No. 722,957. PATENTED MAR. 17, 1903.

C. H. EDDINS & C. BUDDIE.

AIR FEEDING FURNACE DOOR.

APPLICATION FILED MAY 14, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 2.

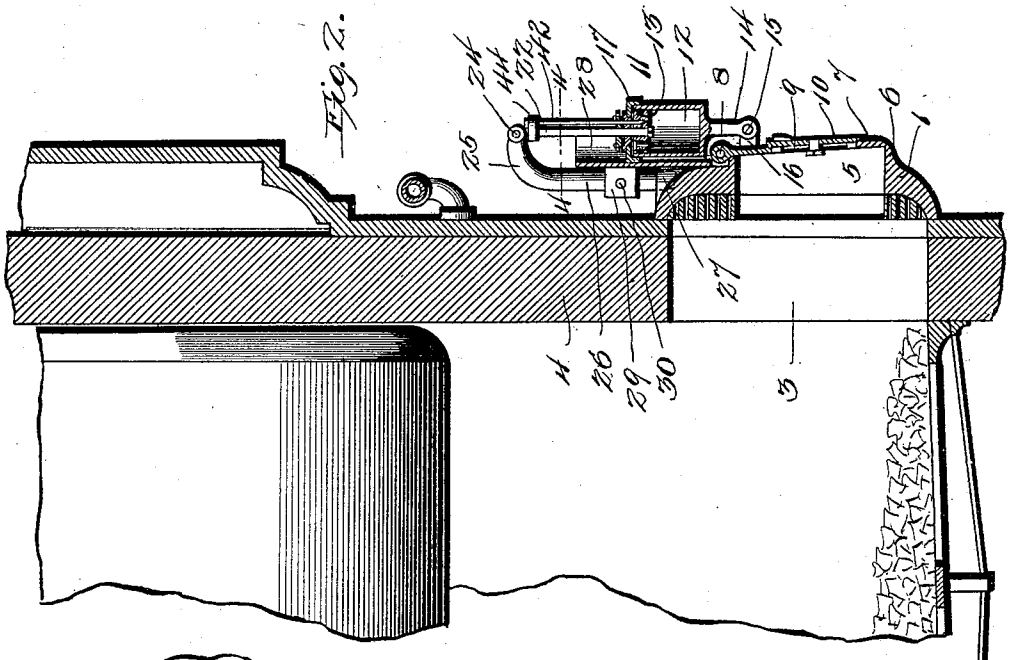
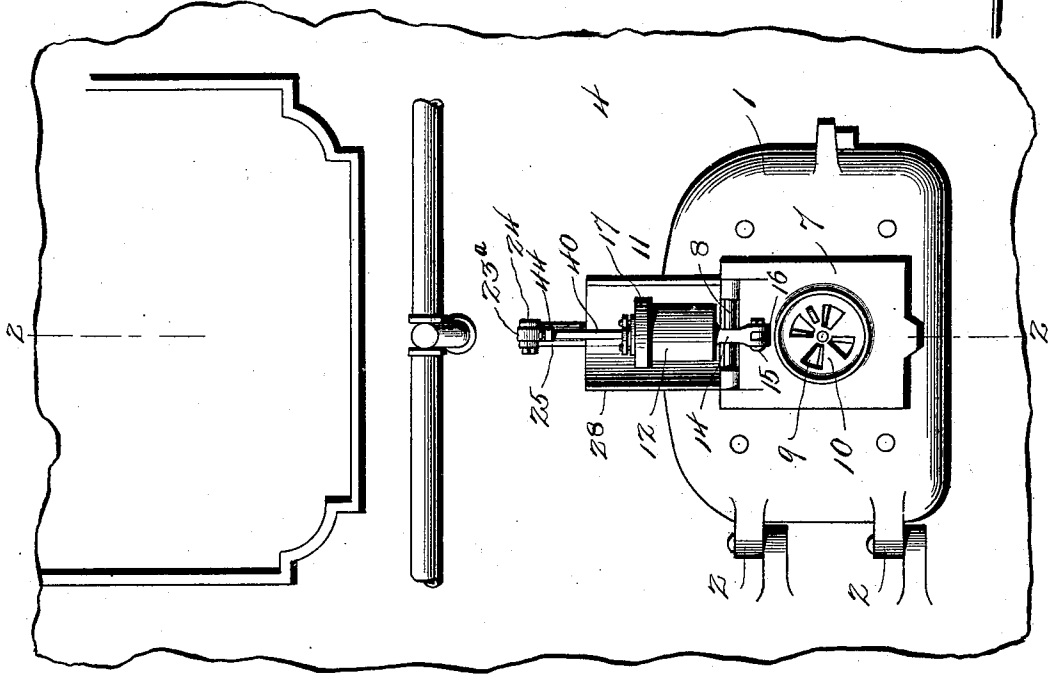


Fig. 1.



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THE NORRIS PETERS CO. PHOTO-LITHO. WASHINGTON, D. C.

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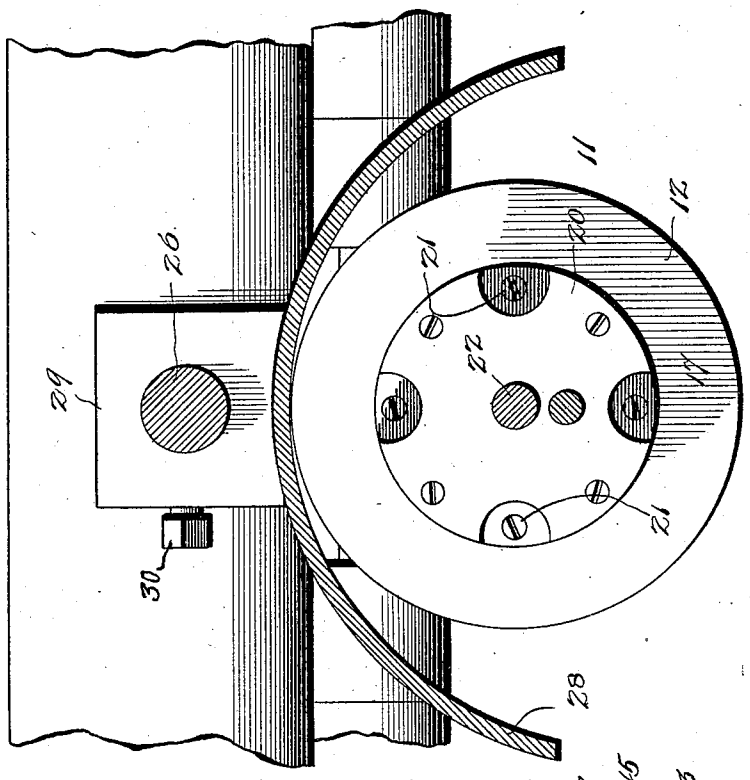
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APPLICATION FILED MAY 14, 1902.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 4.



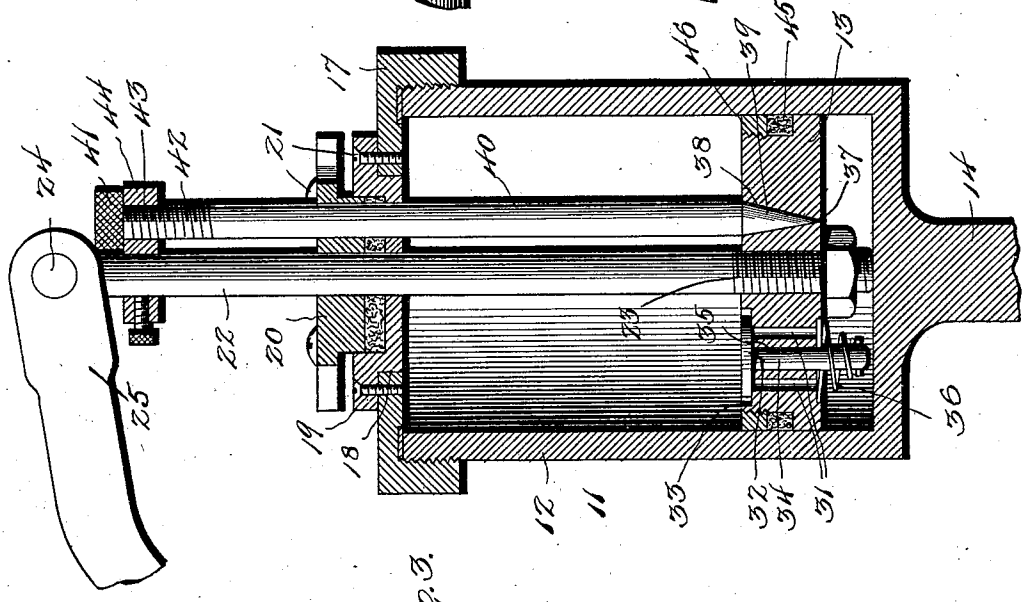


Fig. 3.

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UNITED STATES PATENT OFFICE.

CHARLES HENRY EDDINS AND CLARENCE BUDDIE, OF ST. LOUIS, MISSOURI, ASSIGNORS OF ONE-HALF TO JAMES LAWSON LA PRELLE, OF ST. LOUIS, MISSOURI.

AIR-FEEDING FURNACE-DOOR.

SPECIFICATION forming part of Letters Patent No. 722,957, dated March 17, 1903.

Application filed May 14, 1902. Serial No. 107,215. (No model.)

To all whom it may concern:

Be it known that we, CHARLES HENRY EDDINS and CLARENCE BUDDIE, citizens of the United States, residing at St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Air-Feeding Furnace-Doors, of which the following is a specification.

This invention relates to smoke-consuming furnaces, and has special reference to an improvement of the furnace-door to provide for controlling the feeding of air through such door to the fire, whereby the combustion of the smoke-forming particles is rendered complete, particularly when fresh fuel is put on the fire, thus insuring the consumption as well as the prevention of smoke.

To this end the invention primarily contemplates a fire-door for furnaces comprising in its organization complete means for not only admitting a supply of air through the same to the fire within the fire-pot, but also means for automatically regulating the length or period of time for the admission of such air after the closing of the fire-door itself.

Also the invention has in view a novel construction wherein the furnace or fire door supports and carries the entire equipment or mechanism for controlling and regulating the supply of air through the same.

With these and many other objects in view, which will more readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts, which will be hereinafter more fully described, illustrated, and claimed.

The essential features of the invention involved in the mounting of the complete controlling mechanism upon the fire-door, as well as the provision of means for effecting a regulation in the movement of the air-valve carried by the fire-door, are necessarily susceptible to a variety of modifications from a structural standpoint without departing from the spirit or scope of the invention; but a preferred embodiment of the improvements in the fire-door is shown in the accompanying drawings, in which—

Figure 1 is a general front elevation of a portion of a boiler-furnace equipped with the fire-door embodying the improvements contemplated by the present invention. Fig. 2 is a vertical sectional view on the line 2 2 of Fig. 1, showing the parts of the controlling mechanism in the position which they occupy when the air-valve of the fire-door is closed. Fig. 3 is an enlarged vertical sectional view of the dash-pot controller for the air-valve, showing more plainly the construction of the piston and the elements directly coöperating therewith to effect a regulation in the speed of closing for the air-valve. Fig. 4 is a detail cross-sectional view on the line 4 4 of Fig. 2.

Like numerals of reference designate corresponding parts throughout the several figures of the drawings.

In carrying out the present invention it is to be understood that the improvements embodied in connection with the fire-door may be associated with any suitable type of boiler-furnace and with or without auxiliary smoke preventing or consuming appliances within the furnace. Hence it will be understood that the present invention may be auxiliary to either smoke-consuming appliances or used independently in connection with ordinary styles of furnaces; but irrespective of the particular character of furnace to which the invention is applied the essential features thereof are preserved.

In adapting the invention to a fire-door no special change is required in the construction of this door other than to make suitable provision for the passage of a volume of air through the same into the fire box or chamber. However, for illustrative purposes there is shown in the drawings a furnace fire-door 1 of the usual configuration and hung upon the ordinary hinges 2, so as to cover and uncover the fire-door opening 3 in the front wall 4 of the boiler-furnace. In the present invention the fire-door 1 is provided therein with an air-inlet opening 5, at the outer side of which opening the fire-door body has offset therefrom an inclined seat-flange 6, upon which rests the air-valve 7, which covers and uncovers the opening 5, and hence controls the admission of air through such opening to the fire

box or chamber. While this air-valve 7 may be of any approved type, the same is preferably in the form of a vertically-swinging flap-door hinged at its upper edge by means of a suitable hinge 8 to the outer side of the door-body 1 at the upper edge of the air-inlet opening 5. It is also preferable in the carrying out of the invention to provide the air valve or flap 7 with a plurality of auxiliary inlets 9, controlled by an ordinary perforate register-disk 10, which device is one that is common to furnace-door structures and is employed in the usual way without affecting the general purposes of the present invention.

In connection with the air-valve 7, which covers and uncovers the air-inlet opening 5, there is associated with such air-valve a controlling mechanism comprising means for controlling the speed of closing of the said valve 7 after having been once opened. This air-valve-controlling mechanism includes as an essential and important element thereof a controlling device preferably in the form of a dash-pot, (designated as an entirety by the reference-number 11.) This dash-pot controller 11 essentially consists of a closed cylinder 12 and a piston 13, snugly registering and working therein, and in the preferable arrangement of parts the dash-pot cylinder 12 is provided at one end with a rigid connecting-arm 14, having a pivotal bolt connection 15 with the attaching-lug 16, projected integrally from the outer side of the air valve or door 7, contiguous to the hinged upper end thereof. The dash-pot cylinder 12 is designed to be filled with oil or other liquid serving to retard the movement of the piston 13 and at the open end thereof is preferably covered by a detachably-secured cap 17, having a central stuffing-box opening 18, receiving therein one member of the stuffing-box 19, having the usual gland 20, and detachably fastened to the cap 17 through the medium of the fastening-screws or equivalent devices 21. The stuffing-box 19 receives and slides upon the piston-rod 22, which has an inner bolt end 23, bolted or otherwise rigidly fastened to the piston or piston-head 13, and the outer or upper end of the piston-rod 22 is provided with an eye 23^a, receiving the hanger pivot-bolt 24, fitted in the forwardly-deflected hanger-arm 25 at the upper end of a fixed hanger-bracket 26. This hanger-bracket preferably csnsists of a suitable rod detachably fastened at its lower end, as at 27, in the top edge of the main fire or furnace door 1, although it will be obvious that any suitable connection may be provided between the bracket and the fire-door or the latter provided with any suitable form of permanent bracket which will constitute a support for one of the members of the dash-pot. The said fixed bracket or support 26 may not only constitute a support for one member of the dash-pot or valve-controlling device, but may also be utilized for the support of a vertically-arranged curved protective shield 28, secured to a holding-block 29, mounted upon the said bracket 26 and receiving a binding-screw 30, impinging upon the bracket and serving to sustain the shield properly in its adjusted position. From the drawings it will be observed that the protective shield-plate 28 is held by the bracket in the interval between the latter and the air-valve-controlling mechanism, thus serving to protect the parts of this mechanism from the heat of the furnace, especially when the fire-door is thrown open.

An important part of the present invention resides in the provision of means in connection with the piston 13 for regulating the speed of closing for the air valve or door 7. In the first place, inasmuch as the dash-pot cylinder 12 is entirely closed and there is no circulation for the air or fluid other than from one end of the cylinder to the other, provision must be made for such circulation when the air valve or door is opened and allowed to close, respectively. When said air valve or door is thrown open to entirely uncover the air-inlet opening 5, with the consequence of moving the cylinder 12 upward upon the fixed piston 13, the liquid is permitted to circulate from the under side of the piston to the upper side thereof through the circulating-ports 31, transversely piercing the piston and controlled by a spring-seated check-valve 32. The said spring-seated check-valve 32 normally lies within a valve-recess 33, formed in the upper side of the piston or piston-head and covers the upper ends of the ports 31. The said valve 32 is also provided with a vertically-movable stem 34, working through a guide-opening 35, formed in the piston and carrying upon its lower end beneath the piston a spring 36, which serves to close the valve upon its seat within the recess 33 when the air valve or door 7 has been raised to its fullest height. When the air valve or door 7 is raised to its fullest height and then freed, the same naturally tends to gravitate to its closed position upon the seat 6. Upon such downward movement of the air valve or door the liquid above the piston necessarily holds the check-valve tightly closed, but the same is permitted to escape through a contracted venting-port 37, also piercing transversely the piston or piston-head 13. The contracted venting-port 37 is flared into a needle-valve seat 38, receiving therein a needle-valve point 39, provided at the inner end of an adjustable valve-rod 40. This valve-rod 40, carrying the needle-valve or valve-point 39, also extends through the stuffing-box 19 and exterior to the dash-pot is provided with means for adjustment whereby the needle-valve point may be moved more or less into its seat, and thereby regulate the size of the venting-port 37 according to the speed at which it is desired for the valve or door 7 to close. This adjustment for the valve-rod 40 may be provided in various ways; but a simple expedient is shown in the drawings and simply consists in providing

the valve-rod 40 upon its end exterior to the dash-pot with a finger-knob 41 and also with the exterior threaded portion 42, turning in the threaded opening 43, provided in the stationary nut 44, which may be conveniently secured rigidly to the adjacent piston-rod 22, which is disposed in parallelism with the rod 40. According to the character of the fuel and the conditions of the fire, the needle-valve point 39 is adjusted to control the speed of closing of the air valve or door 7.

In constructing the piston 13 any suitable kind of packing may be employed in connection therewith; but a preferable construction is shown in the drawings, and consists in providing the body of the piston with a peripheral rabbeted portion receiving a packing-ring 45 and a clamping-ring 46, bearing thereon and arranged flush with the periphery of the main body of the piston. This detail of course can be varied without affecting the invention. It will also be understood that various changes in the form, proportion, and minor details of construction may be resorted to without departing from the spirit of the invention or sacrificing any of the advantages thereof.

Having thus described the invention, what is claimed, and desired to be secured by Letters Patent, is—

1. In a furnace, the fire-door having an air-inlet opening, an air-valve arranged to cover and uncover said opening, and a dash-pot device having an operative connection with the air-valve, said dash-pot device being provided with a piston having a check-valve for controlling the movement of fluid in one direction, and also having an independent venting-port, and a regulating-valve for such venting-port having exterior operating means.

2. In a furnace, the fire-door having an air-inlet opening, an air-valve arranged to cover and uncover the said opening, and a valve-controlling mechanism including a dash-pot device having operative connection with the air-valve, said dash-pot being provided with a piston having a spring-seated check-valve for controlling the movement of fluid in one direction, and also having a needle-valve, independent of the piston-rod, for varying the flow of fluid in the other direction.

3. In a furnace, the fire-door having an air-inlet opening, an air-valve arranged to cover and uncover the opening, a hanger-bracket carried by the door, a closed dash-pot cylinder having an operative connection at one end with the air-valve, and a stuffing-box closure at its opposite end, the piston arranged within the cylinder and provided at different points respectively with a spring-seated check-valve, and also with a contracted venting-port, a piston-rod having its inner end connected with the piston and its outer end connected with said bracket, and a separate valve-rod arranged alongside of the piston-rod and having at its inner end a needle-valve point working in said venting-port and at its outer end provided with operating means.

4. In a furnace, the fire-door having an air-inlet opening, an air-valve arranged to cover and uncover said opening, a fixed hanger-bracket mounted upon the door, a closed dash-pot cylinder having pivotal connection at one end with the air-valve and a stuffing-box closure at its opposite end, a piston arranged within the cylinder and provided at different points respectively with a spring-seated check-valve and also with a contracted venting-port, a piston-rod having its inner end connected with the piston and its outer end pivotally connected with the said bracket, a laterally-offset nut rigidly fitted to the exterior portion of the piston-rod, and a valve-rod having at its outer end an operating-knob and contiguous to the latter a threaded portion engaging said nut, the inner end of the valve-rod being provided with a needle-valve point working in said venting-port.

5. In a furnace, the fire-door having an air-inlet opening, an air-valve for said opening, a support carried by the door, air-valve-controlling mechanism connected with said support, and a shield interposed between the air-valve-controlling mechanism and the adjacent side of the door, said shield having adjustable connection with the said support.

In testimony whereof we affix our signatures in presence of two witnesses.

CHARLES HENRY EDDINS.
CLARENCE BUDDIE.

Witnesses:
JAMES B. THOMAS,
H. D. WORTHAM.