No. 720,399. PATENTED FEB. 10, 1903.

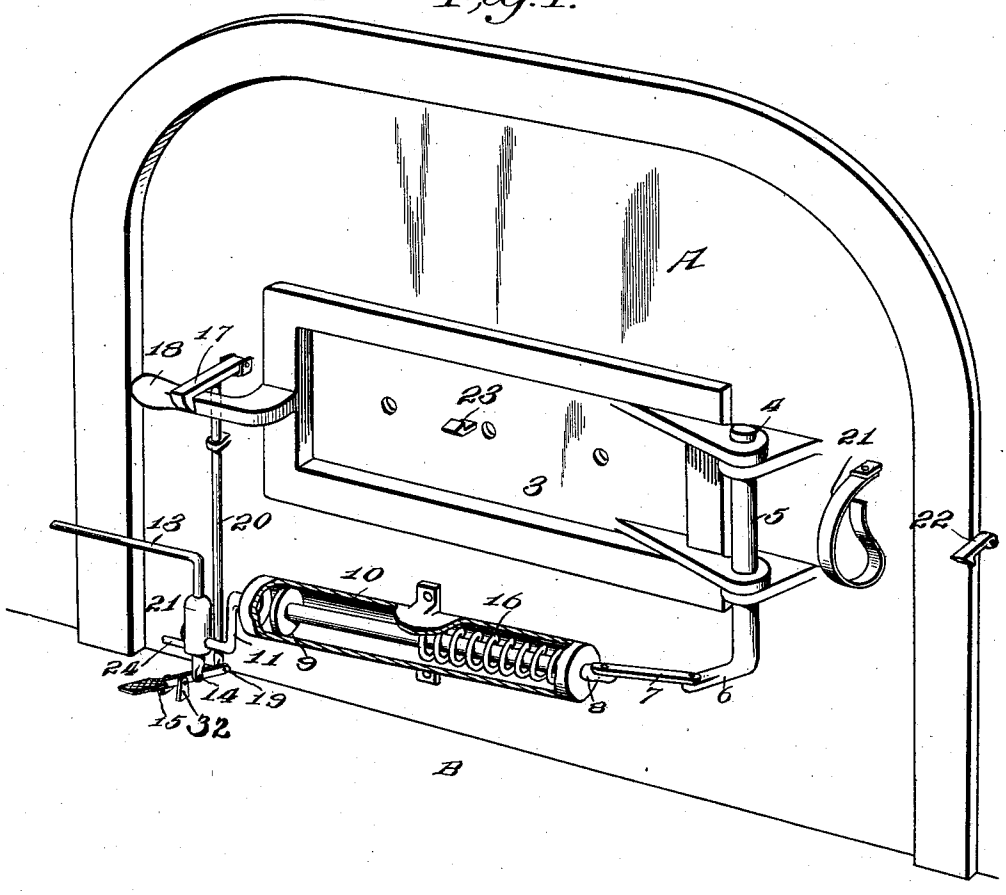
F. L. BREWER.

DOOR OPERATING APPLIANCE.

APPLICATION FILED FEB. 20, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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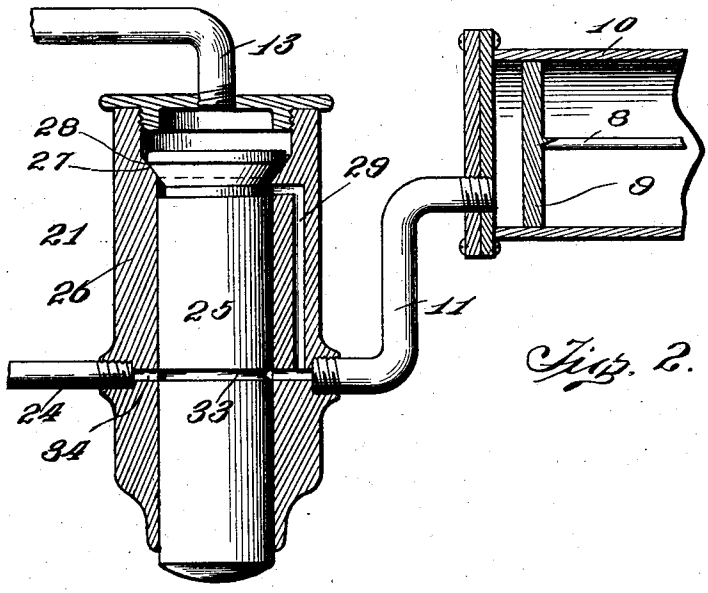
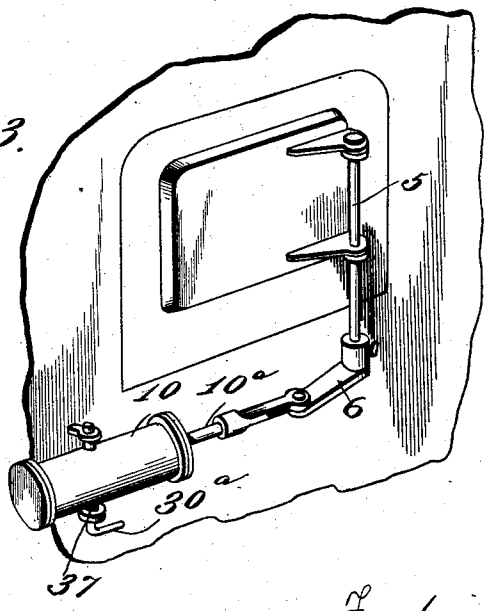


Fig. 2.

Fig. 3.



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UNITED STATES PATENT OFFICE.

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DOOR-OPERATING APPLIANCE.

SPECIFICATION forming part of Letters Patent No. 720,399, dated February 10, 1903.

Application filed February 20, 1902. Serial No. 94,957. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK L. BREWER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Door-Operating Appliances; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to certain new and useful improvements in devices for opening and closing the doors of fire-boxes on locomotives, steam vessels, stationary boilers, and structures of a like character wherein large heating apparatus is used, and is also particularly well adapted to sliding doors.

The object of this device is to provide a mechanism which shall be simple in construction and operation, capable of standing hard usage, one which shall present little liability of derangement of parts, and one from the use whereof a great saving of fuel and labor, as well as the wear and tear on the various parts of the boiler-flues, &c., will result.

To this end the invention consists in an air or steam cylinder containing a piston, a valve controlling the admission of the air or steam to the cylinder, means under control of the operator for opening the valve to admit air or steam to the cylinder, means adapted by the operation of the aforesaid piston to swing the furnace-door open, and mechanism for closing the door.

It will of course be understood that the invention may be susceptible to various changes and modifications as to form, size, and the relative arrangement of the parts without departing from the spirit or sacrificing any of the advantages thereof.

In the drawings like reference-symbols indicate like parts.

Figure 1 is a perspective view showing a furnace having my improvements applied thereto. Fig. 2 is an enlarged detail sectional view through the valve mechanism for controlling the admission and exhaust of pressure with respect to the cylinder. Fig. 3 is a perspective view showing the oscillating cylinder for controlling a furnace-door.

Turning now to the drawings, A indicates the front or head of a boiler of any ordinary and well-known type, either locomotive or stationary, and B indicates the floor or deck upon which the said boiler is placed or mounted. The opening or mouth of the fire-box through which fuel is fed is provided with a door, as at 3, said door being hinged, as at 4, by means of door-hinge rod 5. A crank portion, as at 6, of the rod 5 is connected at one end, preferably the lower, by means of the link 7, with the piston-rod 8 of the piston 9, which moves in the cylinder 10. In my improved form of mechanism, as illustrated in the drawings, I have shown this cylinder fixedly located directly beneath the furnace-door; but it may be secured at any suitable point adjacent to and in proximity with the boiler-head A, and instead of employing a fixed cylinder, as shown, I may make use of an oscillating cylinder. This cylinder is supplied with air or steam for operating the piston 9 therein through the medium of the duct or pipe 11, the admission of the air or steam into said duct or pipe being controlled by a two-way valve of any preferred type.

The valve 25 consists, preferably, of a cylindrical piece or plug vertically movable in a valve-casing 26. The upper end of the valve 25 is enlarged and formed with a valve-surface 27, adapted to engage a valve-seat 28, formed in the upper part of said casing. Pressure is introduced into the valve-casing through a supply-pipe 13, which preferably enters the casing at the upper end thereof. The valve 25 controls a port or passage 29, formed in the walls of the casing 26 and leading to piping 11, which connects the valve-casing with the cylinder 10. The valve 25 is preferably operated by gravity, engaging at its lower end a foot-lever 15, which is fulcrumed upon a suitable support, as at 32, on the floor or other similar support. The valve 25 also controls the exhaust from the piston 10, being provided with an annular groove 33, which when the groove is in its lower or closed position coincides with the passage-way 34, formed in the casing 26, the said passage-way 34 leading to an outlet, as at 24. By placing the foot upon the outer end of the lever 15 and pressing the same the inner end of the lever will be caused to lift the valve 25 from the seat 28 and the inlet-pressure will be per-

mitted to pass through the passage-way 29 to the piping 11 and thence into the cylinder 10. The lifting of the valve 25 also operates to close the exhaust-outlet 34. Upon lifting the foot from the lever 15 the valve 25 will descend of its own weight and become seated upon the valve-seat 28, shutting off the supply of pressure to the cylinder and at the same time opening the exhaust-passage 34 and outlet 24. The pressure through the inlet-pipe 13 being admitted above the valve 25 will tend to hold the same to its seat in addition to the action of gravity.

In order to close the door after it has been opened through the medium of the mechanism above described, I provide a spring, as at 16, which is coiled, as illustrated, around the piston-rod in the cylinder and exerts a force in the direction opposite the movement of the piston when the latter is being operated to open the door. While I have shown the spring as coiled around the piston-rod in the cylinder, it will of course be evident that it may be located in any convenient or desired position.

For the purpose of securely locking the door when closed, to prevent the accidental opening of the same, I provide a latch, as at 17, pivoted to the furnace-front and adapted to engage the handle or lug 18 on the door. Connected to the lever at 19 is a rod 20, adapted when such lever is operated to push the pivoted latch upward and allow the door to be swung open. When the lever is released and the door closes, the latch drops in place and locks the door.

A buffer of any suitable sort, preferably a spring, as shown at 21, is secured to the front of the furnace to prevent the door slamming against such front.

22 is a latch adapted to engage the projection 23 on the furnace-door to hold the same open when it is necessary to clean the furnace or remove the ashes from the grate.

The operation of the device is as follows: On the lever 15 on the floor being depressed by the foot of the operator the two-way valve is actuated, thus opening communication between the source of air or steam supply and the cylinder, pushing the piston in the latter forward, thus operating the door-hinge rod 5 through the medium of the crank portion 6 and the link 7, causing said door to open. After the necessary amount of fuel has been discharged into the fire-box the operator removes his foot from the lever, and the pressure of air or steam on top of the valve closes the latter, and the spring around the piston-rod causes the piston to have a retractive movement in the cylinder. This retractive movement of the piston forces or expels the air from the cylinder through the pipe 11 into the valve-casing, from whence it is exhausted through any suitable means, such as the exhaust duct or pipe 24.

As illustrated in Fig. 3, the cylinder 10 may be pivotally secured to the front of the fire-box, as at 37, so that the said cylinder may oscillate. When thus mounting the cylinder, the connecting-piping 30^a, leading from the valve to the said cylinder, is connected with the said cylinder at its pivotal point, so that the movement of the cylinder will not interfere with the inlet of pressure thereto. The advantage of using an oscillating cylinder accrues from the fact that the piston-rod 10^a of the cylinder may be connected directly with the crank-arm 6 of the door-operating rod 5, doing away with the necessity of a connecting-link 7 and enabling a positive application of the power applied in the cylinder to the said crank 6.

It will be obvious that by the use of my invention very satisfactory results are obtained.

The device is simple and inexpensive and occupies but little space. In many instances the mechanism can be constructed so that the air or steam enters the cylinder through less than one-thirty-second-of-an-inch opening, and by being able to do this it will work when the air or steam pressure has been reduced forty pounds below working pressure, this resulting through the air or steam entering a small cylinder through such a contracted communication or duct. During the last few inches of its travel the resistance of the spring gradually overcomes the pressure of the air upon the piston to such an extent that the door instead of being pushed forcibly against the buffer or spring-stop is cushioned and gradually forced to its outmost position, where it is firmly held by means of the continuous fluid-pressure until the foot is removed from the lever, when, as above described, the air-pressure on top of the valve pushes such valve downward, opening the exhaust-port and allowing the air to pass out through the port, which is made sufficiently small to allow the exhaust air or steam to resist the action of the spring to such a degree as to prevent slamming or forcible closing of the door.

What I claim is—

1. A door-operating mechanism, comprising a power-cylinder connected with the door so as to open and close the same, a piston moving therein, a valve for controlling the admission of pressure to said cylinder, a movable latch for locking the door in its closed position, and a lever for controlling both the latch and the said valve so that the said latch will always be disconnected from the door when pressure is admitted for opening the same, substantially as described.

2. A door opening and closing mechanism, comprising a power-piston connected with the door, a valve for controlling the application of pressure thereto, a gravity-latch for holding the door in its locked position, a foot-lever fulcrumed at a point adjacent to the valve mechanism and connected with the said latch, and said valve, so that the latch and valve will be operated simultaneously when pres-

sure is to be admitted to the cylinder for opening the door, substantially as described.

3. A door opening and closing mechanism, comprising a power-cylinder, a piston moving therein and connected with said door, a gravity-valve for controlling the admission of pressure to the cylinder, a gravity-latch adapted to normally rest upon and engage a part of the door for holding it in its closed position, a rod connecting said latch with a foot-lever, a foot-lever for operating said rod and latch, the said lever also engaging the lower end of the gravity-valve so that when the outer end of the lever is depressed the inner end will be raised beneath the valve for lifting it and at the same time will lift the gravity-catch and unlock the door so that it may be swung open by the power applied in the cylinder, substantially as described.

4. Means for opening and closing doors, comprising a shaft connected with the hinges of the door, a power-piston having a piston-rod moving therein, a crank carried by said shaft and connected directly with the piston in the cylinder, a spring for holding the piston normally in one position, means for introducing a suitable fluid-pressure into the other end of the cylinder when the door is to be opened, means for locking the door in its closed position, a valve for controlling the admission of said fluid-pressure to the cylinder, and means for simultaneously unlocking and operating the valve when the door is to be opened, substantially as described.

5. A door opening and closing mechanism, comprising a crank-shaft secured to the door which is to be operated, an oscillating cylinder pivotally mounted adjacent to the door, a piston operating therein, a piston-rod connected with the piston and pivotally connected with the said crank, means within the cylinder for moving the piston in one direction, and means controlling the inlet of fluid-pressure to the other end of the cylinder for moving the piston in the other direction, the pivotal mounting of the cylinder permitting of the operation of said crank by the piston-rod, substantially as described.

6. In a device of the class described, the combination with a cylinder, pivoted to the front of the furnace in such manner as to permit its oscillation upon said pivot, a piston moving in said cylinder, means connecting the end of the piston-rod with the hinge-rod of the furnace-door, means for conducting the supply of operative fluid to such cylinder and a valve mechanism for controlling such supply, substantially as described.

7. In a device of the class described, the combination with a cylinder, pivoted to the front of the furnace in such manner as to permit its oscillation upon said pivot, a piston moving in said cylinder, means connecting the end of the piston-rod with the hinge-rod of the furnace-door, means for conducting the supply of operative fluid to such cylinder, a valve mechanism for controlling such supply, a depressible trip-lever contacting with and operating such valve against pressure of the fluid for permitting the entrance of the latter into the cylinder, a latch for automatically locking the furnace-door when in its closed position, and vertical movable means actuated by the aforesaid depressible lever for unlocking the door to permit the latter to spring open when the fluid is admitted into the cylinder, substantially as described.

In testimony whereof I hereunto affix my signature in presence of two witnesses.

FREDERICK L. BREWER.

Witnesses:

WILLIAM M. BREWER,

GEORGE E. WISSLER.