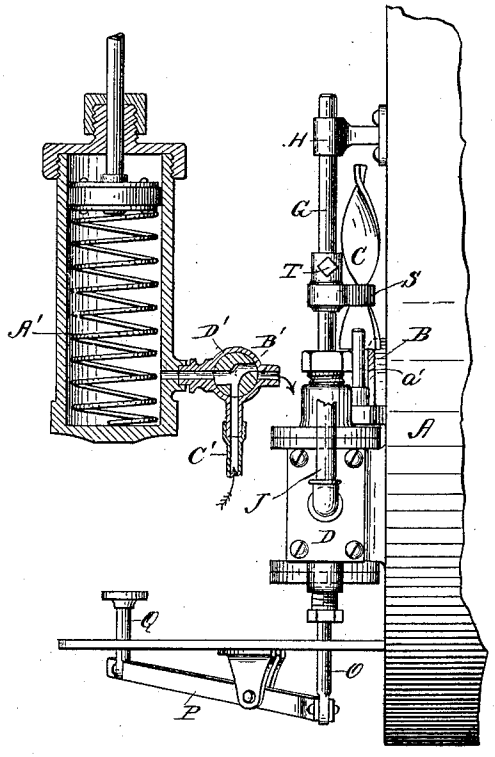


Fig. 4.

Fig. 5.

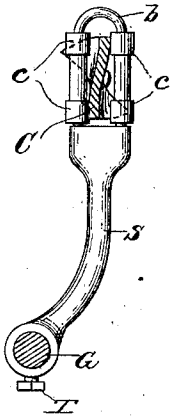
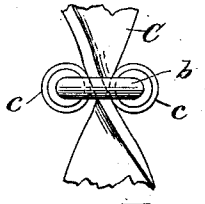


Fig. 6.



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UNITED STATES PATENT OFFICE.

WILL. A. JOYNER AND CHARLES N. PETESCH, OF CHICAGO, ILLINOIS.

DOOR OPENER AND CLOSER FOR FURNACES.

SPECIFICATION forming part of Letters Patent No. 358,977, dated March 8, 1887.

Application filed March 26, 1886. Serial No. 196,655. (No model.)

To all whom it may concern:

Be it known that we, WILL. A. JOYNER and CHARLES N. PETESCH, citizens of the United States of America, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Door Openers and Closers for Boiler and other Furnaces, of which the following, in connection with the accompanying drawings, is a specification.

The purpose of our invention is to provide new and useful means for enabling a fireman or stoker to rapidly open and close, as required, the doors of boiler and other furnaces, while stoking or feeding the fire, without the aid of his hands.

In the drawings, Figure 1 represents a front view of a furnace provided with one form of our means for reducing our invention to practice, showing the parts in the position they occupy when the furnace-door is closed. Fig. 2 is a front view of the parts, showing the same in the position they occupy when the door is open, and also showing certain parts in section in order to more clearly illustrate their construction. Fig. 3 is a top or plan view of parts shown in Fig. 1. Fig. 4 is an end view of the parts shown in Fig. 1. Fig. 5 is a detail, the same showing the means employed for rotating the pintle on which the door is hung. Fig. 6 is also a detail of the same parts viewed in the direction of the ends of the anti-friction rollers, and Fig. 7 is a sectional detail representing one modification of construction to allow the parts to be operated by means of suction or partial vacuum.

Like letters of reference indicate like parts.

A represents the front of a furnace, and B represents a furnace-door. This door is hinged to the furnace-front by means of lugs *a a*, and *a'* is a pintle or shaft to which the lugs upon the door are rigidly connected, and which turns freely in the lugs upon the furnace-front.

C is a spiral extension upward of the pintle *a'*.

D is a steam chest or chamber, and E is a piston-cylinder operating in connection therewith.

F is the piston, and G is the piston-rod. This rod passes freely through a box or lug H.

J is a steam-pipe entering the steam chamber or boiler, and also entering the steam chest or box D.

K is a sliding valve, and L and M are steam-ports, through which the cylinder E communicates with the said steam chest or box.

N is an exhaust port or channel.

O is a valve-rod entering the chest or box D and in connection with the valve K.

P is a centrally-pivoted lever, one end of which is pivoted or jointed to the lower end of the rod O.

Q is a vertical stud or post pivoted to the other end of the lever P.

R is a spring, bearing downward upon that side of the lever P which is in connection with the rod O.

S is an arm mounted adjustably on the rod G by means of a set-screw, T. The outer end of the arm S has thereon a loop, *b*, on the lateral arms of which are anti-friction rollers *c c*. The space between the rollers *c c* is such as to admit the spiral C to pass between them.

N' is an exhaust-pipe entering or in communication with the exhaust duct or port N, in which a stop-cock, O', may be placed.

The operation of the parts is as follows: The steam passes from the boiler or steam-generating chamber through the pipe J into the steam chest or box D, and thence either through the port L or through the port M, according to the position of the valve K, which always closes either one or the other of the said ports and leaves one or the other of them open. The valve K is somewhat concave or dishing on its working face, as shown at *e*, so that the exhaust may always pass out underneath the valve into an exhaust or waste pipe, N'.

It will be perceived on reference to Fig. 2 that the position of the valve K is such as to close the port L, which is the upper port, and open the port M, which is the lower port, and hence that the steam-pressure will exert itself upon the under side of the piston-head and raise the latter in the piston-cylinder. As the piston moves upward, owing to this steam-pressure, the piston-rod G of course also rises and carries with it the arm S. As the outer end of the arm S embraces the spiral C, and moves upward in a true vertical direction, the said spiral will be rotated, and hence the pintle or shaft *a'*, to which it is attached, will also be rotated. As the lugs which are applied to the door B are rigidly connected to the pintle *a'*, the door will be opened as the piston moves upward. When the valve K covers the lower

port, M, the steam will enter the upper port and drive the piston downward. This downward movement of the piston reverses the direction in which the pintle *a'* is rotated, and the door will be closed and held firmly in that position, for the reason that the steam-pressure will exert its force so long as the upper valve remains open. As the piston moves either upward or downward, the steam in the cylinder E, which has once done its work, will escape or be condensed whenever the exhaust port or channel is open.

To shift the valve K from the upper to the lower steam-port, and reversely, we employ the lever P, the spring R, and the stud or post Q. To raise the valve, the fireman simply presses his foot upon the stud Q with sufficient force to depress that end of the lever P to which the said stud is applied, thereby raising the opposite end of the said lever, and consequently carrying the valve K to the upper port, L. The lower port being thus open, the steam passes in through it, raises the piston, and opens the door in the manner already described. After the fireman has finished stoking, he lifts his foot from the stud Q, whereupon the spring R depresses that end of the lever which is in connection with the valve-rod, and the lever K is for that reason shifted to cover the lower steam-port and open the upper one, which then admits the steam above the piston, and the door will be closed and held in that position until it may be desired to open it again.

It will be perceived from the foregoing description, and from reference to the drawings, that the fireman's attention will not be distracted from his work, and that the only thing necessary for him to do in order to open the door is to place his foot upon the stud Q while stoking, and to release the said stud after sufficient fuel has been supplied. It will also be perceived that the force or power applied is derived from the boiler, so far as thus described—in this instance, that the supply of steam, which is always at hand when the boiler is fired up, is employed as the agent for working the mechanism which opens and closes the door and holds it in position.

In Fig. 7 we have shown a modification of the piston-cylinder, for the purpose of illustrating that the piston may also be worked by means of a vacuum or partial vacuum in conjunction with a spring, A'. B' in the modification referred to is a pipe entering the lower portion of the piston-cylinder, and C' is an induction-pipe in communication with the pipe B'. D' is a two-way cock or valve arranged in the pipe B' at its junction with the pipe C'. The channels or ports in the cock D' are such as to permit the air to enter the piston-cylinder through the pipe C' and the inner end of the pipe B' as the piston moves upward in its cylinder. To move the piston up in its cylinder, we depend upon the action of the spring A'. To draw the piston down, we set the cock D' so as to open the pipe B' and close the pipe C', and then exhaust the air from the piston-cylinder by connecting the pipe B' with any of the well-known means for securing a partial vacuum. To work or turn or shift the cock D' in this manner, we employ a lever, P, a rod, O, and a stud, Q, as well as spring R, in like manner as the same parts are employed for the purpose of shifting the valve K; but we have not here shown the said parts in operative connection with the said cock, as it will now be readily understood how the same may be operated.

The door-operating mechanism now described may be applied to use in connection with the fire-box doors of locomotive-boilers, as well as in connection with the corresponding doors of stationary boilers and furnaces generally. We may also add that we would regard a weight as the equivalent of either of the springs referred to.

It is obvious that modifications in form or in modes of application of the foregoing mechanical combinations may be necessitated by certain conditions and different kinds of furnaces; also, that compressed air, hydraulic pressure, and electricity may severally be used as a convenient power, as well as steam and partial vacuum, as already recited. Therefore we do not limit ourselves specifically to the mechanical arrangement as described, nor to the motive power named in the foregoing specification; but

What we claim as new, and desire to secure by Letters Patent, is—

1. The combination, substantially as specified, of the door B of a fire-box or furnace, of a door-pintle in rigid connection with the said door and having a spiral extension thereon, of a vertically-movable arm in engagement with the said extension, a piston having its rod in connection with the said arm, a lever for controlling the valve of the piston-cylinder, and an induction tube or pipe, for the purposes set forth.

2. The combination, substantially as specified, of the door B, having a rotative pintle or shaft in rigid connection therewith, the spiral pintle-extension C, the piston F and its rod, the arm S, applied to the piston-rod and engaging the said spiral, a piston-cylinder in operative connection with induction and eduction openings or ports entering a valve chamber or box, a valve for alternately opening and closing the said ports, a yielding lever in operative connection with the said valve, and an induction tube or pipe for admitting the motive force or power, substantially as and for the purposes specified.

In testimony that we claim the foregoing as our own we hereunto affix our signatures in presence of two witnesses.

WILL. A. JOYNER.
CHARLES N. PETESCH.

Witnesses:
ALBERT W. PORTER,
GEORGE W. UNDERWOOD.